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Table 11.8: Operation & Maintenance Cost for Composting Facility

S. No.	Description	For 200 TPD (Rs. Lakhs)	For 300 TPD (Rs. Lakhs)
1	Manpower	29.10	31.59
2	Cost of services & Inputs	111.34	142.11
3	Plant Machinery & Equipment	36.00	39.15
	Total	176.44	212.85

Table 11.9: Cost of Sanitary Landfill

S. No.	Particulars	Amount (Rs Lakhs)
1	Civil Works	358.60
2	Plant Machinery & Equipment	128.58
	Total	487.18

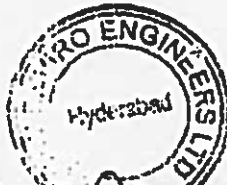
Table 11.10: Operation & Maintenance Cost for Landfill

S. No.	Description	Amount (in Rs. Lakhs)
1	Manpower	20.52
2	Cost of services & inputs	264.79
	Total	285.31

Since the SLF shall be developed in phases on annual basis, the cost of liner, leachate collection pipes etc. would be recurring in nature and thus have been taken as part of operation & Maintenance.

11.4 COMMON FACILITY

Since an integrated facility is being proposed at a common site, some elements (vehicle parking, administrative block, administrative staff, weighbridge etc.) have been considered common to both Compost Plant & SLF and the cost for the same is given below:



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Table 11.11: Common Cost to both Compost Plant & SLF

S. No.	Particulars	Amount (Rs. Lakhs)
1	Civil Works	53.26
2	Plant Machinery & Equipment	31.00
	Total	84.26

The O&M for such facility is estimated at Rs. 1.70 Lakhs per annum. Apart from the above certain costs would have to be incurred by the GMC

Table 11.12: Other Cost

S. No.	Particulars	Amount (Rs Lakhs)
1	Awareness and Training	20.00
2	Preoperative cost including office establishment, consultancy fees for preparation of tender documents, legal vetting of contracts, etc.	10.00
3	Capacity Building & MIS	30.00
4	Further Studies	40.00
	Total	100.00

11.5 TOTAL PROJECT COST

In view of the above and after considering interest during construction period and providing for contingencies, the total cost of the project would work out to be Rs 5167.02 lakhs as summarized below:

Table 11.13: Summary of Total Project Cost

S. No.	Particulars	Amount (Rs. Lakhs)
1	Collection & Transportation	593.9
2	Site Development for Phase I (including road access)	2819.46
3	Composting Facility	854.88
4	Sanitary Landfill	487.18
5	Common Facilities	84.26
6	Interest during construction	43.82
7	Margin Money for working capital	58.0
8	Contingencies	71.32
9	Resource Mobilization	22.43
10	Pre-operative cost	132.35
	Total	5167.02

The details of cost estimations and operation & maintenance costs have been presented in Annexure 11.1

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CHAPTER - 12 IMPLEMENTATION AND FINANCING OF THE PROJECT

12.1 IMPLEMENTATION STRATEGY

The SWM project is conceptualized keeping in view the way of life of the citizens and their aspirations to see their city clean. The implementation strategy and institutional framework will have to be such that it is sustainable in the long run and meets the following requirements:

- Ensuring efficiency in implementation and accountability for outcomes through appropriate contractual and performance measures
- Efficient raising, allocating, deploying and servicing financial resources deployed in the project
- Forging formal links among the community driven approach, the proposed institutional model and State and Local Government's administrative apparatus
- Generating internal and external ownership of the project

The implementation strategy for an efficient and integrated SWM system of Guwahati has been designed keeping into consideration several factors like the cultural, political and demographic profile of the region, existing set up, funding requirements, pay back capacity etc.

12.2 INTEGRATED WASTE MANAGEMENT

The term 'integrated waste management' refers to the complementary use of a variety of waste management practices for safe and effective handling of the MSW stream with the least adverse impact on human health and the environment.

Main components of an integrated waste management system are as follows:

- Adequate primary and secondary collection system.
- Suitable transportation mechanism from the collection points to the disposal locations
- Waste Processing system
- Final disposal of the rejects from the processing facility

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In integrated waste management, all the elements work together to form one complete system for proper management of municipal waste. The integrated waste management system has to be designed consistent with the demographic profile and waste stream characteristics of the town.

For integrated waste management system to succeed, it is best that all the elements of the system are handled by a minimum number of entities with well-defined objectives. The delivery capacities of these entities also need to be assessed carefully. Study of the experiences of other towns in the country where several entities have been handling different elements of the SWM system indicate that there have been instances of disputes, co-ordination problems, blame passing etc. affecting the overall efficiency of the system; sometimes even leading to break-down of the system in whole or in parts.

In view of the above, the consultants have suggested an *Integrated System for Management of Solid Waste for the Guwahati City*. Attempts have been made to utilize the existing infrastructure of GMC and integrate the same to the suggested system to the extent possible.

12.3 FINANCIAL ANALYSIS OF THE PROJECT

GMC has provided 24.12 ha of land in the Baragaon area for the development of integrated facility. As already explained earlier in this report, this land is prone to flooding and therefore, needs to be protected with retaining walls and soil filling up to 8m above existing ground level. Such type of soil filled lands cannot sustain heavy structures as they could lead to land subsidence. The process of composting does not involve construction of heavy structures or heavy duty operations therefore this technology would be suitable option for waste processing in comparison to other methods.

Based on the waste characteristics, it is also observed that Guwahati waste is reasonable for waste to energy option through biomethanation. However, if power is to be generated, the turbine-generators used in this process are heavy and prone to vibrations; therefore this process may not be suitable for this land. If this option is to be considered, a separate land suitable for turbine foundation needs to be identified.

Based on the waste quantity and characteristics, and the land that has been made available for the waste processing facility, the proposed Integrated Municipal Solid Waste Management System has been divided into the following three components:

- Collection and Transportation of MSW
- Compost Plant (in two phases comprising of 200 TPD capacity plant in the first year and 300 TPD plant in the eleventh year).
- Sanitary Landfill



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The total investment required for establishing an integrated facility is estimated to be Rs 5167.02 Lakhs for Phase-I. This cost will be partially funded through the Grant from JNNURM or any other agency and rest by the operator. Table 12.1 shows various cost components of the project for the first phase excluding the cost for site development.

Table 12.1: Cost for various components of the Project

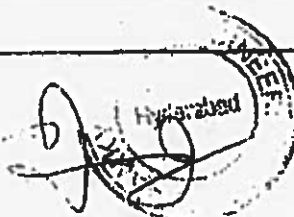
S. No.	Particulars	Amount (Rs. Lakhs)
1	Collection & Transportation (Primary & Secondary)	593.31
2	Composting Facility (200 TPD-Phase-I)	854.88
3	Sanitary Landfill	487.18
4	Common Facilities (weighbridge, parking, office block etc.)	84.26
4	Pre-operative cost	132.35
5	Interest during construction	43.82
6	Margin Money for working capital	58.00
7	Resource Mobilisation Cost	22.43
8.	Contingencies	71.32
	Total	2347.53

As already discussed in Chapter-7, the proposed site that has been allocated for the integrated waste management facility is within the flood plains and gets flooded every year. To ensure that the wastes do not get washed away due to flood and for the safety of the compost plant and the landfill area, the area is to be raised above the flood level by 8 m. The cost for site development for compost plant has been divided into two parts. First part is development of compost plant of 200 TPD capacity in the first year of the project. In the eleventh year, another additional compost plant of 300 TPD capacity would be installed to meet the requirements of waste processing due to increase in the waste generation. In the present model, capital investment for the 300 TPD compost plant has been considered in the eleventh year of the project. The cost of the compost plant for phase II has been calculated at the present value (2006). However, the cost at present value has been increased at the rate of 5% compounded annually and accordingly incorporated in the model.

The cost for the additional 300 TPD plant at current price levels is given in the table below:

S. No.	Description	Total Cost (Rs. Lakhs)
A.	Capital Cost:	
1.	Compost Facility (Base cost)	1016.98
2.	Pre-operative Cost	69.39
3.	Resource Mobilization Cost	25.42
4.	Interest During Construction Period	74.21
5.	Contingencies	50.83
	Total	1236.86
B.	Operational and Maintenance Cost	181.26
C.	Manpower Cost	31.59
	Total	212.85

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Summary of the cost for site development is presented in the Table 12.2.

Table 12.2: Cost for Site Development

S. No.	Description	(In Rs Lakhs)
(A) Sanitary Landfill		Total Cost
1	Retaining Wall (8 m high)	
2	Bottom filling (2m)	785.52
(B) Composting- 200 TPD (Ph-I)		791.99
1	Filling up to 8 m	
(C)	Access Road (8 m wide)	789.23
		452.73
Grand Total (A) +(B) + (C)		2,819.47
(D)	Composting- 300 TPD (Ph-II) to be arranged at the 9 th year of the project	949.63

Grant Funding for Site Development

Since Guwahati does not have a suitable land, and the land that has been provided for the MSW facility needs to be raised to avoid floods, the site development cost for the project is substantial and is about 50% of the total project cost. For a project of this nature, support of GOA is essential. One of the essential components of the integrated system is provision of sanitary landfill. Landfill, though an essential part of the MSW system, is considered as an additional investment burden leading to increase in the overall cost of the project. The Operator would not be willing to invest for this purpose and would normally expect the GOA to provide a developed landfill site for disposal of waste. In view of this, it is suggested that GOA could provide funding support towards cost (as grant funding) of Site development. The responsibility of operations of landfill would however remain with the Operator.

This would be the first private sector initiative of completely integrated SWM project in the country and it can serve as a model for future investments in the sector. GOA participation could be considered through funding by Department of North Eastern region (DONER); North Eastern Council (NEC); North Eastern Development Finance Corporation Limited (NEDFI); Jawaharal Nehru National Urban Renewal Mission (JNNURM), to the tune of about Rs. 2819.47 Lakhs for site development and about 949.63 Lakhs for the capital investment for collection and transportation of MSW.

It is also desirable that for the success of the project, the Capital expenses for the construction of the land fill comprising of the cost of the first year's liner, and equipments be financed as a grant funding which will be to the tune of about Rs. 529.30 Lakhs (Rs.487.18 Lakhs of base cost and Rs. 42.13 lakhs of Common Facilities). Thus, a total 3942.08 Lakhs as grant funding would be required. The total capital outlay to be borne by the Operator of the integrated facility would be in the vicinity of Rs 1224.93 Lakhs.

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In addition to this, funding of Rs. 949.63 Lakhs will be required in the 9th year of the project for meeting the cost of site development for 300 TPD Compost Plant in Phase II. This estimate of Rs 949.63 Lakhs is based on the current price levels and the exact funding required can be calculated at the time of site development for Phase II of composting.

Once the grant funding is arranged, the private sector could bring the required finances under Public Private Partnership (PPP) format where GMC could also be an equity holder.

As already mentioned, in the case of Primary Collection and transportation of waste from the generator's locations to the collection points, GMC would bear the entire capital cost required for the procurement of the vehicles (tricycles, loaders, trucks etc.); bins; containers etc. The task of Primary and Secondary Collection & Transportation; operation of the Sanitary Landfill & setting up of the Compost plant and its operation is proposed to be awarded to a single Operator under the PPP frame work. The allocation of operations between GMC and private operators is given in the attached flow sheet (Figure 12.1).

The life of the designated landfill site has been estimated to be 20 years. However, due to introduction of a 300 TPD capacity compost plant in the eleventh year and assuming its optimum operational period to be 20 years, the financial analysis of the proposed scheme has been carried out for 30 years. This implies that an additional land would be required for landfill after 20 years for the disposal of rejects and other inerts.)

While carrying out the financial analysis for the proposed implementation scheme, the following Cost estimates & Assumptions have been considered:

(A) Capital Costs:

Particulars	(in Rs. Lakhs)		
	Sec. Collection & Transportation	Sanitary Landfill	Composting
Base Capital cost	The capital outlay for the Collection and Transportation as well as Construction cost of Sanitary landfill in the first year is to be provided through the Funding Route		854.88
Apportioned Cost of Common Facilities*			42.13
Other apportioned Pre-operative costs (Inclusive of costs of Interest during construction period, contingencies etc.)	39.83	83.70	146.39
Total	39.83	83.70	1043.40

* Vehicle parking, administrative block, weighbridge etc. are common to both Compost Plant & SLP. Margin money for working capital has been taken as Rs.58.00 Lakhs and is considered as part of total capital to be invested. Thus the total capital investment to be arranged by the operator would be Rs. 1224.93 Lakhs.

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(B) Operation & Maintenance Cost:

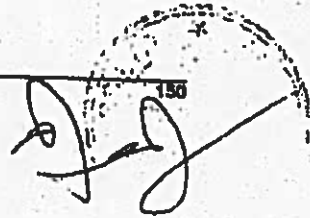
(in Rs. Lakhs)

Particulars	Primary Collection	Sec. Collection & Transportation	Sanitary Landfill	Composting
Manpower		41.88	20.52	29.10
Cost of Services & Inputs	500.91	113.67	248.75	111.34
Plant Machinery & Equipment		43.62	16.88	36.00
Total	600.93	199.17	286.15	176.44
Cost/Ton (In Rs.)	547.98	181.62	305.64	1050.88

Assumptions:

- For Sanitary Landfill the total volume of waste expected to be disposed over the 20 year period is 22,00,000 tons.
- **Composting (Ph-I):**
 - i. Plant capacity is designed at 200 TPD
 - ii. The compost yield is taken as 23%.
 - iii. Number of working days have been assumed to be 365 days.
 - iv. Expected production of compost per annum is taken as 16790 tons.
 - v. Sale Price of Compost has been assumed to be Rs. 2700/- compounded at 5% annually
 - vi. % of Compost sold is taken as 100%.
- **Composting (Ph-II):**
 - i. Plant capacity is designed at 300 TPD
 - ii. The cost of the plant has been estimated based on the present value of the money (i.e in the current year 2006-07). The cost is modified for the 11 th year of the project by increasing it at the rate of 5% per annum in the compounded manner.
 - iii. The compost yield is taken as 23%.
 - iv. No. of working days have been assumed to be 365days.
 - v. Expected production per annum is taken as 41975 tons for both the plants combined.
 - vi. Sale Price of Compost has been assumed to be Rs. 2700 compounded at 5% annually

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vii. % of Compost sold is taken as 100%.

• **Secondary Collection & Transportation:**

i. 90% collection efficiency has been considered. Total waste estimated to be collected over the 20 year period would be 37,99,000 tons.

ii. Escalations : Transportation fee has been taken as Rs. 150 per ton

• **On Annual basis**

i. Cost: 5%

ii. Revenue: 5%

iii. Equipment Prices: 5%

• **Funding Plan for Private Operator:**

(in Rs. Lakhs)

	%	Sec. Collection & Transportation	Sanitary Landfill	Composting
Total Investment Required		39.83 Pre-operative Expenses	613.00	1043.40
Capital Subsidy			529.3	0.00
Debt	70%	27.88	58.59	730.38
Equity	30%	11.95	25.11	313.02

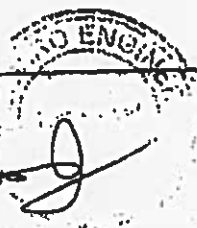
In addition margin money for working capital would also be brought in the same ratio. Thus the total debt brought in would be Rs. 857.45 lakhs. Equity investment would be to the tune of Rs.367.48Lakhs.

- Term of Debt: 9 years with 1 year moratorium and interest cost at 12% per annum on reducing balance method.
- The life of capital assets have been taken at 20 years.
- Plant, Equipment & machinery have been augmented for compost plants on the basis of following assumptions:

	After 10 Years of operation.	After 20 years of operation
200TPD	30% of the base capital cost compounded at 5 %	50 % of the base capital cost compounded at 5 %
300TPD	30% of the base capital cost compounded at 5 %	

The civil structure has been depreciated fully in case of 200 TPD but no replacement is considered necessary as it is expected to outlast the whole project life.

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- ❖ CDM benefits have been taken for 10 years at the rate of Rs 0.4 Lakhs per ton per day per annum. This yields an annual accrual of Rs. 80 lakhs for a 200 TPD plant.

For analysis with & without CDM Benefits the following revenue streams have been adopted.

Proposed Price of Compost per ton (in Rs.)	2700
Transportation Fee per ton (in Rs.)	150
Tipping Fee per ton (in Rs.)	100
Collection Charges (Primury)	550

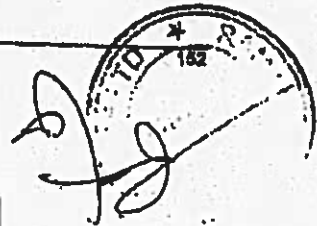
- ❖ The reason for adopting the afore-given revenue stream is that it reduces the gestation period of the project to 3-4 years. The Operator is able to generate profits from 4th year onwards if the CDM benefits are not available. If CDM benefits are available then the Operator is able to generate profits from the 3rd year itself.
- ❖ By adopting an integrated approach to MSW management it is observed that the tipping fee to be paid by GMC is considerably reduced to Rs. 100 per ton resulting in an outflow of about Rs. 93 Lakhs in first year. The transportation fee that GMC will have to pay as per the proposed system would be about Rs 150 per Ton which is far below the amount GMC is currently paying. The operator will be able to subsidize the transportation and landfill operational costs through sale of compost at Rs. 2700 per ton and by collecting user charges on primary collection of wastes.

By adopting the proposed system of integrated SWM, the reduction in the expenditure of GMC for the SWM will reduce substantially. GMC can also be a stake holder in the SPV and that will provide additional benefit in terms of inflow if income through the operation of the SPV.

❖ Clean Development Mechanism (CDM)

CDM is one of the three flexibility mechanisms under the Kyoto Protocol that enable developing countries to assist developed countries in meeting their Green House Gas (GHG) emission reduction targets. The GHG benefits of each CDM project are measured based on internationally agreed methods and are quantified in terms of "Carbon Emission reductions" (CERs). CER is expressed in tonnes of CO₂ emissions avoided (1 ton of CO₂ is equivalent to one CER). Other GHGs like methane is also converted into CO₂ equivalent (1 tonne of methane is equivalent to twenty one tonnes of CO₂).

Composting which forms a major part of the technological solution for processing of waste for Guwahati is eligible for CDM benefits. As per the Dhaka Methodology, NM0090, credit is provided for only about 20-35% of the total emission reductions achieved by a composting plant, depending on the duration and renewal of the crediting period. This is very conservative, especially if compared to other methodologies such as AM0012 (Lucknow), which provides credit for the full methane generation potential of the treated waste. Composting projects also reduce demand for chemical N-fertilizers and associated N₂O emissions. In this sense, the conservativeness of NM0090 seems double surprising. Our intention is to have composting get the full credits, develop the



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methodology and get it approved. This should significantly enhance the profitability of the composting operations and in turn lower the tipping fees. Brief Note on CDM benefits is given in Annexure 12.1

12.4 FUNDING BY PRIVATE OPERATION

The Operator would be responsible to bring in the required investment for implementation of the project. The Operator would arrange for the funds through a mix of equity and debt.

12.5 INVOLVEMENT OF PRIVATE SECTOR

A number of cities in India are experimenting with various arrangements to introduce private sector in the management of solid waste. The term 'private sector' is used here in its broadest sense, to include local private enterprise, community based organizations (CBOs), and large integrated service providers.

The involvement of private sector offers following benefits:

- Increased level of efficiency
- Reduction in overall cost
- Improved service level
- Professional management
- Transparency and accountability
- Raising financial resources

There is a strong case for involving private sector for SWM in Guwahati considering the benefits that could accrue as enumerated above.

Public Private Partnerships (PPP)

It is proposed to award a contract to an Operator for providing integrated SWM system for Guwahati on Built Own and Operate (BOO) format.

- The critical aspect of the BOO framework is the ability to allocate responsibilities and risks through contracts. Each leg of the framework enables allocation on the basis of agreed responsibility and in the process provides a transparent and contractually effective mechanism to undertake project implementation and operation and maintenance within a PPP framework.
- The SWM project for Guwahati has to conform to public desires and aspirations and comply with the provisions of MSW Rules, 2000. Such requirements however, are difficult to be fulfilled within a short period of time unless the project is fully supported by the municipality and other government agencies. Accordingly, a pre-requisite for the sustainability of the project

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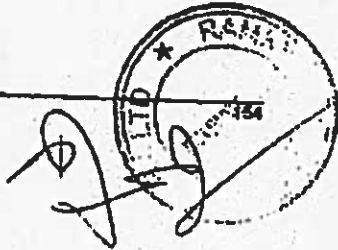
would be PPP framework. As per this framework, GMC would have to work closely as partner with the private sector, in developing and implementing the SWM project.

The proposed PPP framework for MSWM implementation in Guwahati is shown in Figure 12.2.

12.6 CONTRACTUAL FRAMEWORK

It is proposed that GMC and other stake holders form a SPV for the management of the MSW of Guwahati city and award the Concession to an Operator for providing integrated SWM services. The Operator would be responsible for the collection, transportation, processing and disposal of the waste. GMC would enter into a Concession Agreement (CA) with the Operator winning the bid. CA would specify roles and obligations of the parties, tenor, financial terms, performance criteria, default clauses and remedial measures. The expenditure of the operation would be recovered from the generators, sale of compost and from GMC. Since the whole operation will be undertaken by an Operator, GMC will not have any liability for providing any manpower for the whole operation.

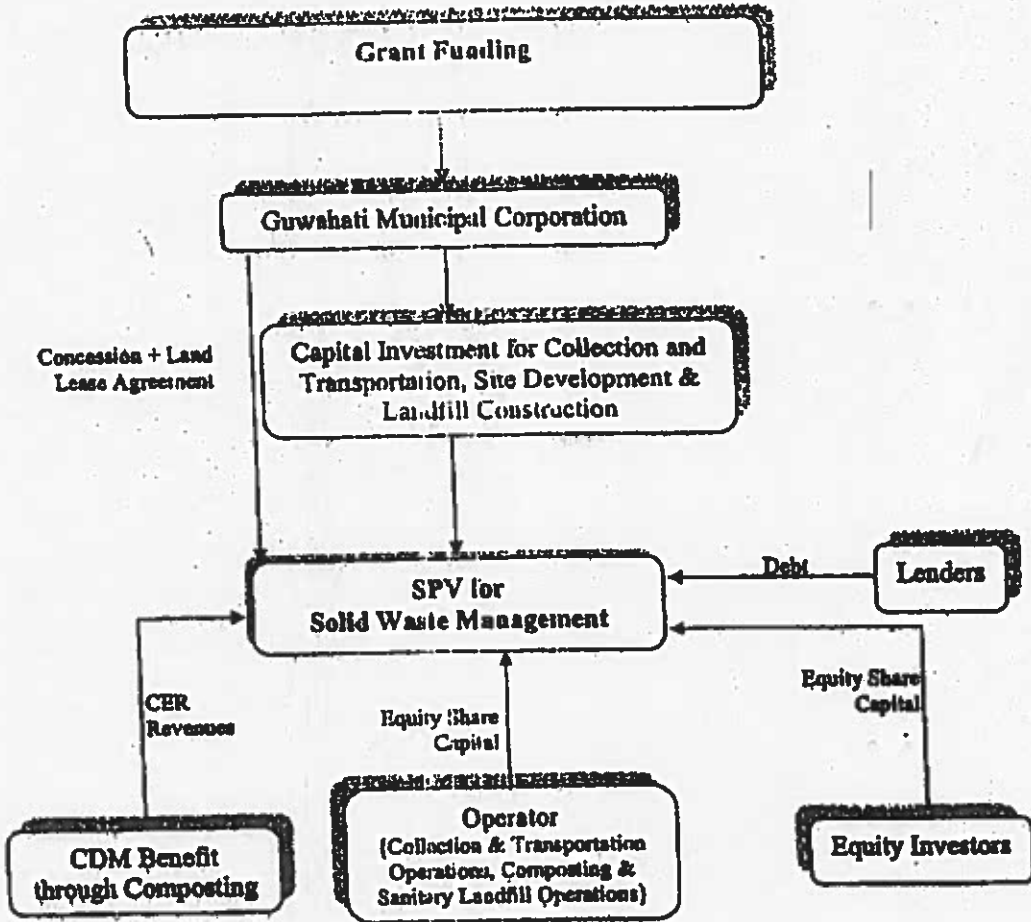
The operational framework for the Integrated SWM operation is depicted in Figure 12.2.



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Figure 12.2: PPP Framework for MSW Management Implementation Plan for Guwahati



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**CHAPTER - 13
ENVIRONMENTAL
MONITORING PLAN**

13.1 INTRODUCTION

In order to ensure the optimal performance of the landfill site, checking the environmental pollution and complying with the regulatory requirements is essential. The following environmental parameters shall be monitored on a regular basis.

- Quality of Leachate after Treatment
- Surface Water Quality
- Ground Waste Quality
- Quantity and Quality of Gas Generated
- Ambient Air Quality

The above parameters shall be monitored as per the Municipal Solid Waste (Management and Handling) Rules, 2000

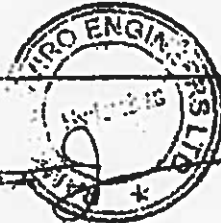
13.2 SAMPLING FOR ENVIRONMENTAL MONITORING

The number of samples and location specifications for monitoring are presented in Table 13.1.

Table 13.1 Sampling Specifications for Environmental Monitoring

Description	Sampling Specifications
Quality of Leachate after Treatment	One grab Sample at out let of the treatment plant every month
Surface Water Quality	One grab sample at up stream side and one grab sample at down stream side for water bodies near the landfill site every month
Ground Waste Quality	One sample at upstream side and three samples at down stream side of the landfill site every month
Quantity and Quality of Gas Generated	24 hours continuous stack monitoring at selected vent every month
Ambient Air Quality	48 hours continuous ambient air quality monitoring at one location in upwind and three locations in downwind directions every month

Source MSW (Management and Handling) Rules, 2000



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13.3 DISPOSAL STANDARDS FOR LEACHATE

The leachate quality after treatment should also meet the MSW Rule, 2000 and presented in Table 13.2.

Table 13.2 Disposal Standards for Treated Leachate

S. No	Parameter	Standards (Mode of Disposal)		
		Inland Surface Water	Public Sewers	Land Disposal
1	Suspended solids, mg/l, Max	100	600	200
2	Dissolved solids (inorganic) mg/l	2100	2100	2100
3	pH	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical nitrogen (as N), mg/l	50	50	-
5	Total Kjeldahl nitrogen as N, mg/l	100	-	-
6	BOD in mg/l (3 days @ 27°C)	30	350	100
7	Chemical oxygen demand, mg/l	250	-	-
8	Arsenic (as As), mg/l max	0.2	0.2	0.2
9	Mercury (as Hg) mg/l, max	0.01	0.01	-
10	Lead (as Pb), mg/l, max	0.1	1.0	-
11	Cadmium (as Cd) mg/l max	2.0	1.0	-
12	Total chromium as Cr, mg/l	2.0	2.0	-
13	Copper as Cu, mg/l	3.0	3.0	-
14	Zinc A as Zn, mg/l	5.0	15	-
15	Nickel as Ni, mg/l	3.0	3.0	-
16	Cyanide as CN, mg/l	0.2	2.0	0.2
17	Chloride as Cl, mg/l	1000	1000	600
18	Fluoride as F, mg/l	2.0	1.5	-
19	Phenolic compounds (C ₆ H ₅ OH) mg/l	1.0	5.0	-

Source MSW (Management and Handling) Rules, 2000

13.4 GROUND WATER QUALITY

The groundwater quality within 50 m of the periphery of landfill site shall be periodically (as presented in table 13.1) monitored to ensure that the groundwater is not contaminated beyond acceptable limits as decided by the Ground Water Board or the State Board or the Committee. Usage of ground water in and around the landfill site for any purpose (including drinking and irrigation) is to be considered after ensuring its quality. The monitoring results of surface and ground water quality shall meet the drinking water quality standards as presented in Table 13.3.

Table 13.3 Water Quality Standards for Surface and Ground Water Quality Monitoring

S. No.	Parameter	IS 10500: 1991 Desirable Limit
1	Arsenic, mg/l	0.05
2	Cadmium (as Cd) mg/l	0.01
3	Chromium, mg/l	0.05
4	Copper as Cu, mg/l	0.05

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S. No.	Parameter	IS 10500: 1991 Desirable Limit
5	Cyanide as CN, mg/l	0.05
6	Lead (as Pb), mg/l	0.05
7	Mercury (as Hg) m ⁻¹	0.001
8	Nickel as Ni, mg/l	-
9	Nitrate as NO ₃ , mg/l	45
10	pH	6.5 - 8.5
11	Iron, mg/l	0.3
12	Total Hardness (as CaCO ₃), mg/l	300
13	Chloride as Cl, mg/l	250
14	Dissolved solids, mg/l	500
15	Phenolic compounds (as C ₆ H ₅ OH), mg/l	0.001
16	Zinc A as Zn, mg/l	5
17	Sulphate (as SO ₄), mg/l	200

Source MSW (Management and Handling) Rules, 2000

Ambient air quality at the landfill site and at the vicinity shall be monitored (as presented in table 13.1) to meet the prescribed standards as presented in Table 13.4.

Table 13.4: Ambient Air Quality Standards

S. No	Parameters	Acceptable Levels
1.	Sulfur dioxide	120 µg/m ³ (24 hours)
2.	Suspended particulate matter	500 µg/m ³ (24 hours)
3.	Methane	≤ 25 % of the lower explosive limit (650 mg/m ³)
4.	Ammonia (24 hour average)	0.4 mg/m ³ (400 µg/m ³)
5.	Carbon Monoxide	1 hour average: 2 mg/m ³ 8 hour average: 1 mg/m ³

Source MSW (Management and Handling) Rules, 2000

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CHAPTER - 14 COMMUNITY PARTICIPATION AND ENVIRONMENTAL EDUCATION

14.1 INTRODUCTION

Management of solid waste and its effectiveness is primarily dependent on the attitude, co-operation and participation of the local community. People in all walks of their day-to-day activities generate waste, which however, can be collected by the local body only once or maximum twice in a day. In the present setup, the waste is thrown on the streets or open collection points, leading to unhygienic conditions in the city. It is difficult for GMC to collect all the stray litter in a systematic and regular manner.

The other critical aspect of waste management is the location of waste management facilities such as dumper bins or the disposal site. There have been number of cases where in the community has objected to the location of these facilities in their neighbourhood. Popularly known as 'Not in My Back Yard (NIMBY) Syndrome', it is the general perception of the public that location of any of these solid waste facilities will create problems of health and hygiene.



To make implementation of any solid waste management plan successful, effective co-operation and co-ordination of the local community in various aspects of waste collection, transportation and disposal is essential.

Several cases in various parts of the country viz. Exnora in Chennai, ALM System in Mumbai, Muskan Jyoti Samiti in Lucknow, DWCUA groups in Hyderabad and Vijayawada all accentuate the fact that effective participation by the community can ensure a successful waste management system in the city.

Sections below discuss the several aspects of community participation that could complement the efforts of the local body in improving the solid waste management practices in the city.

Several rounds of discussions with various sections of people were held on the need for public participation and cooperation for the municipal activities with specific reference to SWM in Guwahati. The feedback of the community was mixed. Some groups were ready to participate where as the majority was totally



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dissatisfied with the past performance of GMC and felt helpless. Such attitude of majority of the population makes the management of the MSW with public participation and cooperation even more difficult. It is felt that a significant effort is required to induce the public to support the efforts of GMC on the management of the MSW.

14.2 CURRENT LEVEL OF COMMUNITY PARTICIPATION

There are practically no NGOs operating in the city in the area of solid waste management, health and sanitation and welfare of ragpickers. It is, however, significant to note that, the level of understanding of the community on sanitation issues is good. This is depicted by the successful operation of house-to-house waste collection in the Uzan Bazar and Ullubari localities and also observations during the quantity and quality estimate surveys by the consultants. There are some efforts also going on for plastic recycling and reuse and conducting training programmes. Thus it can be concluded that the mobilisation of the community and educating them on SWM issues may be difficult but not an impossible task. The modalities of educating the community are discussed below.

14.3 MODALITIES OF COMMUNITY EDUCATION AND PARTICIPATION

The steps involved in implementing and ensuring community participation will comprise of the following sub-activities

- Identification of Resident Associations (RAs) and formation of Resident's Welfare Committees (RWCs)
- Identification and mobilisation of Non-Governmental Organisations or other social welfare groups in the city
- Identification of areas of SWM where community participation is elicited
- Orient the RAs, RWCs, key personalities, social activists, politicians and local corporators towards environmental education and solid waste management
- conduct sanitation campaigns in various parts of the city emphasising on areas where their co-operation / participation is sought
- carry out mass media campaigns on various aspects of solid waste management

14.3.1 Identification and Orientation of Resident's Welfare Committees

Resident's Welfare Committee (RWC) is basically a group of people from a particular Resident's Association who can actively involve and influence the members of RAs. RWCs will ideally comprise of around 10 to 15 people representing RA.

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For the purpose of forming RWCs, all the RAs in Guwahati shall be listed and identified. Similarly the commercial traders may also be divided into vegetable markets, wholesale traders, commercial business centers, etc.

The municipal officials shall help them to form a group of welfare association by explaining to each of these RAs/groups the benefits of formation of such groups. The community will identify 10-15 people who shall be representing the RAs/group in various activities of solid waste management and sanitation.

Orientation of RWCs

The RWCs thus formed will then have to be trained and oriented by the local body officials and NGOs on various aspects of solid waste management, especially on new guidelines of solid waste management by MoEF. These groups will also have to be oriented towards the importance of community participation in implementing these guidelines and need to educate all members of the RAs/group on these aspects.

14.3.2 Identification and Mobilisation of NGOs or Social Welfare Groups

Groups and organisations shall have to be identified and appraised of various activities that could be taken for improving the solid waste management of the city and the emphasise the significance of community participation to achieve this.

14.3.3 Identification of Areas of SWM for Community Participation

The next step after identifying and mobilising the RWCs and NGOs is to identify areas where the active involvement of community participation is elicited and working out the modalities of the same. Some of the areas in which the community can contribute to the waste management are,

- avoiding indiscriminate throwing of waste by the citizens on the streets and the river side
- segregating and storing the waste at source and handing over the same to the sanitary workers of the local body or to the private operator arranged by the association themselves at a specified time
- understanding the importance of community secondary collection stations such as dumper bins at various localities of the city and their criticality in the efficient management of waste and therefore co-operating while the siting of these facilities
- realising the utility of organic component (compost) in the solid waste and
- understanding the importance of Reduce, Reuse, Recycle and Recovering of various recyclables in the waste and their utility

All these aspects have to be explained to the representatives of RWCs and NGOs

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who will in turn convey the message to the community.

14.3.4 Orientation of Key Personalities, Social Activists and Policy Makers

After identifying the areas of participation expected from the community, the key personalities, policy makers of the city will also have to be appraised of the implications of the new guide lines and the need for the community participation in managing the waste. The cost implications of house to house collection of waste and need for the community to organise primary collection from the households by themselves are also to be highlighted.

An effective orientation program shall sensitise the group on the above aspects and shall motivate them to educate the community. The orientation program shall be organised with active co-operation from well known personalities / specialists in the field of waste management in order to ensure the proper understanding to the community in respect of waste management and the importance of such programs in the ensuring community participation in waste management.

14.3.5 Conduct Sanitation Campaigns

In addition to the above activities, vigorous sanitation campaigns across the city shall also be taken up emphasising the need for storage and segregation, recycling and reduction and house-to-house collection of waste. These campaigns shall also involve the school children and NGOs so that the message of the campaign reaches the community effectively.

14.3.6 Media Campaigning and Environmental Awareness

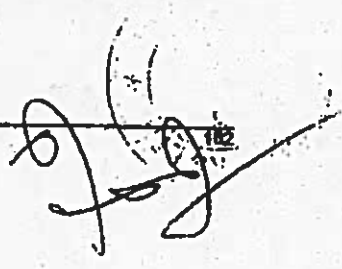
Media is another important tool in environmental education. Hence extensive campaigning through electronic media, print media, mass media and other means on environmental sanitation and solid waste management shall be carried out.

All these activities may be performed by the local body through nodal agency in the form of ALM formed in Mumbai or assigned to an NGO (if this work is to be assigned to NGO, there is no budgetary provision for the same. Keep it in the budget below) who can guide and support the RWCs and the local officials in environmental education. These NGOs shall conduct rallies, street plays, competitions and cultural activities concerning environmental sanitation and try to educate the community.

14.4 IMPLEMENTATION

The measures discussed above can be implemented in phases in Guwahati, preferably in two or three zones every quarter and shall be targeted to complete within two years period. However, provisions should also be made on penalties and punishments to the people who do not abide by the agreed practices of waste management.

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CHAPTER - 15 TRAINING AND CAPACITY BUILDING

15.1 INTRODUCTION

Training and capacity building are gaining importance in the present context. Urban Local Bodies (ULBs) are bound to upgrade SWM in tune with the Municipal Solid Waste (Management & Handling) Rules 2000, which is possible if proper training and capacity building is imparted.

15.2 TRAINING NEEDS

The ultimate delivery of services will depend up on the service providers. In general training is required for the following target groups are:

- Senior level officers-Decision makers
- Middle level officers-Managers and technical staff
- Junior Level -Technical staff
- Elected members
- Members of NGOs

As middle, lower level staff and workers are the cutting edge functionaries, appropriate training programmes have to be organized for them on the dynamic concepts of SWM, health, environmental, legal implications and functional aspects. Audio visual aids and exposure of new systems through visits to other local bodies should form a part of the training programme. Refresher Courses for all levels of staff should be organized every five years for updating the knowledge to improve the services.

The senior level officers should be frequently exposed to the developments taking place in various parts of the state and country by sending them out on city visits and for attending workshops, seminars, training courses.

15.3 PROPOSED COURSE CONTENTS FOR TRAINING

Training needs should be identified for various levels including top and middle management, supervisors and workers. The training should be customised to the level of competence and awareness of the manpower involved in the SWM system. The training needs could be identified by the heads of each department and implementation of the training could also be done by them. A training calendar could be formalised and the course contents be defined. General contents of the training courses at various levels are outlined below.

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15.3.1 Course Content for the Training Programmes :

The suggested general course content for training the various levels of people in the SWM system is as given below

- introduction to SWM
- salient features of the Municipal Waste (Management & Handling) Rules
- practices in other parts of the country through audio visual presentations, films
- background issues of SWM issues, health and environmental aspects
- sources and types of solid waste, waste generation rates density, composition
- waste reduction and material recovery
- rag picker activity and the role of informal sectors
- importance of segregation & storage, primary collection systems
- role of community and their participation
- planning an efficient sweeping and collection system, tools and equipments- brooms, containers, primary collection vehicles
- transfer depots, container collection
- transportation- vehicle selection, alternatives for collection vehicles, vehicle routing
- processing options, composting, market for compost
- sanitary land filling, options for meeting statutory and environmental requirements, site selection and procurement, site development, operation, monitoring and closure of sites

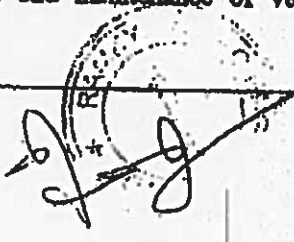
The training programmes for the workers could be conducted in an informal manner and in the local language.

15.4 MANAGEMENT INFORMATION SYSTEM

Good management is the key to keep a city clean. This requires collection of critical information which is not just for keeping the records up to-date but used effectively for taking corrective measures as well as proper planning for future. Some information is, therefore, required to be collected to have an overall idea of the prevalent situation, deficiency in the system and likely requirements for the future. Information that highlights the day to day deficiency in the system and can be used in taking corrective measures has to be collected at regular intervals to monitor the services.

With the advancement of information technology, Geographic Information System (GIS) could be introduced in large cities and MIS may be integrated in this system. Similarly, citizen interface could be maintained by seeking comments and suggestions.

Information that needs to be recorded and studied includes relevant information of the department for planning process as well as specific information to know whether every one involved in SWM services is performing his duty well, adequate vehicles are given to the SWM department by the workshop, the vehicles give their optimum output, the repairing and maintenance of vehicles and



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equipment at the workshop is properly done, the vehicles carrying the waste to the disposal site are optimally utilized, the processing plants are performing well, landfill sites are well managed etc.

The first thing each morning, the Division Engineers should see is whether anything unusual or unsatisfactory has happened needing immediate remedial measures. A list of items is given below on which the data should be collected and kept on record for planning purposes and a few forms are designed for monitoring the activities done by various sections of SWM department as under which may be utilized by the local bodies with suitable modifications.

There should be route maps and duty charts with each of the supervisory staff, who should check whether work on site is going as per schedule and whether vehicles and manpower are giving their optimum output. Mobile phones or other communication networks essential for effective communication and monitoring of services should be provided to Zonal Engineers & supervisors.

15.4.1 General information to be collected and updated

The following information needs to be collected and updated from time to time:

- ⇒ Area of the city;
- ⇒ Population of the city;
- ⇒ Decadal growth of population;
- ⇒ Number of wards, their area and population;
- ⇒ Ward-wise information in regard to:
- ⇒ Population density in different wards;
- ⇒ No. of Households, shops and Establishments
- ⇒ Vegetable/fruit/meat/fish markets
- ⇒ Number of Hotels & Restaurants
- ⇒ Number Of Hospitals and Nursing Homes
- ⇒ Number Of Industries
- ⇒ Number Of slum pockets /their population
- ⇒ Road length width wise
- ⇒ Percentage of area covered with under-Ground sewage system
- ⇒ Percentage of area having surface Drains
- ⇒ Percentage of area having no drainage Facility
- ⇒ Total number of public toilets and Toilet seats.
- ⇒ Number Of public urinals
- ⇒ Number Of Nuisance spots

Other general information on SWM

Waste generation

1. Average quantity of waste produced each day.
2. Seasonal variations in daily waste generation.

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3. Total quantity of waste produced annually during last 3 years
4. Breakup of the quantity of wastes generated
 - i. Household, shops and establishment waste;
 - ii. Vegetable and food market waste;
 - iii. Meat, fish and slaughter house waste;
 - iv. Construction & demolition waste
 - v. Hospital waste
 - vi. Industrial waste
5. Average number of carcass removed each day

Staff position

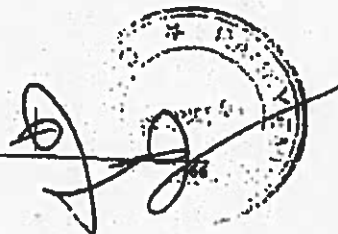
- 6 Number of sanitation workers deployed in the city for the collection of waste
- 7 Number of sanitation workers deployed for the transportation of waste
- 8 Ward wise allocation of sanitation workers
- 9 Sweeper population ratio in each ward
- 10 Sweeper road length ratio in each ward
- 11 Sweeper supervisor ratio in each ward

Waste storage depots

- 12 Number of sites designated/notified for temporary of waste (Dust bins)
- 13 Type and size of Dustbin provided in each ward.
- 14 Ward-wise Quantum of waste generated each day.

Transportation

- 15 Number Of vehicles available with the local body for the transportation of waste, their type, size and age.
- 16 Number of trips made by each vehicle in one shift.
- 17 Number of vehicles used in:
 - First shift



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- Second shift &
- Third shift

- 18 Quantity of waste transported in each shift.
- 19 Total quantity of waste transported each day.
- 20 Percentage of waste transported each day.

Waste processing and disposal

- 21 Number of waste processing and disposal sites in the city.
- 22 Their distances from the Centre of the city.
- 23 The area of these sites
- 24 The quantity of waste treated/disposed of at each site
- 25 The expected life of each land filled site

Financial aspects

26 Operating cost

- Cost of collection per ton/day
- Cost of transportation per ton/day
- Cost of disposal per ton/day

27 Allocation of revenue and Capital budget for SWM vs. the Corporation's budget.

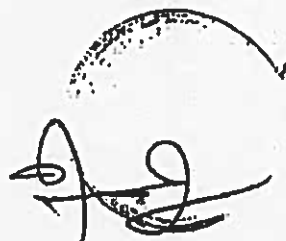
15.5 MONITORING OF SWM SERVICES

For the day-to-day monitoring of SWM services, the following data may be collected, compiled and analyzed.

Daily reports to be sent by supervisors

(1) Collection of waste

- i. Number of sweepers required to report for duty
- ii. Number of sweepers actually reporting for duty
- iii. Number of sweepers absent



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- iv. Areas left unattended
- v. Arrangements made or proposed to be made for clearing the backlog
- (2) **Inspection by supervisors for street sweeping & primary collection**
 - i. Number of persons under his supervision
 - ii. Number of persons supervised during the day
 - iii. Number of cases where performance found satisfactory
 - iv. Number of cases where performance was not up to the mark
 - v. Action taken or proposed to be taken
 - vi. Complaints received and attended

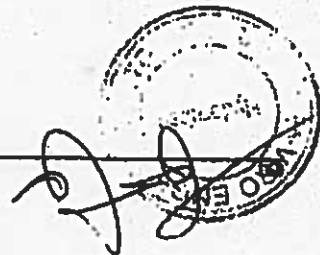
(3) **Inspection of cost recovery services**

These would include hotels, hospitals, commercial streets and offices

- i. Number of cost recovery sites
- ii. Number of sites inspected
- iii. Deficiencies noticed
- iv. Complaints received and attended
- v. Action taken or proposed to be taken
- (4) **Inspection of secondary waste collection points**

Number of sites in the area

- i. Number sites inspected
- ii. Number of sites found well maintained
- iii. Number of sites found ill maintained or needing repair or replacement
- iv. Action taken
- v. Number of unauthorized waste disposal sites or sites identified during field visits
- vi. Action taken



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(5) Inspection of silt removal sites & building waste disposal sites

- i. Number of silt removal sites inspected
- ii. Number of sites found to be faulty
- iii. Number of sites where silt was found lying outside the man hole or surface drain
- iv. Number of construction sites/construction waste disposal sites visited
- v. No of sites where construction waste where there was unauthorised dumping
- vi. Action taken

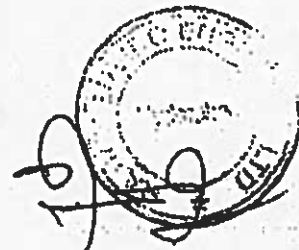
Daily Report to be sent by Zonal Engineers

(6) Transportation of waste

- i. Number and type of vehicles and equipment required to report for duty
- ii. Number and type of vehicles and equipment which actually reported for duty
- iii. Breakdowns reported during the day and action taken
- iv. Number of trips made to the disposal site by each vehicle
- v. Number of bins cleared during the day
- vi. Number and locations of bins left un-cleared and
- vii. Arrangements made or proposed to be made for clearing the backlog

(7) Quantities of waste transported

- i. Number of vehicles deployed during the day or night
- ii. Number of trips made
- iii. Quantity of waste transported
- iv. Number of vehicles which did not make adequate trips
- v. Number of vehicles which carried less garbage
- vi. Action taken or proposed to be taken against defaulters



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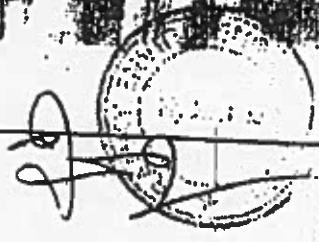
Abbreviations

ABBREVIATIONS

AC	Asbestos Concrete
AD	Anaerobic Digestion
APCB	Assam Pollution Control Board
BARC	Beltsville Aerated Rapid Composting
BMW	Bio Medical Waste
BOO	Build Own Operate
BOOT	Build Own Operate Transfer
BOT	Build Operate Transfer
BT	Black Top
C&D	Construction and Demolition
C&T	Collection and Transportation
C/N	Carbon/Nitrogen
CBO	Community Based Organization
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CH ₄	Methane
Cm	Centimeter
CO ₂	Carbon Dioxide
CPHEEO	Central Pollution Control Board Environmental Engineering Organisation
CV	Calorific Value
DG	Diesel Generator
DONER	Department of North East Region
DPR	Detailed Project Report
EPA	Environmental Protection Agency
EU	European Union
EWS	Economically Weaker Section
GHG	Greenhouse Gas
GMC	Gawhati Municipal Corporation

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Abbreviations

GNP	Gross National Product
GoA	Government of Assam
H ₂ S	Hydrogen Sulphide
Ha	Hectares
HDPE	High Density Polyethylene
HFL	High Flood Level
HIG	High Income group
HP	Horse Power
IOC	Indian Oil Corporation
JNNURM	Jawahar Lal Nehru National Urban Renewal Mission
KVA	Kilovolt Ampere
KW	Kilowatt
LDPE	Low density Polyethylene
LIC	Life Insurance Corporation
LIG	Lower Income Group
LS	Lump Sum
M	Meter
MIG	Middle Income Group
MIS	Management Information System
Mm	Milli Meter
MoEF	Ministry of Environment & Forests
MSW	Municipal Solid Waste
NCAER	National Council for Applied Economic Research
NEC	North Eastern Council
NEDFI	North Eastern Development Finance Corporation Ltd.
NGO	Non Governmental Organisation
NH	National Highway
NSW	New South Wales
PAH	Polycyclic Aromatic Hydrocarbon
PGB	Poly Chlorinated Biphenyl
PCG	Per Capita GNP

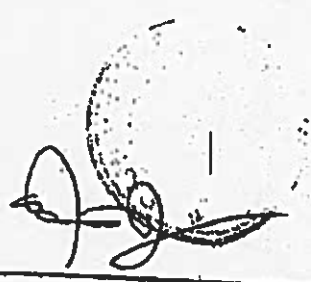


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Abbreviations

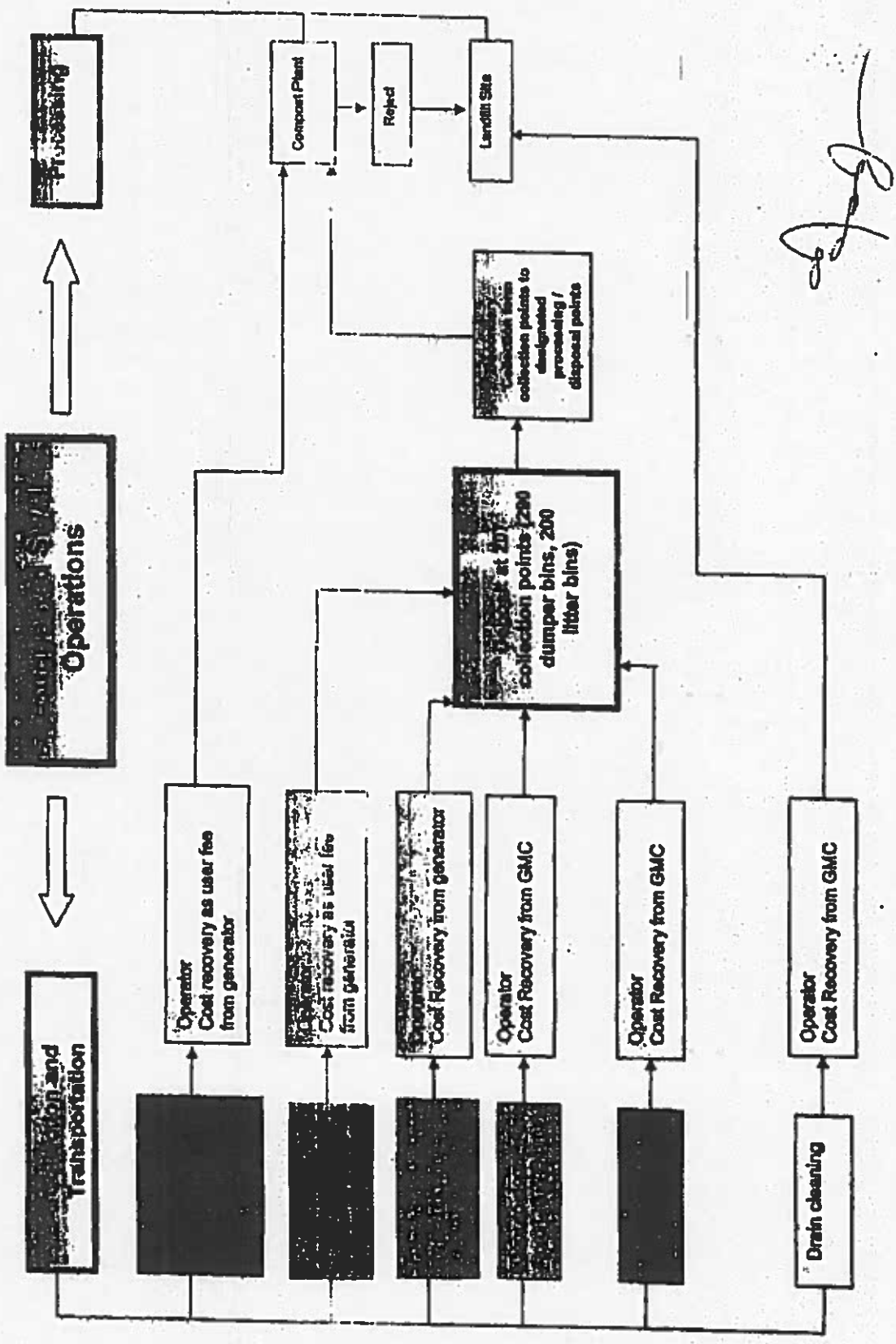
PDD	Project Design Document
PIL	Public Interest Litigation
PM	Particulate Matter
ppm	Parts per Million
PPP	Public Private Partnership
RCC	Reinforced Cement Concrete
RDF	Refuse Derived Fuel
ROB	Rail Over Bridge
RWA	Resident Welfare Association
SWM	Solid Waste Management
TRD	Tons per Day
UK	United Kingdom
ULB	Urban Local Bodies
USA	United States of America
USEPA	United States Environmental Protection Agency
VIP	Very Important Person
w/w	Weight by Weight
WBM	Water Bound Macadam




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FIGURE - 12.1 IMPLEMENTATION FLOWCHART



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**MODEL ENERGY PURCHASE AGREEMENT
BETWEEN**

(Guwahati Waste Management Company Private Limited)
("Generating Plant")

AND

Lower Assam Electricity Distribution Company Limited
("PROCURER")

THIS AGREEMENT is made this day of, (hereinafter called the Effective Date), by and between **Guwahati Waste Management Company Private Limited (GWMCL)** registered under the (Companies Act 1956) and having its registered office at (C/O Infrastructure Development Corporation of Assam Limited, Mezzanine Floor, Hotel Brahmaputra Ashok, M.G. Road, Panbazar, Guwahati - 781001), hereinafter called the "Generating Company", which expression shall, unless repugnant to the context or meaning thereof, include its successors and assignees as party of the first part and **Lower Assam Electricity Distribution Company Limited**, a Company registered under the Company's Act, 1956, having its Registered Office at (Bijuloe Bhawan, Paltanbazar, Guwahati - 781001), hereinafter called "PROCURER", which expression shall, unless repugnant to the context or meaning thereof, include its successors and assignees as party of the second part

WHEREAS, the Generating Company is engaged in the business of Generating Power from municipal waste and development of Integrated Waste Management Complex and other incidental businesses situated at Boragaon site, Gauwahati in the state of Assam, more particularly described in Annexure I attached hereto and made a part hereof and,

AND WHEREAS, *PROCURER* is a distribution licensee operating in the State of Assam, and has license to supply power in the specified municipal area of Gauwahati including the project site at Boragaon.

WHEREAS the Generating Company has undertaken to implement the power project by installing Plant and Equipment having installed capacity capable of exporting [MW] (minimum 4.8 MW) situated at Boragaon based on Municipal Waste (hereinafter referred to as the Plant) its production facility and complete erection, installation and commissioning of the said capacity and to make it operational within a period not exceeding 18 months from the date of Financial Closure, Further, the Generating company shall be under an obligation to finalize and achieve the Financial Closure within a period not exceeding 4 months from the date of issue of Lol in its favour.

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and

WHEREAS, the Generating Company desires to sell surplus (after its own use) (...Insert capacity in MW, minimum 4.8 MW) power generated in the Generating Plant's facility of [...] MW, and PROCURER agrees to purchase electricity generated from such capacity by the Generating Plant for sale, under the terms and conditions set forth herein,

and

WHEREAS the PROCURER agrees to purchaseMW power for its consumption from such plant at tariff determined through a transparent process of Competitive Bidding as per Regulations specified by the Commission, and

WHEREAS the parties to this Agreement agree for prior consultation with the State Transmission Utility for the purpose of implementation of this agreement and seek its approval for permitting, inter alia, interconnection to the generating plant with the Garçhug sub-station) grid substation under LAEDCL and

WHEREAS the parties to the agreement bind themselves for compliance of all relevant provisions specified by the Commission in different regulations regulating the functioning of State Transmission Utility, other transmission licensee and State Load Despatch Centre.

Now, therefore, in consideration of premises and mutual agreements, covenants and conditions set forth herein, it is hereby agreed by and between the parties as follows:

1. Definitions

Other than those defined below, the words/expressions used in this agreement, unless repugnant to the context, shall have the meaning assigned to them in the Electricity Act, 2003, Assam Electricity Reforms Act, 1999 and Assam Electricity Grid Code as amended from time to time, AERC (Terms and Conditions for Supply of Power) as amended from time to time, and the rules framed there under. The words/expressions listed below shall have the meanings respectively assigned hereunder.

1.1 'Bill Meter' means ABT compatible Import and Export Meter on the basis of which energy bills shall be raised by the Generating Plant/PROCURER.

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- 1.2 'Check Meter' means ABT compatible Import and Export Meter for performing a check on the accuracy of the Bill Meter.
- 1.3 'Date of Commissioning' means the date on which supply of Energy is commercially commenced by the Generating Plant to PROCURER and includes COD.
- 1.4 'Export Meter' means Bill Meter installed at the grid substation *Garchug Sub-station*) of PROCURER/STU for measurement of Active Energy, Maximum demand and Power factor for Energy exported to the Generating Plant from PROCURER/STU's Grid Sub-Station *Garchug Sub-station*).
- 1.5 'Energy Account Month' means period from date of meter reading in previous month to date of meter reading in following month and such period should not exceed 35 days.
- 1.6 'Sub Station' means sub-station (*Garchug sub-station*) of 33 KV or higher voltage maintained and operated by LAEDCL.
- 1.7 'Import Meter' means Bill Meter installed at the grid substation of PROCURER/STU (*delete whichever not applicable*) for Measurement of Active Energy, Maximum demand and Power factor of Energy Imported to PROCURER from the Generating Plant.
- 1.8 'L.C.' means "revolving and self-replenishing Letter of Credit".
- 1.9 'Bill' means a bill raised, that includes all charges to be paid by PROCURER with respect to sale of Power by the Generating Plant to PROCURER.
- 1.10 'State Transmission Utility (STU)' means Lower Assam Electricity Distribution Company Limited being the Government company specified so by the Government of Assam.
- 1.11 'TOD' means "Time of day", for the purpose of Metering.
- 1.12 'AERC' means the Assam Electricity Regulatory Commission.
- 1.13 'Wheeling' means the operation whereby the distribution system and associated facilities of a transmission licensee or distribution licensee, as the case may be, are used by another person for the conveyance of electricity on payment of charges to be determined under section 62 of the Electricity Act 2003.

2. POWER PURCHASE, SALE AND BANKING

- 2.1. PROCURER shall accept and purchase entire power made available to PROCURER's system from the Generating Plant's in accordance with the terms and conditions of this Agreement, at the rate determined through a transparent process of Competitive Bidding, as specified in Annexure X. PROCURER shall only be liable to make payments as per rates specified in Annexure X and no other taxes, duties and/or levies imposed by any of the Central and/or State Government or other local authorities, both present and

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future, directly or indirectly relating to generation shall be payable by PROCURER.

- 2.2. The rate applicable for supply of electricity by PROCURER to the Generating Plant shall be same as the tariff for the year as per Annexure X, determined through a transparent process of Competitive Bidding as per the Guidelines issued by Ministry of Power, Govt. of India
- 2.3. The provisions set out in Annexure-II shall govern the Sale and accounting for power purchased by PROCURER.
- 2.4. The generating plant and PROCURER shall comply with all the regulations issued by AERC from time to time including but not limited to Assam Electricity Grid Code, Open Access Regulations, SLDC Regulations to the extent they are applicable to them.
- 2.5. The generating company agrees to bank energy to the extent of% of the energy supplied to PROCURER from the plant during the periodand PROCURER agrees to allow withdrawal of the banked energy during the time specified by the Commission.
- 2.6. The generating company agrees to supply minimum [___ MUs] (not less than 29.32MUs) of energy per annum from the Generation Plant
- 2.7. The provisions of Banking and wheeling of electricity shall be as per the guidelines of AERC.

3. MAINTENANCE REQUIREMENT OF THE GENERATING PLANT

- 3.1. The Generating Plant's annual maintenance schedule shall normally be from to The Generating Plant shall inform PROCURER and the STU regarding the Maintenance schedule, in accordance with provisions of the Assam Electricity Grid Code as revised by the Commission from time to time.
- 3.2. Environmental Clearance and compliance of environmental standards shall be the sole responsibility of the generating plant.

4. SUPPLY SCHEDULE

The Generating Plant shall furnish to PROCURER and the State Transmission Utility (STU) or State Load Despatch Centre (SLDC), as the case may be, a month-wise Supply Schedule, schedule of banking and withdrawal of banked energy and other information, as required in the Assam Electricity Grid Code as amended from time to time or provisions of any other regulation in that regard or as desired otherwise.

5. BILLING PROCEDURE AND PAYMENTS

- 5.1. PROCURER shall raise monthly bill for electricity purchased by the Generating Plant as per its normal billing cycle after taking into account energy withdrawn from the banked energy and maximum recorded demand



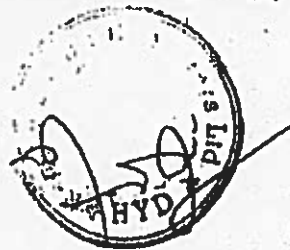
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in the manner as specified by the Commission and such bill shall be payable within the time period stipulated in the General Conditions of Tariff.

- 5.2. The Generating Plant shall raise monthly bill based on the monthly meter reading in the Bill Meter at the grid substation (*Garchug sub-station*) after deduction of bankable energy as certified by PROCURER.
- 5.3. The Monthly Bill raised by the Generating Plant shall be delivered to PROCURER at its designated office (*or Garchug sub-station*) on or before the fifth (5th) working day of the following month hereinafter called the Monthly Bill date.
- 5.4. PROCURER shall make full payment against such Monthly Bills to the Generating Plant within thirty (30) working days of the receipt of the Monthly Bill through irrevocable revolving & self-replenishing letter of credit of a value equal to the billable amount opened with a public sector bank in favour of the Generating Plant or through any other mode. The L.C. opening and maintenance charges shall be borne by PROCURER. The L.C. shall cover the average monthly billing for units indicated in the supply schedule furnished under para 4 above for the particular calendar quarter. The LC shall be updated by 5th working day of the calendar quarter.
- 5.5. A rebate of 2 percent on the billed amount shall be allowed for payment made through LC within a period of 7 days from the date of billing and 1 percent rebate shall be allowed if the payment is made after 7 days but within one month of the date of billing and for default in payment beyond one month from the date of billing, a surcharge at the rate of 2 Percent per month or part thereof shall be levied on the billed amount. Format of the Monthly Bill to be raised by the Generating Plant is given in Annexure III attached hereto and made a part of this agreement. If the payment is made by a mode other than through LC but within a period of one month of presentation of bill by the generating company, a rebate of 1 percent shall be allowed. However, a surcharge at the rate of 2 percent per month of part thereof shall be levied on the billed amount in case of default payment in within 30 days.
- 5.6. The bills raised by the Generating Plant shall be paid in full subject to the conditions that:-
 - i) There is no apparent arithmetical error in the bill(s).
 - ii) The bill(s) is/are claimed as per tariff referred to in Para 2 of this agreement.
 - iii) They are in accordance with the energy account referred to in Para 14 of this agreement.
- 5.7. In case of any dispute regarding the bill raised by the Generating Plant, PROCURER shall file a written objection with the Generating Plant within fifteen days of receipt of the bill giving full particulars of the disputed item(s), with full details/data and reasons of dispute and amount disputed against each item. The Generating Plant shall resolve the above dispute(s) with PROCURER within 30 days.

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5.8. In case, the dispute is not resolved within 30 days as provided in para 5.7 above, and in the event it is decided to proceed with the Arbitration as provided in para 23 of this agreement, then PROCURER shall pay 100% of the disputed amount forthwith and refer the dispute for arbitration as provided in this agreement. The amount of excess / shortfall with respect to the said disputed amount on final award of arbitration shall be paid / adjusted; but in case of excess, the adjustment shall be made with interest at rate 1.25% per month from the date on which the amount in dispute was refundable by the generating company to PROCURER.

6. PARALLEL OPERATIONS

Grid substation (*Garchug sub-station*) maintained by PROCURER shall allow the Generating Plant to interconnect its facility and operate in parallel with PROCURER system, subject to the provisions of this Agreement, Electricity Act, 2003 and the Assam Electricity Grid Code as amended from time to time.

7. GENERATION FACILITIES OWNED AND OPERATED BY THE GENERATING PLANT

7.1. The Generating Company shall own, install, operate, and maintain the generating plant equipments and associated transmission line described in Annexure 1. The Generating Plant shall follow such operating procedures on its side of the electric interconnection with PROCURER system, as are consistent with applicable laws, rules and regulations, the terms and conditions of this Agreement, provisions of the Assam Electricity Grid Code, and other related guidelines, if any, issued by AERC, SLDC, PROCURER, STU and any other concerned Transmission licensee.

7.2. Supplementary fuel shall be allowed to the extent of start up of the plant and this will further use methane as the supplementary fuel generated from Municipal Waste.

7.3. All electrical equipments shall be installed in compliance with the requirements of the Director of Electrical Safety, Government of Assam and safety specifications of the Central Electricity Authority (CEA) under section 53 of the Electricity Act, 2003.

7.4. The Generating Plant further agrees to make no material changes or additions to its facility, which may have an adverse effect on PROCURER system, or amend the single-line diagram, relay list and/or trip scheme given in Annexure 1, without PROCURER's prior written consent. PROCURER agrees that such consent shall not be unreasonably withheld or given without the prior permission of STU.



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- 7.5. Without prejudice to the foregoing, the Generating Plant shall install, operate, and maintain its facility in accordance with accepted prudent utility practices in the electricity industry. The Generating Plant's operation and Maintenance schedules and staffing shall be adequate to meet such standards at all times.
- 7.6. PROCURER shall follow such operating procedures on its side of the electric interconnection point with the Generating Plant, as required to receive Power from the Generating Plant's facility, without avoidable interruptions or adverse consequences on the Generating Plant, and consistent with applicable laws, rules and regulations, and the terms and conditions of this Agreement.

8. INTERCONNECTION FACILITIES

- 8.1. Power from the Generating Plant shall be transmitted at 33 kv Voltage through a 33 KV line from the Generating plant located at Garchug The power so transmitted shall be interfaced with PROCURER's 33 KV substation located at. *managed* by PROCURER.
- 8.2. The cost of the dedicated transmission line from the Generating Plant to the Designated grid sub-station Garchug sub-station) of LAEDCL and the cost of interfacing at both ends (the Generating Plant and grid substation) including work at the PROCURER Sub-Station, cost of bay, tie- line, terminal equipments and associated synchronizing equipments, shall be borne by AEDCL/ PROCURER.

(Explanation: The technical and other specifications of the work shall be finalized with AEDCL 's/PROCURER's approval and be in accordance with standards and specifications laid by AEDCL /PROCURER. The lines constructed for the evacuation of power from the Generating Plant, shall not be used for transmitting/supplying power for any other purpose, without a mutual agreement between the Generating Plant and AEDCL /PROCURER and without prior approval of AERC. Existing transmission/distribution lines of PROCURER may be utilized for evacuation of power from the Generating Plant to the Grid sub-station, on the basis of a mutual agreement between the Generating Plant and PROCURER, with the approval of AERC. Notwithstanding the above, the work of interfacing at PROCURER's Sub-Station will be done by PROCURER only.)

The Transmission Open Access Charges in cash & kind if any from the sub station of AEDCL to the PROCURER' S Sub station(Interface Point) would be borne by the PROCURER Only

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8.3. The Generating Plant shall be responsible for the Maintenance of equipment at the generating end.

8.4. It is the responsibility of PROCURER to maintain the terminal equipments at the sub station at which the plant is connected through a dedicated transmission line.

8.5. Any work to be done by the Generating Plant shall be taken up only with a specific approval and on the basis of approved drawings and specifications from PROCURER and in compliance with the safety requirements as per the Assam Electricity Grid Code. On the completion of work, final approval shall be obtained from PROCURER before charging the line. The Generating Plant would obtain all statutory clearances/approvals required for this purpose.

8.6. The Generating Plant shall consult PROCURER on the scheme of protection of the interconnecting line/s and the facilities at both ends, and accordingly provide the equipment at both ends. The protection system, installed by the Generating Plant, shall be checked by PROCURER.

8.7. Without limiting the foregoing, the Generating Plant and PROCURER shall, operate and maintain the interconnection and parallel operation facility in accordance with accepted good engineering practices in the electricity industry and the Assam Electricity Grid Code as amended from time to time and directions of Director Electrical Safety (GOASSAM) and safety requirements as specified by the Authority under section 53 of the Act, 2003.

8.8. The interconnection facilities, to be provided by the Generating Plant are set forth in Annexure IV attached hereto and made a part hereof.

9. PROTECTIVE EQUIPMENT & INTERLOCKING

9.1. The interconnection facilities shall include necessary protective equipment and interlocking devices, which shall be so coordinated that any malfunctioning or abnormality in the generators or in the bus of the Generating Plant shall not adversely reflect on or affect PROCURER's grid system. In event of any malfunctioning or abnormality, the system shall be designed to ensure that the Generating Plant's breaker trips first to protect the equipment. Prior to adopting it the Generating Plant shall obtain approval of PROCURER for the protection logic of the generator system and the synchronisation scheme.



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9.2 The Generating Plant shall install necessary equipment to eliminate feeding of reverse power from the Grid to the Generating Plant's system in absence of any agreement for purchase of power with PROCURER.

10. TECHNICAL ASSISTANCE BY PROCURER & GENERATING PLANTS RESPONSIBILITY

10.1. On request, PROCURER, in consultation with STU, shall provide reasonable technical assistance to the Generating Plant in preparing the design and specifications of the required facilities and for laying down the standard operating and maintenance procedures. The Generating Plant, however, shall be responsible for procurement, installation, testing, maintenance and operation of the electrical system installed in the Generating Plant's premises.

10.2. Notwithstanding the above, PROCURER shall not be responsible for any damage caused to the electrical system/generating set of the Generating Plant, on account of errors or defects in the design, procurement, installation, testing, maintenance and operation of the system.

11. ARRANGEMENTS AT THE POINT OF SUPPLY

The Generating Plant shall make all arrangements for paralleling the set with PROCURER's grid in consultation with and to the satisfaction of PROCURER and/or STU, subject to the approval of the Director of Electrical Safety, Government of Assam and safety specifications of the Central Electricity Authority (CEA) under Section 53 of the Electricity Act 2003.

12. SYNCHRONISATION

12.1. The Generating Plant shall synchronize its power generating set in consultation with the (Designated Authority), in-charge of the Garchug sub-station of LAEDCL and as per provisions of the Assam Electricity Grid Code as amended from time to time. The Generating Plant shall give seven (7) days prior intimation of the synchronisation programme to the Nodal Officer.

(i) When commissioning the plant for the first-time,

(ii) When commissioning after completion of the annual Maintenance programme.



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12.2. PROCURER shall not be responsible for the damage, if any, caused to the plant and equipment of the Generating Plant due to failure of the synchronising or the protective system provided by the Generating Plant.

13. LIASON WITH & ASSISTANCE FROM PROCURER

The Generating Plant shall closely liaise with the Nodal Officer of PROCURER and the STU and shall inform the date of commencement of delivery of power to the designated officials of PROCURER and STU one month in advance and also arrange for testing and commissioning of the protection system at least 15 days in advance. If requested by the Generating Plant, PROCURER, in consultation with STU as the case may be, shall extend assistance for testing, subject to the condition that the Generating Plant shall pay the charges for such assistance to PROCURER, if so indicated by the concerned Testing Division of PROCURER. This charge shall be reasonable and be based on the man-hours devoted by PROCURER staff and their usual levels of remuneration, and PROCURER equipment used.

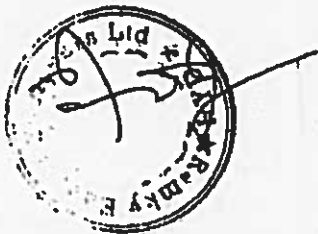
14. METERING

14.1. The Generating Plant shall supply, two identical sets of ABT compliant meters, with the facility for downloading data to measure the quantity and time details of the Power exported from and imported by the Generating Plant, conforming to the specifications approved by STU, along with all necessary associated equipments. These meters shall be installed and maintained by PROCURER. These meters shall be installed at the grid substation of PROCURER at the interconnection point. One set of export/import meters shall be termed as Bill Meter and other set will serve as the Check Meter. The complete metering system consisting of meters, Current Transformers & Potential Transformers shall conform to the 0.2 accuracy class, individually and collectively, and shall comply with the technical standards, accuracy and calibration requirements of the Indian Electricity Rules and the specifications of the Bureau of Indian Standard and the guidelines of CEA for installation of meters.

14.2. The meter readings shall be downloaded and recorded in the format given in Annexure V & VI.

14.3. The Meter/Metering system shall be properly sealed and made pilfer proof, to the satisfaction of both parties.

14.4. PROCURER shall, test all the metering equipment for accuracy, in the presence of a representative of the Generating Plant, if the Generating Plant so elects, at least once every year while the agreement is in force. Either



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party may, however, elect to get the meters tested at any time they so desire, at their own cost, in the presence of the other party.

14.5. PROCURER's designated representative and the representative of the Generating Plant shall jointly certify the meter test results. After every testing all metering equipment and the Metering system shall be securely sealed jointly by the representatives of PROCURER and the Generating Plant.

14.6. The reading and testing of meters and associated equipment shall be in accordance with accepted good engineering practices in the electricity industry.

14.7. Calibration, inspection and testing of meters and the associated equipment shall be the responsibility of PROCURER, who shall bear the related costs.

14.8. Meter readings shall be taken as per directions of AERC

14.9. The reading of the Bill Meter shall form the basis for the energy account, provided that the magnitude (i.e. absolute value) of the difference between the Check and Bill Meter reading is within one percent of the Bill Meter reading.

14.10. If in any month the readings of the Bill Meter and Check Meter are found to be doubtful or beyond the permissible 1% deviation indicated above, both sets of meters shall be checked and calibrated in the presence of authorized representatives of both the parties. Corrections shall be made, if required, on the basis of the error detected during this process, in the Monthly Bill for the period between the previous meter readings and the date and time from which accurate readings become available through replacement or re-calibration. These corrections shall be full and final for the Bill of that month.

14.11. During the period of checking and calibration of both meters simultaneously another export and import meter duly calibrated would be installed by PROCURER. For this purpose, one spare set of meters would be required to be available with the generating plant at all times.

14.12. If the Bill Meter is found to be defective, and the Check meter is found to be accurate then the reading from the latter shall be used for billing purpose and the Bill meters would be re-calibrated and re-installed or replaced by duly tested and calibrated meters as necessary. Where error in the Check Meter is indicated beyond permissible limit but there is no error in the Bill Meter, monthly energy account would be prepared on the basis of the Bill

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Meter reading and the Check Meter shall be immediately re-calibrated and re-installed or replaced as necessary. If both meters are found to be defective, then the Bill will be revised on the basis of the in-accuracy discovered in the testing. The M.R.I. output from the meters shall be considered an authentic document for verification.

14.13. Metering at generating terminal of each unit of the generating plant shall be ensured as per the guidelines of the Central Electricity Authority.

15. ACCEPTANCE AND APPROVAL OF PROCURER

PROCURER's acceptance or approval for equipment, additions or changes to equipment, and their operational setting etc., would be required. Such acceptance/approval shall not be unreasonably withheld and shall be based on PROCURER's existing policies.

16. COMMISSIONING OF GENERATION FACILITIES

The Generating Plant shall commission the generation facility and synchronise it with PROCURER's grid by In case, the plant is commissioned beyond the said dates of commissioning, the tariff applicable for sale of electricity from the plant to PROCURER shall be the rate corresponding to the year in which the Commissioning of the plant was agreed to as above in case of delay. However, in the case of delay in Commissioning of the plant for reasons beyond the reasonable control of the generating company, the provisions of para 21 of the Agreement shall apply.

17. CONTINUITY OF SERVICE

17.1. The supply of electricity by the Generating Plant shall be governed by instructions from the state load dispatch centre, as per the provisions of the Assam Electricity Grid Code as amended from time to time. Furthermore, the Generating Plant shall be treated as "must run" power station and shall not be covered under merit order. However, PROCURER may require the Generating Plant to temporarily curtail or interrupt deliveries of power only when necessary in the following circumstances: -

- a. Repair and/or Replacement and/or Removal of PROCURER's equipment or any part of its system that is associated with the Generating Plant's facility; and/or
- b. Endangerment of Safety: If PROCURER determines that the continued operation of the facility may endanger the safety of PROCURER's personnel or integrity of PROCURER's electric system, or have an adverse effect on the provision of electricity to PROCURER's other consumers/customers; and/or
- c. Force Majeure Conditions as defined in para 26 below



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Note: Any necessary inspection, investigation or maintenance of PROCURER's equipment or any part of its system that is associated with the Generating Plant's facility shall be planned by PROCURER to coincide with the scheduled outage of the Generating Plant's generation system;

17.2. Before disconnecting the Generating Plant from PROCURER's system, PROCURER shall, except in the case of an emergent situation, give advance intimation to the Generating Plant through telephone/wireless or through other means of communication along with reasons for disconnection, and the likely period of the disconnection. However, subsequent to disconnection, PROCURER shall immediately notify the Generating Plant by telephone and confirm in writing the reasons for, and the likely period of, disconnection. During the period so notified PROCURER shall not be obligated to accept or pay for any power from the Generating Plant.

17.3. In any such event as described above, PROCURER shall take all reasonable steps to minimize the frequency and duration of such interruptions, curtailments, or reductions.

17.4. PROCURER shall avoid scheduling any event described in 17.1 above, to the extent reasonably practical, during the Generating Plant's operations. Where the scheduling of such an event during the Generating Plant's operations cannot be avoided, PROCURER shall provide the Generating Plant with fifteen days advance notice in writing to enable the Generating Plant to cease delivery of Power to PROCURER at the scheduled time.

17.5. In order to allow the Generating Plant's facility to remain on-line and to minimize interruptions to Generating Plant operations, the Generating Plant may provide automatic equipment that will isolate the Generating Plant's facility from PROCURER system during major system disturbances.

18. DAILY/MONTHLY/ANNUAL REPORT

The Generating Plant shall submit daily/monthly/annual and other reports on the format, and as per the procedure, specified in the Assam Electricity Grid Code as amended from time to time or as desired by the PROCURER.

19. CLEARANCES, PERMITS AND LICENSES

The Generating Plant shall obtain, at its own expense, all authorizations, permits, and licenses required for the construction, installation and operation

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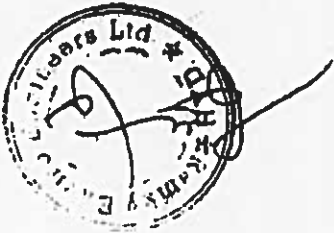
of the Generating Plant's facilities and any interconnection facilities, including but not limited to, rights-of-way or easements within the boundary limits of the Generating Plant. PROCURER shall provide reasonable assistance, including permissions, approvals and clearances from STU, to the Generating Plant if so requested by the Generating Plant.

20. DURATION

- 20.1. Unless terminated by default, this agreement shall be valid till the expiry of 25 years from the date of commissioning of the plant.
- 20.2. The agreement may be renewed or extended for such period as may be mutually agreed between the Generating Company and PROCURER on expiry of initial term of 25 years.

21. EVENTS OF DEFAULT AND TERMINATION

- 21.1. The occurrence of any of the following events at any time during the term of this agreement shall constitute a default by the Generating Plant:
- (a) Failure on the part of the Generating Plant to use reasonable diligence in operating, maintaining, or repairing the Generating Plant's facility, such that the safety of persons and property, PROCURER's equipment, or PROCURER's service to others is adversely affected; or
 - (b) Failure or refusal by the Generating Plant to perform its material obligations under this agreement; or
 - (c) Abandonment of its interconnection facilities by the Generating Plant or the discontinuance by the Generating Plant of services covered under this agreement, unless such discontinuance is caused by force majeure, or an event of default by PROCURER, or
 - (d) Failure by the Generating Plant to abide by all statutory provisions, rules, regulations, directions and conditions for installation, operation, and supply of power and maintenance of power generation units etc. enforced from time to time by the Union/State Government, AERC or other empowered authorities, including compliance with the Assam Electricity Grid Code, or
 - (e) Failure by the Generating Plant to pay PROCURER any amount payable and due under this agreement within sixty (60) working days of the demand being raised.
- 21.2. The occurrence of any of the following at any time during the term of this agreement shall constitute a default by PROCURER: -
- (a) Failure to pay to the Generating Plant any amount payable and due under this agreement within sixty (60) working days of the receipt of the bill/monthly purchase bill; or



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- (b) Failure to use reasonable diligence in operating, maintaining, or repairing PROCURER's interconnecting facilities, such that the safety of persons or property in general, or the Generating Plants equipment or personnel are adversely affected; or
- (c) Failure or refusal by PROCURER to perform its material obligations under this agreement; or
- (d) Abandonment of its interconnection facilities by PROCURER or the discontinuance by PROCURER of services covered under this agreement, unless such discontinuance is caused by force majeure or an event of default by the Generating Plant.
- (e) Except for failure to make any payment due, within sixty (60) working days of receipt of the monthly purchase bill, if an event of default by including non payment of bills either party extends beyond a period of sixty (60) working days after receipt of written notice of such event of default from the non defaulting party, then the non-defaulting party may, at its option, terminate this agreement by delivering written notice of such termination to the party in default.
- (f) Failure by either PROCURER or the Generating Plant to exercise any of its rights under this agreement shall not constitute a waiver of such rights. Neither party shall be deemed to have waived the performance of any obligation by the other party under this agreement, unless such a waiver has specifically been made in writing and approved by the AERC.

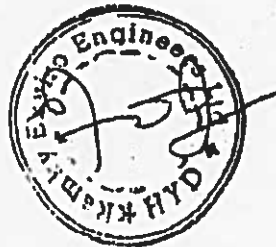
21.3. PROCURER reserves the right to terminate this agreement upon one months notice to the Generating Plant, if the Generating Plant's facility fails to commence production and export of electric power by the planned commercial operation date shown in Annexure 1.

22. COMMUNICATION

In order to have effective co-ordination between PROCURER and the Generating Plant, a designated official shall be kept on duty round the clock by the Generating Plant and PROCURER in their respective premises, with information to each other about the name, location, and telephone number etc., of the official. Without prejudice to discharge of their rightful duties by others, this duty official shall take necessary action on receiving information about developments from the other party. The Generating Plant shall provide reliable and effective communication through wireless/hotline etc., between the Generating Plant & the interconnecting substation of PROCURER/and between the Generating Plant and the SLDC. The Generating Plant shall make provision for an RTU for remote monitoring of voltage, current and other related electrical parameters, as may be required by the STU.

22.1. DISPUTES AND ARBITRATION

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In the event of any dispute or difference between the parties concerning performance of this agreement and/or the rights and liabilities of the parties in respect of which a procedure for the resolution is not otherwise provided for in this agreement the following provisions shall apply:

a)(Designation of Authorised Official) on behalf of PROCURER, and the authorised representative of the Generating Plant would be empowered to indicate explicitly the nature and material particulars of the dispute/dissatisfaction and the relief sought, and serve notice thereof on the other, with copy to the PROCURER's(Designation of Senior Official of PROCURER) of the Circle under whose jurisdiction the Generating Plants plant is located.

b) On receiving such information, the (Designation of Senior Official of PROCURER) of the Circle of PROCURER in which the Generating Plant is located, shall be required to personally meet the authorised representative of the Generating Plant and the(Designation of PROCURER's Official) Executive Engineer of the concerned Division, at his own office, separately and/or together, within 15 (Fifteen) days of the date of receipt of such notice, and attempt in good faith to resolve the dispute to the mutual satisfaction of the two parties, within the stipulations dictated by the letter and spirit of the agreement.

c) If the dispute is not resolved by way of a settlement being arrived at and duly signed by each of the above officers within (30) thirty days of the date of receipt of the notice described in clause (a) above, the matter may be referred by either or both the above designated officers of the two parties to the PROCURER's (Designation of Senior Official of PROCURER), who has direct supervisory jurisdiction over the (Designation of Senior Official of PROCURER) referred to above, with information to the Chief Executive of the Generating Plant.

Within 15 days of receipt of such notice, the (Designation of Senior Official of PROCURER) and the Chief Executive of the Generating Plant would be required to meet at the formers office and endeavor to settle the dispute within a further period of (30) thirty days, i.e. within a total period of 45 (forty Five) days from the initial date of receipt of the notice by the(Designation of Senior Official of PROCURER).

(d) If the said dispute / dissatisfaction remains unresolved, either party can file a petition before AERC, whose decision will be final and binding on both the parties. AERC shall be empowered to determine the exact



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nature and modalities of the procedure to be adopted in resolving the matter.

23. INDEMNIFICATION

23.1. The Generating Plant shall indemnify, defend, and render harm free, PROCURER, its members, directors, officers, employees and agents, and their respective heirs, successors, legal representatives and assignees, from and against any and all liabilities, damages, costs, expenses (including attorneys fees), losses, claims, demands, action, causes of action, suits, and proceedings of every kind, including those for damage to property of any person or entity (including the Generating Plant) and/or for injury to or death of any person (including the Generating Plant's employees and agents), which directly or indirectly result from or arise out of or in connection with negligence or wilful misconduct of the Generating Plant.

23.2. PROCURER shall indemnify and render the Generating Plant, its directors, officers, employees and agents, and their respective heirs, successors, legal representatives and assignees harmless from and against any and all liabilities, damages, costs, expenses (including outside attorneys fees), losses, claims, demands, actions, causes of action, suits and proceedings of every kind, including those for damage to the property of any person or entity (including PROCURER) and/or injury to or death of any person (including PROCURER's employees and agents), which directly or indirectly result from or arise out of or in connection with negligence or wilful misconduct by PROCURER.

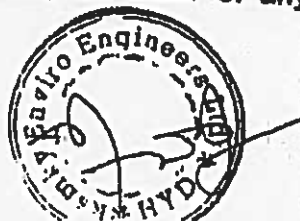
24. ASSIGNMENT

This Agreement may not be assigned by either PROCURER or the Generating Plant without the consent in writing of the other party, except that either party may assign its rights under this Agreement, or transfer such rights by operation of law, to any corporation with which or into which such party shall merge or consolidate or to which such party shall transfer all or substantially all of its assets; provided that such assignee or transferee shall expressly assume, in writing, delivered to the other party to this Agreement, all the obligations of the assigning or transferring party under this Agreement.

25. FORCE MAJEURE

25.1. If any party hereto is wholly or partially prevented from performing any of its obligations under this agreement by reason of or due to lightning, earthquake, riots, fire, floods invasion, insurrection, rebellion, mutiny, tidal wave, civil unrest, epidemics, explosion, the order of any court,

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judge or civil authority, change in State or National law, war, any act of God or a public enemy, or any other similar or dissimilar cause reasonably beyond its exclusive control and not attributable to its neglect, then in any such event, such party shall be excused from whatever performance is prevented by such event, to the extent so prevented, and such party shall not be liable for any damage, sanction or loss for not performing such obligations.

25.2. The party invoking this clause shall satisfy the other party of the occurrence of such an event and give written notice explaining the circumstances, within seven days to the other party and take all possible steps to revert to normal conditions at the earliest.

25.3. Any payments that become/have become due under this agreement shall not be withheld, on grounds of force majeure conditions developing.

26. AUTHORITY TO EXECUTE

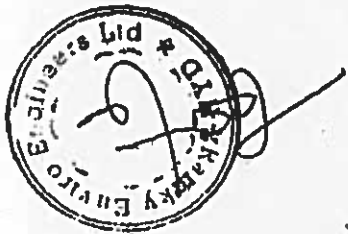
Each respective party represents and warrants as follows: -

- (a) Each party has all necessary rights, powers and authority to execute, deliver and perform this agreement.
- (b) The execution, delivery and performance of this agreement by each respective party shall not result in a violation of any law or result in a breach of any government authority, or conflict with, or result in a breach of, or cause a default under, any agreement or instrument to which either respective party is a party or by which it is bound.
- (c) No consent of any person or entity not a party to this agreement, including any governmental authority, is required for such execution, delivery and performance by each respective party. All necessary consents have been either obtained or shall be obtained in the future as and when they become due.

27. LIABILITY AND DEDICATION

27.1. Nothing in this agreement shall create any duty, standard of care, or liability to be discharged by any person not a party to it.

27.2. No undertaking by one party to the other under any provision of this Agreement shall constitute the dedication of that party's system or any portion thereof to the other party or to the public; or affect the status of PROCURER as a public utility or constitute the Generating Plant or the Generating Plant's facility as a public utility.



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28. NODAL AGENCY OF PROCURER

The (Designation of Senior Official of PROCURER) shall act as a nodal agency for implementing this Agreement.

29. AMENDMENTS

Any waiver, alteration, amendment or modification of this Agreement or any part hereof shall not be valid unless it is in writing, signed by both the parties and approved by AERC.

30. BINDING EFFECT

This Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors, legal representatives, and permitted assignees.

31. NOTICES

Any written notice provided hereunder shall be delivered personally or sent by registered post, acknowledgement due, or by courier for delivery on written receipt, with pre-paid postage or courier charges, to the other party, at the following address:

THE (Designation of Senior Official of PROCURER)
PROCURER:

GENERATING PLANT:

Notice delivered personally shall be deemed to have been given when it is delivered at the office of the Generating Plants or to the office of the (Designation of Senior Official of PROCURER) of PROCURER, as the case may be, at address set forth above and actually delivered to such person or left with and received by a responsible person in that office. Notice sent by post or courier shall be deemed to have been given on the date of actual delivery as evidenced by the date appearing on the acknowledgement of delivery.

Any party to this agreement may change its address for serving a written notice, by giving written notice of such change to the other party.

32. EFFECT OF SECTION AND ANNEXURE HEADINGS

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The headings or titles of the various sections and annexure hereof are for convenient reference and shall not affect the construction or interpretation of any provision of this Agreement.

33. NON-WAIVER

No delay or forbearance by either party in the exercise of any remedy or right will constitute a waiver thereof and the exercise or partial exercise of a remedy or right shall not preclude further exercise of the same or any other remedy or rights.

34. RELATIONSHIP OF THE PARTIES

- Nothing in this Agreement shall be deemed to constitute either party hereto as partner, agent or representative of the other party or create any fiduciary relationship between the parties.

35. ENTIRE AGREEMENT

This agreement constitutes the entire understanding and agreement between the parties.

36. GOVERNING LAW

This agreement shall be governed by and construed in accordance with the laws applicable in the State of Assam

37. NO PARTY DEEMED DRAFTER

The parties agree that no party shall be deemed to be the drafter of this Agreement and that in the event this Agreement is ever construed by arbitrators, or by a court of law, no inference shall be drawn against either party on account of this Agreement or any provision hereof being drafted by them. BEPL and the Generating Plant acknowledge that both parties have contributed substantially and materially to the preparation of this Agreement.

38. APPROVALS

Wherever approvals from either PROCURER or the Generating Plant are required in this Agreement, it is understood that such approvals shall not be unreasonably withheld.

39. ANNEXURES

ANNEXURES I to X WOULD FORM PART OF THIS AGREEMENT.

40. STANDARD FOR DECISION MAKING



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40.1. All operational decisions or approvals that are to be made at the discretion of either PROCURER or the Generating Plant, pursuant to the terms of this agreement, including specifications and design criteria etc., shall be made or performed according to good engineering practices prevailing in the electricity industry.

40.2. Professional decisions or activities undertaken by either party for the purpose of constructing, installing, removing, maintaining or operating any facility, which may affect the operations of the other party's facility or facilities, shall be made or performed according to good engineering practices prevailing in the electricity industry.

IN WITNESS:

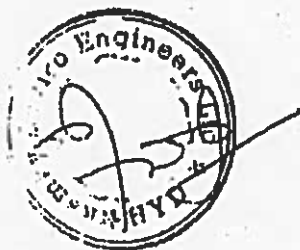
WHEREOF, PROCURER and the Generating Plant have executed this agreement as of the..... Day of in the year.

FOR THE GENERATING PLANT:

NAME:
DESIGNATION:
ADDRESS:
WITNESSED BY:
NAME:
DESIGNATION:
ADDRESS:

FOR PROCURER:
NAME:
DESIGNATION
ADDRESS
WITNESSED BY:
NAME
DESIGNATION:
ADDRESS:

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ANNEXURE

THE GENERATING COMPANY'S GENERATION FACILITIES

1. THE GENERATING PLANT:

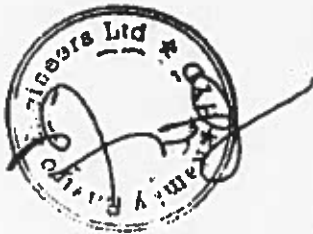
- NAME:
- LOCATION:
- CHIEF EXECUTIVE:
- CONTACT PERSON:
- MAILING ADDRESS:
- TELEPHONE NUMBER:
- FAX NUMBER:
- EMERGENCY TELEPHONE NUMBER:

2. GENERATING EQUIPMENT:

- BOILERS:
- TURBO-GENERATOR SETS:
- GENERATION VOLTAGE:
- SPEED:
- TYPE OF GOVERNOR:
- TRANSFORMER:
- FIRST SYNCHRONISATION WITH _____ KV LINE (INITIAL OPERATING DATE):
- TRANSMISSION LINE:.....KV line connecting withKV station of PROCURER.
- COMMERCIAL OPERATION DATE:

3. STIPULATIONS RELATING TO THE FACILITIES:

3.1. For the purpose of this agreement the Generating Plant's facility include all real estate, fixtures, and property owned, controlled, operated, managed by the Generating Plant in connection with or to facilitate generation, transmission, delivery, or furnishing of electricity or request to interconnect and deliver the electricity to PROCURER's system (Explanation: A single-line diagram relay list and trip scheme of Generating Plant's facility, reviewed and accepted by PROCURER at the time the Agreement is signed, shall be attached to this agreement and made part hereof. The single-line diagram, relay list, and trip scheme shall expressly identify the point of electrical interconnection of the Generating Plant's facility to PROCURER's system. Material changes or additions to the Generating Plant's generating and interconnect



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facilities reflected in the single-line diagram, relay list, and trip scheme shall be approved by PROCURER.)

- 3.2. The Generating Plant shall furnish, install, operate and maintain facilities such as breakers, relays, switches synchronising equipment, monitoring equipment, and control and protective devices as suitable for parallel operation with PROCURER's system and acceptable to PROCURER. Such facilities shall be accessible to authorised PROCURER personnel for inspection, with prior intimation to the Generating Plant
- 3.3. The Generating Plant shall furnish, in accordance with PROCURER's requirements, all conductors, service switches, fuses, meter sockets, meter and instrument transformer housings and mountings, switches, meter buses, meter panels, and similar devices required for the service connection and meter installation at PROCURER's premises. This equipment shall be installed and Commissioned by PROCURER
- 3.4. PROCURER shall review and approve the design drawings and Bill of Material for the Generating Plant's electrical equipment, required to interconnect with PROCURER's system. The type of electrical equipment, the type of protective relaying equipment and the settings affecting the reliability and safety of operation of PROCURER's and the Generating Plant's interconnected system shall be approved by PROCURER. PROCURER, at its option, may request witnessing operation of the control, synchronising, and protection schemes.
- 3.5. The Generating Plant shall provide a manual isolating device, which provides a visible break to separate the Generating Plant's facilities from PROCURER's system. Such a disconnecting device shall be lockable in the OPEN position and be readily accessible to PROCURER personnel at all times.

4. Operating Procedures:

- 4.1. The Generating Plant shall operate its plant when interconnected with the grid as per the procedure given in the Assam Electricity Grid Code as amended from time to time. The overall responsibility of operation and implementation of the Assam Electricity Grid Code rests with the State Load Despatch Centre and the State Transmission Utility under the provisions of the Act, 2003.
- 4.2. The Generating Plant's normal annual Maintenance shall be carried out fromto
- 4.3. The Generating Plant shall notify PROCURER's interconnecting sub station and SLDC prior to synchronizing a generator on to or taking a generator off of the system. Such notification should be as far in advance as reasonably possible under the circumstances causing the action.

5. Single Line Diagram


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Annexure II

Sale and Accounting for Power

- (1) In case the Generating Plant is not a consumer of PROCURER, protective gear at PROCURER's Substation would be designed to ensure that reverse flow of power from PROCURER's system to the Generating Plant is totally blocked out and the circuit breaker at the Substation gets opened automatically when required. However, notwithstanding this provision, if any export to the Generating Plant takes place, it would be paid for by the Generating Plant in accordance with the terms of of this agreement.
- (2) On the first day of the Energy Account Month, the Generating Plant shall provide information in writing or Generation Schedule to SLDC and PROCURER about the quantity of Power to be wheeled by way of purchase or sale or banking, as the case may be, during the month.
The purchase of electricity by PROCURER shall be subject to the provisions of the Distribution Licence, Regulations & Directions of AERC and other statutory authorities, and requirements of the state load dispatch centre.
- (3) Power accounting and Billing would be done on the basis of the section titled "Metering" in the main agreement (Clause No. 14.0)



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ANNEXURE III

SAMPLE MONTHLY BILL
INVOICE

For the Month of ,

Monthly Purchase Bill No.

Date

Name of Buyer: PROCURER

Address:

Town: District:

PIN Code:

Tel. No.: Fax:

Name of the Generating Plant:

Address:

Town: District:

PIN Code:

Tel. No.: Fax:

DESCRIPTION	QUANTITY	UNIT	PRICE	AMOUNT
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ENERGY SUPPLIED (KWh)

ENERGY FOR WHEELING (KWh)

ENERGY FOR PAYMENT (KWh) (1-2)

Banked Energy

1. Energy banked during the month
2. Energy balance as on preceding month
3. Energy scheduled for withdrawal during the month
4. Banking charges
5. Energy withdrawan during the month (3-4)
6. Energy banked at the end of the month (1+2-3)

OTHER CHARGES

Less/Add :

SUBTOTAL

TOTAL DUE

For Generating Plant Ltd.

Authorised Signatory
PROCURER

Authorised

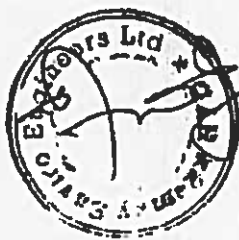
Verified by
Signatory,

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ANNEXURE IV
INTERCONNECTION FACILITIES PROVIDED BY THE GENERATING PLANT


ITEMS PROVIDED NOT PROVIDED

LINE BAY/S
STRUCTURES
BUS BARS, CLAMPS AND CONNECTORS
GROUNDING GRID
ISOLATORS
CURRENT TRANSFORMERS
CIRCUIT BREAKERS
CONTROL CUBICLES
CONTROL CABLING
AC / DC POWER SUPPLY
COMMUNICATION EQUIPMENT

SYNCHRONISATION & PROTECTION FACILITIES
AUTOMATIC VOLTAGE REGULATOR
AUTO SYNCHRONISATION UNIT
CHECK SYNCHRONISATION RELAY

PROTECTION FOR INTERNAL FAULTS:
DIFFERENTIAL GENERATOR
DIFFERENTIAL UNIT TRANSFORMER
RESTRICTED EARTH FAULT
STATOR EARTH FAULT
ROTOR EARTH FAULT
INTER-TURN FAULT
OVER VOLTAGE
LOSS OF EXCITATION
UNDER VOLTAGE
REVERSE POWER
LOW FORWARD POWER RELAY

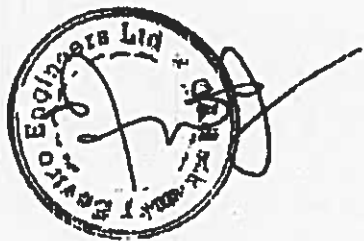
PROTECTION AGAINST GRID FAULTS:
MINIMUM IMPEDANCE (DISTANCE PROTECTION RELAY)
UNBALANCE (NEGATIVE PHASE SEQUENCE)
O/C & E/F (UNIT TRANSFORMER)-LT & HT


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ITEMS	PROVIDED	NOT PROVIDED
OVERLOAD ALARM		
OVERFLUXING RELAY		
PROTECTION AGAINST GRID DISTURBANCES:		
UNDER FREQUENCY		
OVER FREQUENCY		
POLE SLIP		



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