Pre-Feasibility Report

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1. Executive Summary:

Solid waste management has become a major environmental issue in India. The increase in population and urbanization are largely responsible for the increase in solid waste. Municipal Solid Waste (MSW) includes mostly residential waste, commercial waste, and market waste, Domestic house waste, street sweeping etc. It consists of biodegradable waste, recyclable waste, inert waste, combustible and non-combustible waste etc.

At present any scientific system is rarely been practiced for the safe disposal of municipal solid waste in city. Inefficient storage, collection, transportation, treatment and disposal of waste lead to contamination of air, surface and ground water, which result in formation of breeding grounds for vectors, pests, rodents, etc. causing public health problems. Proper planning for collection, transportation, treatment and disposal of solid waste are therefore, extremely essential for the protection of environment, health, sanitation and social wellbeing of the people.

Currently, Chirkunda town is generating an average MSW of 13.73 MT with per capita waste generation of approximately 253.80 grams. The Chirkunda Nagar to establish a 25 TPD Integrated MSW Processing and Disposal Facility in Chirkunda town with facilities such as Composting, Refuse Derived Fuel (RDF) for recovery of high calorific value waste, sanitary Landfill (for disposal of inert materials).

As per MOEF & CC Notification of SO No.1533, dated 14th September 2006 and subsequent amendments, the proposed project falls under Item 7 (i) (Common Municipal Solid Waste Management facilities) as per Environmental Impact Assessment Notification dated September 14, 2006 and its amendments.

Table1-1: Details of the proposed project

S.No	Information	Details
1	Project Name & Address	Integrated MSW Management Project for Chirkunda Nagar Panchayat at Village- Mauja-Kapasada, Thana No.-255, Khata No- 114, Plot No-123, Rakba-10.0 Acre, District-Dhanbad (Jharkhand).

2	Plant Area/Facility	**Total Area – 10.0 Acre.** Capacity of Processing Facility:25TPD Compost plant capacity- 15 TPD RDF plant Capacity -10 TPD Sanitary landfill Area -6496 sqm or 1.40 acres
3	Name of the Client	Chirkunda Nagar Panchayat.
5	Water Requirement and its Sources	11.0 KLD fresh water for operational activities. (Source-PHED supply)
6	Power Supply and its source	50 KVA,from JBVNL
7	Project Cost	790.22/- Lakhs only
8	Nearest Railway Station	Barakar Railway station 2.71 km in NE direction.
9	Nearest State highway (SH) /National Highway (NH)	SH 5 (4.53 km) in SE direction. NH-2 (4.12) Km) in N direction
10	Nearest Airport	Birsa munda airport in Ranchi is about 157 km SW direction.

2. INTRODUCTION OF PROJECT/BACKGROUND INFORMATION:

2.1 Introduction of the projects;-

Solid waste management is now become the necessity for maintaining the public health, sanitation, environmental and aesthetic vision for the urban local body in almost all developing countries. Municipal Solid Waste (MSW) management is one of the essential services for providing quality of life in urban areas and for ensuring of better standards of health and sanitation. Presently, the systems adopted are inadequate and inefficient. The system will include effective segregation, collection, storage, processing and disposal of inert materials in sanitary engineered landfill in an environmentally acceptable manner in accordance with the Municipal Solid Wastes (Management and Handling) Rules, 2016.

Govt. of India has launched Swachha Bharat Mission to improve the environment, health and sanitation condition as well as SWM services in all ULBs of India. Municipal solid waste management is the need of the day to keep the city clean and improve the hygienic condition and environment of the city.

Solid waste is the unwanted solid materials which get generated due to the domestic, commercial and sometimes industrial processing activities. Similar to the other cities in state Jharkhand is also facing this problem of scientific management of generated solid Waste in city. In view of this Government of India has taken several initiatives as well as formulated required rules and policy, to improve the existing SWM practices in different ULBs in our country. In Chirkunda city the present solid waste generation is around

13.73 MT/Day of municipal solid waste is generated daily in various wards located in Chirkunda Nagar Panchayat area. Out of which, about 9.64 MT/Day is wet organic waste, 4.09 MT/Day is commercial waste and is projected to total waste generation in year 2038 is around 21.03 MT/day.

The main aim of this project is to identifying the existing MSWM practices within the town and associated deficiencies in the present system of solid waste management. In this project there is a proposal for formulation of comprehensive plan for MSW handling, including segregation at generation point, then collection, transportation and cluster approach for the scientific processing and disposal at MSWM facility in line with the SWM Rules 2016.

In regards of this Chirkunda Nagar Panchayat proposed to setup an Integrated MSW Management Project for Chirkunda Nagar Panchayat at Village- Mauja-Kapasada, Thana No.-255, Khata No- 114, Plot No-123, Rakba-10.0 Acre, District-Dhanbad (Jharkhand). **Refer Annexure-I for land documents & Khasra detail of the project.**

The Proposed site is for establishment of processing plant for MSW and development of engineered sanitary landfill as per details below.

Total Area: - 10 Acre

Capacity of Processing Facility: 25TPD

Sanitary landfill area – 6496 sqm or 1.40 acres

2.2 Identification of Project Proponent: -

Name and Address of the Project Proponent:

As ULB is in the process of obtaining of approval from the competent authorities in respect of erection of "MSW Facility" therefore the signing authority will be the administrative head of the Chirkunda Nagar Panchayat.

Signing Authority: - Mr. Arun Kumar, EO

Email – executiveofficer.chirkunda@gmail.com-

2.3 Current Situation of MSW Management in Chirkunda and Surrounding ULBs:-

The current municipal waste management practice in Chirkunda and surrounding ULBs does not comply with MSW (Management and Handling) Rules, 2000 and subsequent amendments. Non-compliance(s) to MSW Rules include.

(a) Unmanaged and insufficient primary and secondary collection.

(b) There is no segregation of waste.

(c) Most waste dumped in open areas.

(d) There is no recovery of resources from waste before disposal;

(e) Indiscriminate dumping and no sanitary landfill.

As per MoEF norms and MSW rules, it is mandatory to set up an efficient management of Municipal Waste including: (1) Waste Collection (2) Transportation (3) Processing and (4) Disposal of Inert Waste through Sanitary Land Fill by each ULB but the proposed ULB's do not have technical and financial strength to set up the Integrated system on their own, hence to make SWM services financially sustainable and efficient, the project is designed integrated waste processing and disposal facility at Village-Mauja-Kapasada.

Table No 2.1 Physical Composition of Municipal Solid Waste in Chirkunda Town

S.No.	Particulars/Categories	% weight
1.	wooden pieces	2.2
2.	Paper	7.4
3.	textile	2.4
4.	thermo Cole	2
5.	coconut shell/ coconut hair	1.6
6.	green leave	7.2
7.	green matter	7.2
8.	concrete / stone	2
9.	sand/soil / dust/ earth	17
10.	Metal	0.4
11.	brick	1.6
12.	glass	1.8
13.	rubber/ leather	3
14.	kitchen waste	17.4
15.	ceramic	0.6
16.	P.V.C / pipes	0.6
17.	plastics	5
18.	polythean	4.4
19.	vegetable	9.6
20.	dry matter, straw	6.6

2.4 Need for the Proposed Project and its importance to the country or region:-

There is no scientific disposal method being followed, the garbage is left open for the natural decomposition. Since existing open trenches are not engineered landfills, therefore they are prone to ground water and soil pollution, vector nuisance, odor problem, besides becoming breeding grounds for mosquitoes, flies, etc. The leachate generated may cause unsanitary condition in the surroundings. To avoid all above, this project has the prime requirement in the area.

The importance of effective Integrated Municipal Solid Waste Management (IMSWM) services is to protect public health, the environment and natural resources (Water, Land and Air). To promote the ecological management of solid waste in compliance with the principle of the: Reduce, Reuse, Recycle, Recover and safe disposal. An effective IMSWM service can be achieved only by improving the efficiency of IMSWM activities, thereby leading to the reduction of waste generation, separation of MSW and recycling and recovery of materials, and generation of compost and energy.

2.5 Demands-Supply Gap

This point is not applicable to this project as it is not a manufacturing or production unit. However, there are no existing MSW facilities in Chirkunda. Therefore, Chirkunda Municipality has proposed Processing Facility and sanitary landfill facility to be developed for scientific disposal of inert waste having design life of 20 years (2018 to 2038).

2.6 Imports vs. Indigenous Production

This point is not applicable. During construction phase construction materials would be transported from the neighbouring state if required.

2.7 Export Feasibility

This activity is not applicable for this project.

2.8 Domestic/Export Market

The major source of revenue generation through this project is the methane generation. The rag pickers segregate the resalable materials like scraps, metal cans, bottles, card boards, batteries, polymers, plastic etc and then sold to the secondary market for earning of money. Recyclable waste is itself an indirect source of employment to the rag pickers.

Number of rag pickers and low income deprived peoples of slums areas are maintaining their family livelihood by selling of recyclable waste.

2.9 Employment Generation (Direct and Indirect) due to the Project:-

For construction of processing facility and landfill sites there would be requirement of local semiskilled people and also during operation period there would be requirement of skilled and semiskilled people. This will lead to generation of employment at local level. Also there would be requirement of unskilled people for door to door collection of waste. All these activities would generate employment. Thus the project shall have positive impact on the society and will enhance the socio-economic condition of all people who would be associated with this project directly or indirectly.

In construction phase about 20 employee will be employed

Approx.13 employees will be employed during project operation phase. About 50-60 Nos. temporary employment will be generated for primary/secondary collection, transportation etc.

3.0 PROJECT DESCRIPTIONS:

3.1 Type of Project Including interlinked and Interdependent Projects, if any

As per the EIA notification dated 14th September, 2006, as amended till date, the proposed project Falls under the Project / Activity: 7 (i) –Municipal Solid Waste Management Facilities (MSWMF) under Category B" but it is to be assessed as "A" because applicability of general Conditions. There is interstate boundary exist which is at distance about 0.27 Km.

The project is not interlinked and interdependent. This project is an integrated solid waste management, and is proposed for the setting up of processing facilities. The main components of the facility will be the sanitary landfill, weigh bridge, composting, RDF technology, leachate collection system, drainage system, gas handling equipment's and proper haul road etc.

All the inert/rejects generated from processing facility shall be transferred to the sanitary engineered landfill for the safe disposal, at the proposed landfill site at Village-Mauja-Kapasada.

3.2 Project Location - (Map showing general location, specific location, and project boundary & project site layout) with coordinates:-

The proposed project is located at Village- Mauja-Kapasada, Thana No.-255, Khata No- 114, Plot No-123, Rakba-10.0 Acre, District-Dhanbad (Jharkhand). The proposed area is sufficient for the development of processing facility for the next 20 years of projection.

Map showing general location of the project is given in **Figure -3.1.** Google map of 500 m radius showing project boundary **(Figure 3.2)** and specific location on topographical map of 10 km radius is provided below in **Figure –3.3.**

TABLE 3.1 Project Location Detail:

S No	Latitude	Longitude
1.	23°43'33.92"N	86°47'55.26"E
2.	23°43'33.40"N	86°47'55.26"E
3.	23°43'32.83"N	86°47'55.08"E
4.	23°43'31.51"N	86°47'54.49"E
5.	23°43'30.48"N	86°47'53.79"E
6.	23°43'30.04"N	86°47'53.26"E
7.	23°43'29.06"N	86°47'52.78"E
8.	23°43'28.38"N	86°47'52.69"E
9.	23°43'27.39"N	86°47'52.95"E
10.	23°43'24.72"N	86°47'53.39"E
11.	23°43'24.37"N	86°47'51.03"E
12.	23°43'29.49"N	86°47'51.21"E
13.	23°43'30.90"N	86°47'48.62"E
14.	23°43'34.29"N	86°47'53.10"E

Figure 3-1 General Location of Proposed Project Site

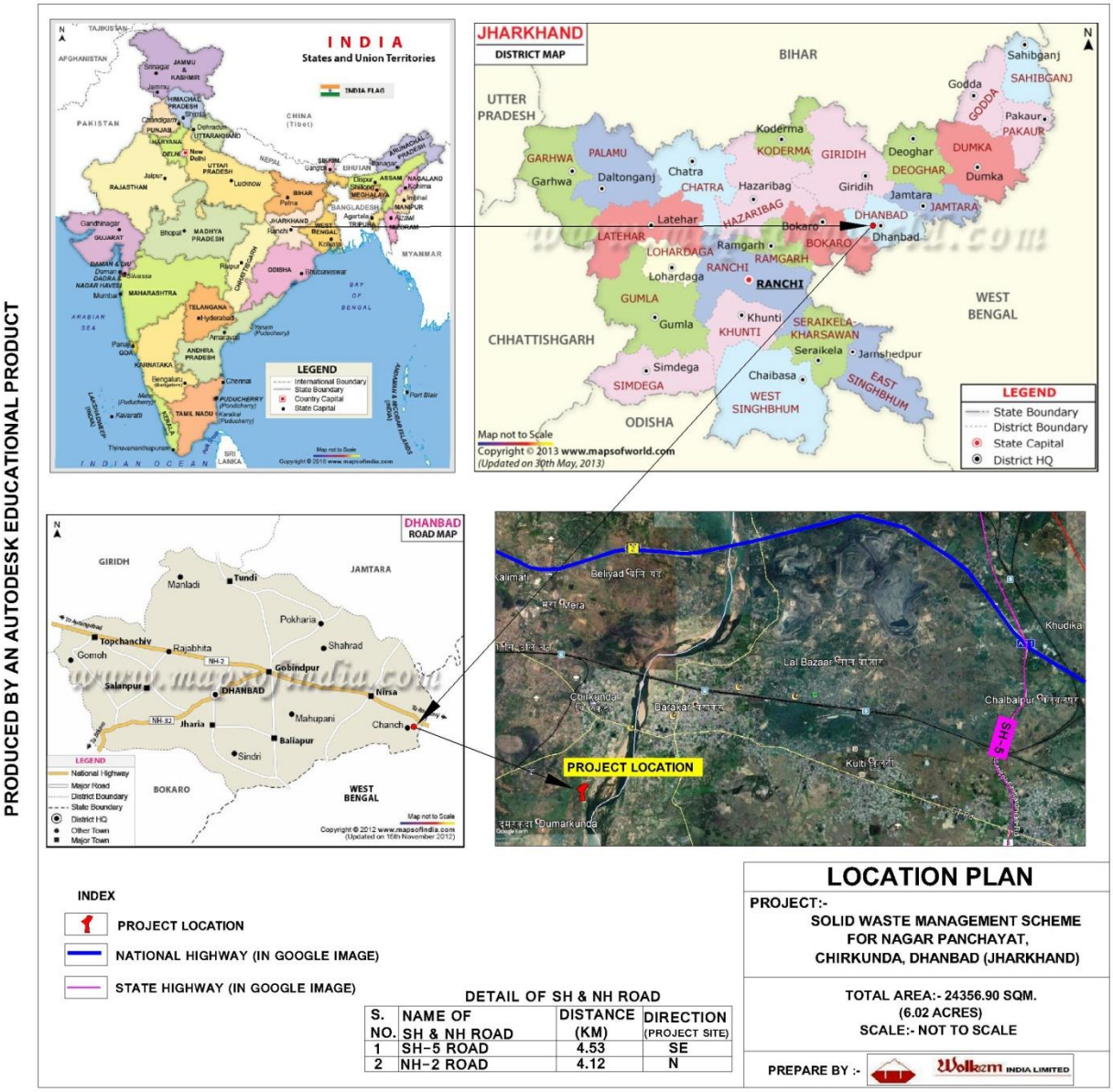
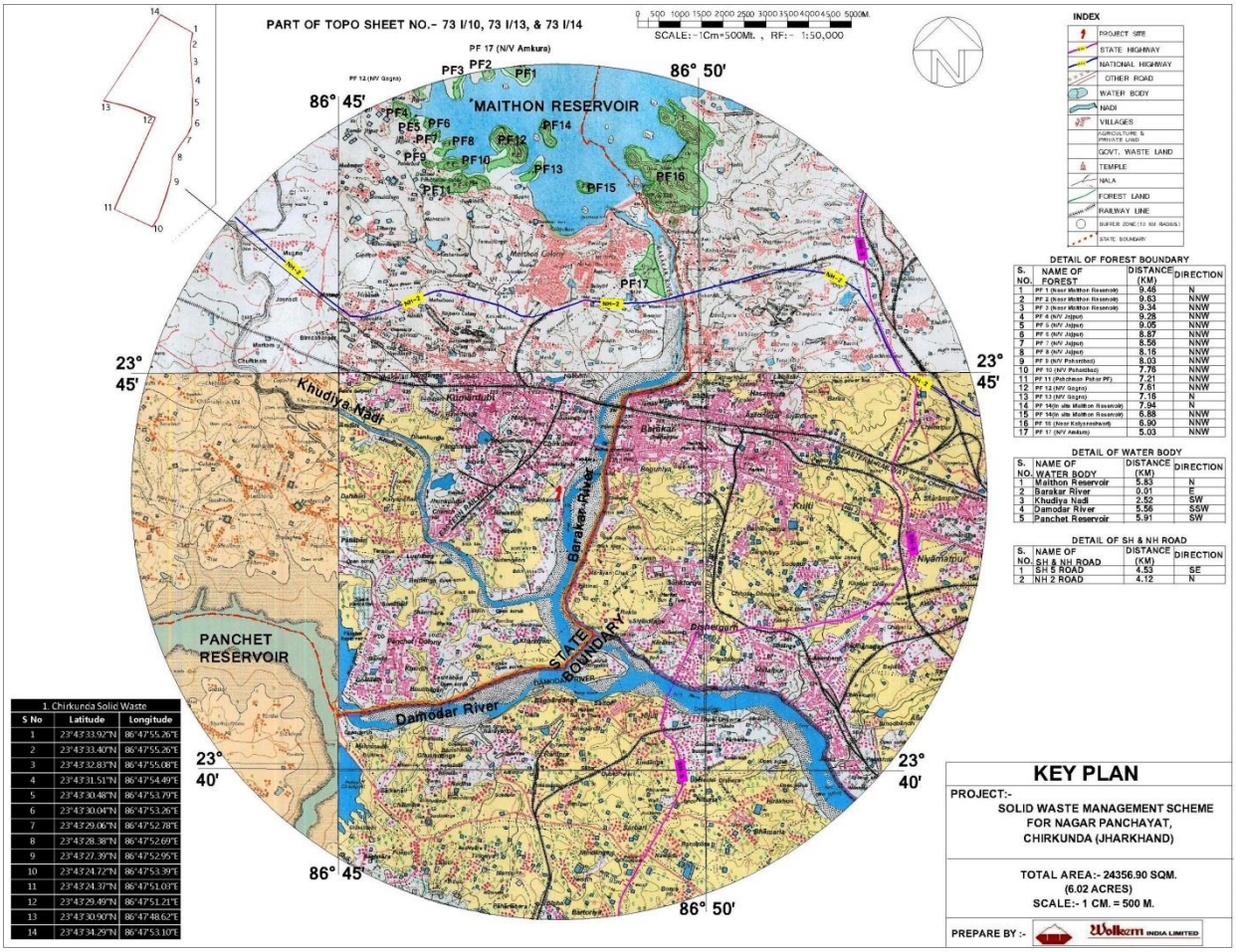


Figure 3-2 Google Image showing the Project site

Figure 3.3 Topographical Map of 10Km radius showing the Project site



3.3 Details of alternate sites considered and the basis of selecting the proposed site, particularly the environmental considerations gone into should be highlighted.

No alternate site has been considered for the proposed project. The proposed site based in Chirkunda Town proves to be the best location considering both the environmental and economic factors.

3.4 Size or Magnitude of operation:-

The current MSW waste generation from Chirkunda and surrounding ULBs is about 13.73 TPD.

Considering future needs, the proposed Integrated MSW Processing and Disposal Facility will be established to handle about 25TPD of MSW per day.

Total Area: - 10 Acres

The proposed Integrated Municipal Solid Waste processing facility of 25TPD

- Aerobic Compost Plant – 15 TPD
- RDF Processing Plant – 10 TPD

3.6 Project Description with Process details

The activities planned in the proposed project include collection, transportation, treatment & disposal of municipal solid waste in compliance to the SWM Rules 2016. The basic concept for the solid waste management of the project area is presented in the form of the flow chart in **Figure 3-4**.

This concept has been developed keeping into considerations the following design criteria:-

1. Compliance to the SWM Rules 2016 for waste collection, transportation, treatment & disposal.
2. Providing door to door collection of waste from source in segregated manner.
3. Introduction of an efficient secondary waste collection & transportation system using Refuse collectors.

The municipal waste received at the site is processed at waste management facility by segregating the waste into recyclable and composting material. After separation of recyclables the compostable material will be diverted to compost plant.

1. Waste Processing System

Based on the sampling study conducted and the number of waste generators existing in the city, it is estimated that the waste generation in Chirkunda is about 13.73 TPD.

Various fractions in the Municipal Solid Waste can be classified into following broad groups:

Compostable Fractions: Compostable fractions mainly consist of biodegradable (food) waste. This is wet in nature & degrades very fast. Moisture content may be as high as 70%. This fraction can be economically & effectively converted into good quality organic manure through controlled aerobic composting process. About 50% of organic matter present in MSW is very hard to compost. They mainly consist of high lignin items like food particles, plant stems, dry leaves, packing materials, coconut shells, etc. Jharkhand has deciduous category of forest and during spring season (Feb to March) plants are used to drop their dry leaves and bark annually. So during these season organic part of waste quantity used to increase due to excessive falling of leaves. However, these items have good calorific value & hence are combustible. Along with these organic combustible fractions, other items like leather, tyres, rags, etc. can be processed to produce RDF (Refuse Derived Fuel) having a reasonable calorific value. The RDF can be used as a substitute for coal in furnaces, kilns, boilers, etc.

B) Recyclables: Items like aluminum cans, glass bottles, LDPE/HDPE bags, etc. can be recycled. Since the recycling industry is well organized, recyclable materials can be separated & directly sold to the recycling industry.

C) Inert: Most of this inert material can be effectively used to produce building materials like interlocking tiles for pavement, hollow & solid concrete blocks for building walls, etc.

D) Remnants: While recovering various resources, process remnants will be generated & these remnants will have to be disposed-off in Sanitary Landfill Facility (SLF). The land fill burden will decrease due to the lower amount of incoming garbage.

Detail of Technology Adopted:-

1. Concrete Radial Loader-
2. Bio-Drying Unit
3. Manual Sorting conveyor with blower
4. Shredder
5. Volumetric Air Density Separator:
6. Vibrating Sever
7. Brick Making Machine
8. Weigh Bridge
9. On-site Laboratory

Process in Brief

1st step in waste processing is to receive waste and keep turning for three days for removal of surface moisture and dissipation of inherent moisture.

Thereafter its segregation into two different stream i.e. compost and Refused Derived Fuel (RDF).

Waste receiving and its Pre-segregation

• **Inspection:** This is done to ensure that fresh garbage received has only the specific constituents of the waste are received at the Composing Facility.

• **Weighing:** After the inspection, the garbage is weighed to record the quantity of fresh garbage received.

After the waste pre-segregation, the waste is received into the pre-processing section where the MSW collected in Bio-drying Unit is placed for 3 days. Bio- drying is a circular area divided in four parts. There is a loader in the Centre of bio-drying unit, which is worked for transferring MSW from one part to another part day by day for removing water droplets from MSW. Thereafter MSW is fed in feeding conveyor by Loader. Higher size fraction which is predominantly recyclable like bottles, glasses, mirror etc. and non-biodegradable is sent to manual picking conveyor where recyclable products are separated manually.

Thereafter the MSW is fed into Volumetric Air Density Separator (VADS) by feeding conveyor. There is a Magnetic Separator on the Belt Conveyor to separate Magnetic items. Magnetic separator is used to filter and remove metal contamination from MSW and to prevent damage to Volumetric Air Density Separator and Shredder. Here MSW is segregated into RDF, Compost Material and Inert in +75 mm and - 75 mm fractions.

The material coming in category of + 75 mm is fed in Hopper which is connected to shredder. Shredder is used to shred this MSW to prepare RDF.

-75 mm fraction mainly Bio degradable is conveyed through Belt Conveyor to Windrows Section for further processing. VADS output is divided into three phases: 1. Bio degradable, 2. Non bio degradable, and 3. inert. Bio degradable material size is -75 mm and it is sent to windrows and non-bio degradable materials size is +75 mm and it is fed to Shredder.

-75 mm fraction, which is almost 40% of MSW in VADS having 15-20% moisture is placed in windrows for 30-35 days by making hips. Here curing process also worked and leachate is also removed. After 30-35 days it is fed to Vibrating Sieve.

Vibrating Sieve is used to screen out large particle with 16mm sieve size screen. Filtered material will be further cured for 7 days to convert into compost. Further this will be fined screened through vibrating screen of 6mm sieve size to get final compost.

In this way the products i.e. Compost and RDF are prepared and stored and during RDF processing the Plant will segregate recyclables for further disposal.

The residual material of above process (inert) will be used make bricks through brick making machine. Any further residual shall be dumped in SLF.

Figure 3-4 Flow Sheet for Collection and Transportation of Solid Wastes

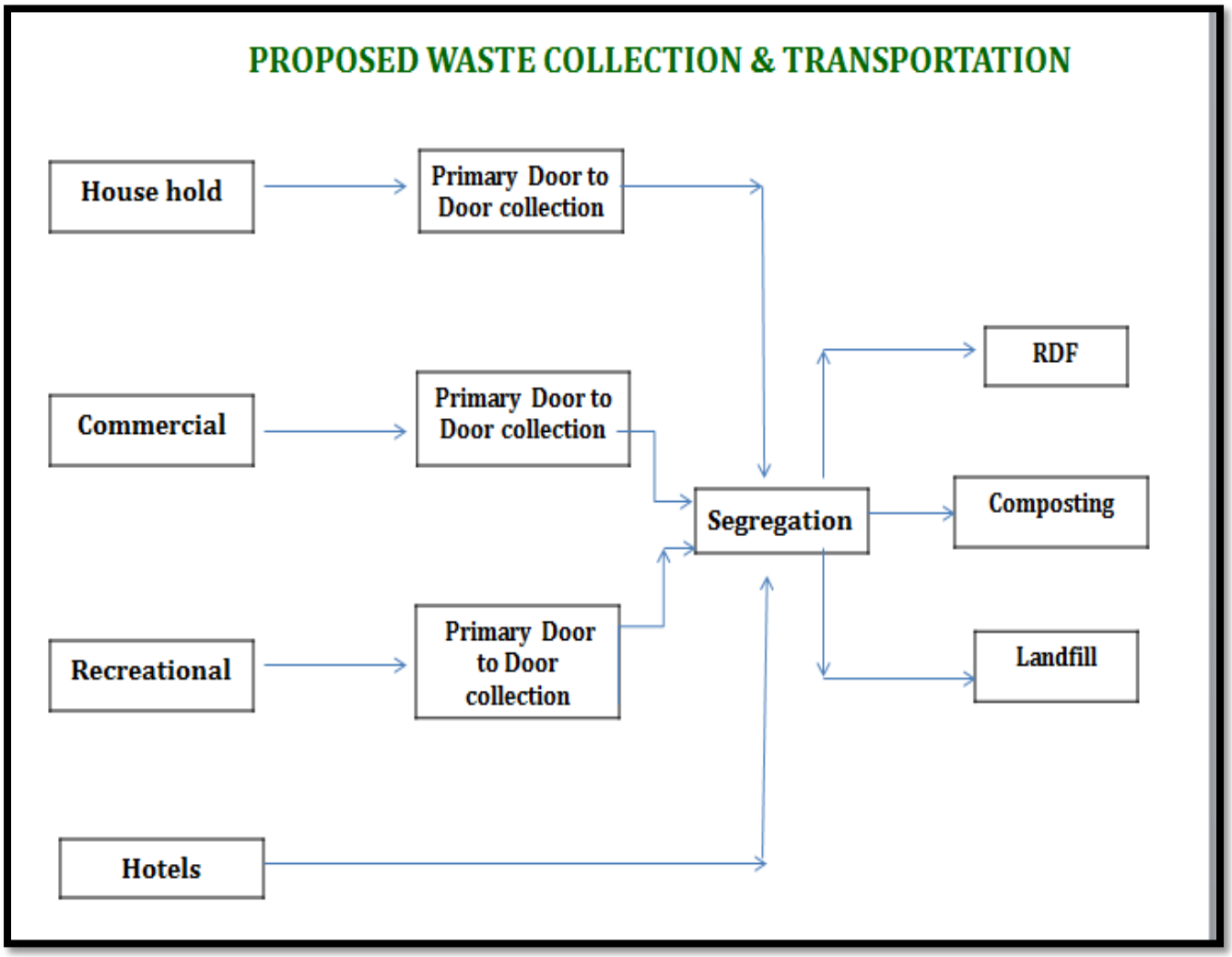


TABLE 3-2 Mass balance

MATERIAL FLOW & MASS BALANCE (21.03 TPD)

AS RECEIVED M S W		21.03
MOISTURE %		34%
B->BIOMASS/WOOD/PAPER/TEXTILE/organic	33%	6.94
R->PLASTIC/RUBBER/LEATHER/metal	12%	2.52
E->SAND/GRIT/EARTH	11%	2.31
S->STONES / CERAMIC / BRICKS	10%	2.10
MOISTURE	34%	7.15
TOTAL	100%	21.03

Manually sorted MSW	
MOISTURE %	5%
SOLID (B)	0.00
SOLID (R)	1.51
SOLID (E)	0.12
SOLID (S)	1.05
MOISTURE	0.14
TOTAL	2.82

Waste after Manual Sorting		18.21
MOISTURE %		39%
B->BIOMASS/WOOD/PAPER/TEXTILE/organic	38%	6.94
R->PLASTIC/RUBBER/LEATHER/metal	6%	1.01
E->SAND/GRIT/EARTH	12%	2.20
S->STONES / CERAMIC / BRICKS	6%	1.05
MOISTURE	39%	7.01
TOTAL	100%	18.21

Volumetric Air Density Separater

Grit & stone from VADS	
MOISTURE %	3%
SOLID (B)	0.00
SOLID (R)	0.00
SOLID (E)	0.88
SOLID (S)	0.42
MOISTURE	0.04
TOTAL	1.34

-75 MM MSW for Compost	
MOISTURE %	55.0%
SOLID (B)	4.51
SOLID (R)	0.05
SOLID (E)	0.92
SOLID (S)	0.19
MOISTURE	6.93
TOTAL	12.61

+75 MM MSW for RDF	
MOISTURE	20.0%
SOLID (B)	2.43
SOLID (R)	0.96
SOLID (E)	0.40
SOLID (S)	0.44
MOISTURE	1.06
TOTAL	5.28

MOISTURE	4.50

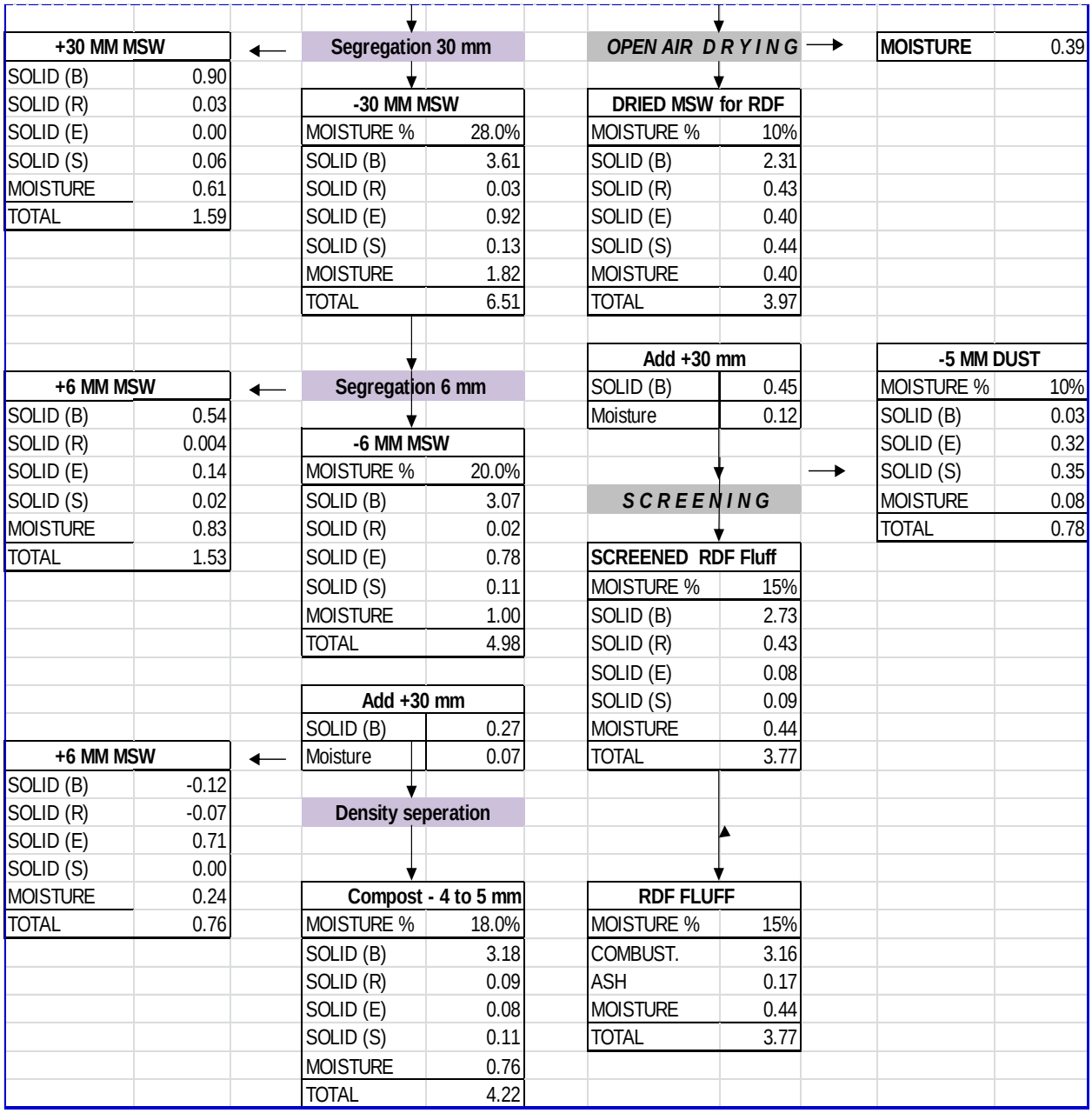
DIGESTION AT WINDROW

Size Reduction

-75 MM MSW	
MOISTURE %	30.0%
SOLID (B)	4.51
SOLID (R)	0.05
SOLID (E)	0.92
SOLID (S)	0.19
MOISTURE	2.43
TOTAL	8.11

MSW for RDF	
MOISTURE %	18%
SOLID (B)	2.31
SOLID (R)	0.43
SOLID (E)	0.40
SOLID (S)	0.44
MOISTURE	0.79
TOTAL	4.36

DRIED +75 MM MSW	
MOISTURE %	5%
SOLID (B)	0.12
SOLID (R)	0.53
SOLID (E)	0.00
SOLID (S)	0.00
MOISTURE	0.27
TOTAL	0.92



3.6 Raw material required along with estimated quantity, likely source, marketing area of final product/s, mode of transport of raw material and finished product.

In this project, the raw materials such as stones, aggregates, cement, sand, bricks, Geo membrane, PVC sheets, PVC pipes, steel, aluminum etc. will be used as construction material. During construction stage, the following raw material handling methods will be adopted:

1. Cement will be separately stored under cover in bales.
2. Sand & aggregates will be stacked under tarpaulin cover.
3. Temporary material storage yard will be constructed for storage of construction materials.

Construction materials will be transported by trucks or trolleys etc. Precautions will take to reduce the impact of the vehicular movement by avoiding the vehicular trips during peak hours. Also vehicle's speed limit shall be maintained during the construction and operation phase. Vehicles carrying the raw material will be covered during construction and operational phase as per the SWM Rules 2016.

During operation phase of solid waste management, the following waste handling methods shall be adopted.

1. Waste shall be ensured to cover under tarpaulin during transportation of waste.
2. Care shall be taken to avoid littering and spillages of waste on city road during transportation.
3. Segregation of waste shall be ensured at the generation point.
4. Moist waste shall be avoided to transport for avoiding of leachate spillages on city road.
5. Speed limit as well as traffic rule shall be followed during transportation of waste.

3.7 Resource optimization/ recycling and reuse envisaged in the project, if any.

The proposed project is an Integrated Municipal Solid Waste Management Project; the waste will be segregated into biodegradable and non-biodegradable waste. Bio-degradable waste will be processed and converted into compost and recyclable material will be sent to recyclers in which some fraction of materials shall be reused while remaining part will be recycled.

3.8 Availability of water, its source, energy/ power requirement and source

3.8.1 Water requirement

About 11KLD fresh water will be required for Domestic, Operation, dust separation & plantation purpose.

TABLE 3-3 WATER BALANCE

.N.	Utility	Water requirement(KLD)	Waste water generation (KLD)	Waste Water Reused	Remarks
1	Domestic	1.0	0.8	0	Sent to septic tank/soak pit
2	Floor washing /Vehicle maintenance shed	5.0	4.5	3.5	4.5 cum Flow in Leachate pond (1.0 Kl losses) 3.5 KL again use in to recirculate on windrow)
3	Process water	9.5	7.5	5.5	7.5 Kl Flow in Leachate pond (2.0 Kl losses) 6.0 KL again use in to recirculate on windrow)
4	Green belt	2.5	-	0	
5	Dust suppression	2.0	-	0	
	Total	20	12.8	9.0	
	Fresh Water requirement	**11**			

Power

Power consumption during the operational phase will be 50 KVA and will be supplied by (J.V.V.N.L).

3.8 Quantity of wastes to be generated (liquid and solid) and scheme for their management/disposal-

3.9.1 Solid waste generation & its disposal

As this is the Integrated Municipal Solid Waste Management Project. The stand-alone Sanitary Landfill facility is designed for 20 years from the base year 2018 till year 2038. A detailed inventory survey indicated that Total waste generated is 13.73 MT/day. The main sources of solid waste generation are residential areas, commercial markets, slums, institutional organization like schools, colleges hospitals, hostels and restaurants, small and big scale industries, construction and demolition waste (debris) etc.

Solid waste processing reduces the amount of material requiring disposal and, in some cases, also produces a useful product. Solid waste processing technologies include material recovery facilities, where recyclable materials are removed and/or sorted.

The generation of waste for project year is as estimated below: -

Table 3-4: Waste Projection

Year	Population	Waste generation
2018	54085	13.73 MT / day
2023		15.44 MT / day
2028	68522	17.16 MT / day
2033		19.09 MT / day
2038	86881	21.03 MT / day

Presently, the Chirkunda Nagar Panchayat comprises of 20 wards and from jurisdiction of each ward the estimated waste is as calculated below: -

Ward No.	Waste Generation								
	2018			2028			2038		
	Domestic	Comm.	Total	Domestic	Comm.	Total	Domestic	Comm.	Total
1	0.464	0.559	1.022	0.588	0.676	1.263	0.745	0.758	1.503
2	0.416	0.072	0.487	0.526	0.087	0.613	0.668	0.097	0.765
3	0.523	0.048	0.571	0.663	0.058	0.721	0.841	0.065	0.906
4	0.378	0.052	0.430	0.479	0.062	0.541	0.607	0.070	0.677
5	0.513	0.449	0.962	0.650	0.543	1.193	0.824	0.609	1.433
6	0.255	0.071	0.326	0.323	0.086	0.409	0.410	0.096	0.506
7	0.302	0.066	0.368	0.382	0.080	0.462	0.485	0.090	0.574
8	0.696	0.237	0.933	0.882	0.286	1.168	1.118	0.321	1.439
9	0.485	0.475	0.960	0.615	0.575	1.190	0.780	0.644	1.424
10	0.818	0.063	0.881	1.037	0.076	1.112	1.315	0.085	1.399
11	0.813	0.261	1.074	1.031	0.316	1.346	1.307	0.354	1.661
12	0.494	0.076	0.570	0.626	0.092	0.718	0.793	0.103	0.896
13	0.652	0.063	0.714	0.826	0.076	0.902	1.047	0.085	1.132
14	0.341	0.057	0.398	0.432	0.068	0.501	0.548	0.077	0.625
15	0.308	0.088	0.396	0.391	0.106	0.496	0.495	0.119	0.614
16	0.239	0.196	0.435	0.303	0.237	0.540	0.385	0.265	0.650
17	0.654	0.576	1.230	0.829	0.696	1.525	1.051	0.781	1.832
18	0.517	0.581	1.098	0.655	0.703	1.358	0.830	0.788	1.618
19	0.392	0.050	0.442	0.497	0.060	0.557	0.630	0.067	0.697
20	0.374	0.058	0.431	0.473	0.070	0.543	0.600	0.078	0.678
Total	9.64	4.092	13.73	12.21	4.95	17.16	15.48	5.55	21.03

3.8.2 Liquid Effluent

Peak leachate generation rate works out to 215.36 m3 /day during monsoon period. The leachate should be collected in 'leachate collection sump' and will be partially re-circulated to windrow and landfill and balance pumped to leachate evaporation pond.

Domestic wastewater generated at the site shall be treated in septic tank followed by soak pits. Sludge from soak pit shall be mixed with compost. Leachate generated at site will be collected in leachate collection sump and dumped to leachate evaporation pond. Since the leachate quantity is moderate solar evaporation ponds combined with aeration facility will be more suitable.

4. Site Analysis:-

4.1 Connectivity:-

S.No	Items	Distance and Direction (Approx.)
1	Nearest Railway Station	**Railway station-** Nearest railway station is Barakar railway station which is 2.71 km in NE direction.
2	Nearest Highway	SH-5 – 4.53 Km SE direction. NH-2 -4.12 Km N direction.
3	Nearest Airport	**Nearest Airport-** Birsa Munda Airport, Ranchi is about 157 Km in SW direction from project site.

4.2 Land Form, Land Use, and Land Ownership

Currently the land is owned by Nagar Parishad Chirkunda for proposed CMSWM project at Chirkunda.

4.3 Topography (Along with Map):-

The project site has almost flat topography. The land belongs to Pakur Nagar Parishad. The project area is free from vegetation, only some grasses are present but no tree is growing within project boundary.

FIGURE:-4.1 LAY OUT PLAN OF PROPOSED PROJECT

4.4 Existing land use pattern (agriculture, non-agriculture, forest, water bodies (including area under CRZ), shortest distances from the periphery of the project to periphery of the forests, national area, wild life sanctuary, eco sensitive areas, water bodies (distance from the HFL of the river), CRZ. in case of notified

industrial area, a copy of the gazette notification should be industrial area, a copy of the gazette notification should be given.

The project site is almost flat land. Currently, the site is vacant. The land is already provided to the Chirkunda Municipality from the Govt. of Chirkunda Nagar Parishad for the development of Solid waste management facility. **Documents are attached as Annexure-I.**

The distance of the Forest, National Parks, Wildlife Sanctuary, Eco sensitive area, water bodies are provided in Table No:-4.1.

4.5 Existing Infrastructure:-

Local road network is available for transporting the MSW.

Existing land use pattern and shortest distances from the boundary of the project to periphery of the forests, National Parks, Wildlife Sanctuary, Eco sensitive area, Water bodies, CRZ. In case of notified industrial area, a copy of the Gazette Notification is given Table No-----. Currently, the proposed site is vacant and its boundary doesn't come under the periphery of any sensitive areas. The land is already approved for the development of landfill under Chirkunda Nagar Parishad.

The distance of the Forest, National Parks, Wildlife Sanctuary, Eco sensitive area, water bodies are provided in below Table -4-1.

Table 4-1 Eco Sensitive Area

<table>
<tr><th>S.No</th><th>Description</th><th>Name</th><th colspan="4">Distance from the Project Boundary</th></tr>
<tr><td>1</td><td>National Park/Wildlife Sanctuary/Eco sensitive Area</td><td>NA</td><td colspan="4">No any notified National Park/Wildlife Sanctuary/Eco sensitive area are coming within the 10 Km of radius.</td></tr>
<tr><td>2</td><td>Protected Forest/protect forest</td><td></td><td colspan="4"><table>
<tr><th>S.No</th><th>Name</th><th>Distance (Km)</th><th>Direction</th></tr>
<tr><td>1.</td><td>Maithon Reservoir</td><td>5.83</td><td>N</td></tr>
<tr><td>2.</td><td>Barakar River</td><td>0.01</td><td>E</td></tr>
<tr><td>3.</td><td>Khudiya Nadi</td><td>2.52</td><td>SW</td></tr>
<tr><td>4.</td><td>Damodar River</td><td>5.56</td><td>SSW</td></tr>
<tr><td>5.</td><td>Panchet Rese</td><td>5.91</td><td>SW</td></tr>
</table></td></tr>
</table>

3	Water Bodies		**S. No**	**Name of PF/RF**	**Distance (Km)**	**Direction**
			6.	PF-1(Near Malthon Reservoir)	9.46	N
			7.	PF-2(Near Malthon Reservoir)	9.63	NNW
			8.	PF-3(Near Malthon Reservoir)	9.34	NNW
			9.	PF-4 (Near Village Jalpur)	9.28	NNW
			10.	PF-5 (Near Village Jalpur)	9.05	NNW
			11.	PF-6 (Near Village Jalpur)	8.87	NNW
			12.	PF-7 (Near Village Jalpur)	8.56	NNW
			13.	PF-8 (Near Village Jalpur)	8.16	NNW
			14.	PF-9 (NV Pahardbad)	8.03	NNW
			15.	PF-10 (NV Pahardbad)	7.76	NNW
			16.	PF-11 (NV Pahchman Pahar)	7.21	NNW
			17.	PF-12 (NV Ganga)	7.61	N
			18.	PF-13 (NV Ganga)	7.16	N
			19.	PF-14(In site Malthon Reservoir)	7.94	NNW
			20.	PF-15(In site Malthon Reservoir)	6.88	NNW
			21.	PF-16(N/V Kalyaneshwarl)	6.90	NNW
			22.	PF-17 (N/v Amkura)	5.03	NNW

Note: - No CRZ is coming within 10 km of radius of proposed project site.

4.6 Existing infrastructure

Till now only land area has been demarcated with fixing of pillars. Besides this any development work has not yet started at the project site. There is no built-up structure erected at project site.

4.7 Soil classification

The soils of the district are mostly of the residual type. High temperature and high rainfall have led to the formation of lateritic type of soils from rocks of Archean metamorphic complex exposed in the greater part of the district and also from the lower Gondwana rocks in the west-central and east central parts. Texturally the soils of the district have been classified into four classes---

A. Stony and gravelly soils- These are low-grade soils having a large admixture of cobbles, pebbles and gravels generally found at the base of the hills.

B. Sandy soils— these types of soils are generally found near the river and streambeds. They contain more than 60 percent sand and poor in plant nutrients. They are also called hungry soils because of heavy manuring required.

C. Loamy soils- They consist mostly detritus of decomposed rocks and vegetable matter and contain between 30 to 60 percent sand.

D. Clayey soils -These soils are sticky when wet and very hard and difficult to break when dry. They are very fertile but yield in such soils improve with addition of sand, lime, coarse bulky manures etc. Climatic data from secondary sources.

Climatic condition-The climate is tropical in Chirkunda. The summers are much rainier than the winters. This climate is considered to be Aw according to the Köppen-Geiger climate classification. Climatically the whole year can be divided into three periods. From February to May, the weather is dry and moisture less. The wind direction is predominantly from the North-East to South-West during winter season and South-West to North-East during summers. The temperature here averages 26.4 °C. With an average of 32.8 °C, May is the warmest month. The lowest average temperatures in the year occur in January, when it is around 18.9 °C. The greatest amount of precipitation occurs in July, with an average of 310 mm. The precipitation varies 308 mm between the driest month and the wettest month. The average rainfall in Chirkunda is 1221 mm. There is 2 mm of precipitation in December. Here important trees within and in the surrounding area of the town are Shisham, Palas, Neem, Mango, Kanthal etc.

4.8 Social infrastructure available

Table 4-2 Details of social Infrastructure

S.No	Items	Distance and Direction (Approx.)
1	Nearest School	No school within 1 Km
2	Nearest Hospital	No school within 1 km
3	Nearest Railway Station	**Railway station-** Nearest railway station is Barakar railway station which is 2.71 km in NE direction.
4	Nearest Highway	SH 5 (4.53 km) in SE direction. NH-2 (4.12) Km) in N direction
5	Nearest Airport	**Nearest Airport-** Birsa Munda Airport, Ranchi is 157 Km in SW direction from project site.

4.10 Compliances of SWM Rules:-

With considering the potential of impact due to adopted activities for processing and landfill the distance of buffer zone is regularly prescribed by regulatory agencies. The compliance of site selection criteria for proposed landfill facility as per SWM Rules, 2016 is as presented below-

Table 4-3Compliances of Selected Landfill as per SWM Rules, 2016

Criteria for landfill site	Required as per SWM Rule 2016	Actual Position
Design Life Period	20-25 years	for 20 years
Distance from River	>100 Mtrs	No river flowing within 100 m from the land fill site.
Distance from Pond	>200 Mtrs	Not applicable
Distance from Highway	>200 Mtrs	Distance of highway is more than 200 m from the project boundary
Distance from Habitation	>200 Mtrs	No habitation is settled within 200m from the project boundary
Distance from Public Parks	>200 Mtrs	No public park exit in 200m from the project boundary
Distance from Water supply wells	>200 Mtrs	No any water supply well was observed within 200m from the project boundary
Water table*	2 m from bottom liner of landfill	Criteria complied
Earthquake zone*	500 m from fault line fracture	The project district comes under seismic zone III.
Airport/Airbase	>20Kms	Birsa munda airport 157 km SW
	10-20 Kms.	
Floodplains (100 Yrs.)	Not Allowed	Not Applicable
Zone of Coastal Regulations	Not Allowed	

Criteria for landfill site	Required as per SWM Rule 2016	Actual Position
Wetland	Not Allowed	
Critical Habitat Area	Not Allowed	
Sensitive Eco Fragile Area	Not Allowed	
General Conditions: EIA Notification 2006;Project is category A if	EIA Notification 2006; Requirement	Yes, the project falls under interstate boundary of West bengal which is distance about 0.27 km in N direction from project site.
Protected Area under Wildlife	>10 Kms	Not Applicable
Critically Polluted Area under CPCB	>10 Kms	Not Applicable
Notified Eco Sensitive Area	>10 Kms	Not Applicable
Interstate Boundaries or International Boundaries	>10 Kms	West bengal state border is at distance of 0.27 km in SE direction from proposed project boundary.

5.0 PLANNING BRIEF:-

5.1 Planning concept (Type of industries, facilities, transportation etc.) town and country planning/development authority classification.

Type of Facility: Integrated Municipal Solid Waste Management Facility

Facility Planned: - Development of sanitary Landfill, Composting & RDF plant

Estimated Development Cost of the Project: Approx. Rs. 790.22 Lacs
Total Area 10.0 Acre

Capacity of Processing Facility-25 TPD

5.2 Population Projection:

Projection of population was carried out. The details of population projection are presented in Table – 5-2.

5.3 Trend of Population Growth

The population growth Trend and forecasting in Pakur Nagar Parishad is mentioned in Table-5-2

Table 5-2 Population Forecasting

Year	Population(As per G.P.formula)	Population (A.P. Formula)	Population (I.I. Formula)	Average of 1,2,3
1971	12945	12945	12945	12945
1981	15539	15539	15539	15539
1991	33535	33535	33535	33535
2001	39131	39131	39131	39131
2011	45508	45508	45508	45508
2021	64716	53649	54910	57758
2031	92032	61790	65573	73131
2041	130877	69930	77496	92768
2051	186119	78071	90681	118920

5.4 Land use Planning (Break up along with green belt, etc.)

The total project area is 10 Acre. The land use breakup of the area is provided in Table-5-3 below:

Table 5-3 Land uses break up of proposed facility

S.N.	Area	In Sqm
1	Built up area	1328.29
2	Plat form area	800.00
3	Road area	290.50
4	Plantation area	14038.00
5	Landfill area	6538.25
7	Open area	1361.86
	Total area	24356.90

5.5 Assessment of Infrastructure Demand (Physical & Social)

Boundary wall, internal roads, Guard room, Weigh Bridge Room, HT-LT & MEP(Mechanical, Electrical and Plumbing) room, Generator Room, Office building, Workers Retiring Room, Toilet Block, Septic Tank and parking facilities will be provided at the site.

5.6 Amenities/Facilities

The following facilities/amenities will be extended by the proposed project:

a) Arrangements for safe and healthy working conditions & temporary rest shelters.

b) Provision of drinking water facility.
c) Provision of PPE for workmen.
d) First-Aid facilities and health check-up camps for the workers.
e) Conducting medical camps for workers and nearby villagers at regular interval.
f) Provision of firefighting system.
g) Provision of Laboratory and canteen facility.

6. Proposed Infrastructure

6.1Industrial Area (Processing Area):

This activity is not applicable to this project as it is an Integrated Municipal Solid Waste Management facility project. However, the facility is proposed to process the biodegradable waste through Composting & RDF.

6.2 Residential Area (Non Processing Area):

The labour will be employed from nearby villages hence there is no requirement to establish residential settlement within project site.

6.3Green Belt:

A green belt will be planed, tall growing trees is to be developed along the periphery of the project boundary and inside the buffer area. Within project site, about 33 % of total area will be planted & maintained with green plantation in which local herbs and shrubs for plantation to enhance the landscaping of facility. The long tree will break the wind velocity and their direction which leads to mitigate particulate and other air pollution.

6.4 Social Infrastructure:

a) Employment opportunity
b) Medical camps
c) Social awareness camps
d) Safe & Hygienic conditions

6.5 Connectivity:

1	Nearest Railway Station	Barakar railway station 2.71 km in NE
2	Nearest SH/NH	SH5 4.53 Km in SE NH2 4.12 km in N

6.6 Water management:

About 11KLD fresh water will be required which will be fulfil through PHED supply.

6.7 Sewerage system:

The domestic wastewater generated at the site shall be treated in septic tank followed by soak pits. However, provision of PHYTORID based system has been kept also. Sludge from soak pit shall be mixed with compost. Leachate generated at site will be collected in leachate tanks and solar evaporation pond for its proper management.

6.8 Industrial waste management:

The proposed project doesn't have such activity, which will generate any industrial waste.

6.9 Solid waste management:

It is itself an Integrated Municipal Solid Waste Management facility project. The generated solid waste will be collected with following guidelines of SWM Rules, 2016 and shall be an integral part of proposed processing and disposal facility

6.10Power requirement & supply/source:

The estimated power consumption during the operational phase will be ……50….KVA which will be procured under the agreement with JBVNL.

7.0 Rehabilitation & Re- Settlement (R & R) plan:-

The land is already approved for the development of processing facility under the Chirkunda Nagar Panchayat. This project doesn't tend to displacement of any local settlements and communities hence, does not require a resettlement and rehabilitation study and plan. The proposed land is barren land and free of settlements area.

8.0 Project schedule & cost Estimates:-

8.1 Likely date of start of construction and likely date of completion.

The project will commence once Environmental Clearance and other necessary clearances are obtained from the respective departments. Estimated project cost along with analysis in terms of economic viability of the project

Total cost of the project is Rs.- 790.22/-Lacs, which includes all components of facility like processing facilities, common facilities, sanitary landfill, RDF plat, Composting plant as well as Collection, Transportation and Monitoring system.

Table 8-1 Capital cost of the project

S. No.	Particular	Total Cost in Lacs
A	Primary collection storage and transportation	130.22
B	Monitoring and tracking system	34.68
C	Site development works	173.43
D.	Estimate on cost of the plant	323.54
E	Development of sanitary landfill	80.35
F	Carriage	17.29
G	Cost of EIA and other statuary document	20.00
H	Labour Cess@1%	2.91
I	Contingencies	7.80
	Total cost	**790.22**

9.0 Analysis of proposal (final recommendations):-

9.1 Social Benefits

Living condition of the local inhabitants shall be improved as per social and environmental aspects. No open dumping will be carried out after development of processing facility. This will improve the living standard of society & will provide safe & hygienic surroundings. It will also eliminate the passage of solid waste/ garbage problems in sewer lines. Hence choking of sewer in rainy season shall be sort out up to maximum extent. Further it will reduce the emission of road dust, which mostly generated due to the spreading of solid and C&D (Construction and demolition) waste on road and road side. Road dust emission has the adverse effect on the health of local people. The fine dust particle gets pass through the nasal opening and finally trapped on the lungs alveoli of human beings and causes the pulmonary diseases. This is the major health issues in the urban areas, which would be under controlled upto maximum extent after the implementation of solid waste management facility.

a) Enhancement of Aesthetic Value of Area:

It will control the roaming of cattle & other stray animals around the existing open dump site. Such animals creates disturbance to the society. It will control the diseases which get spread due to the unattended waste lying at dumping site which attracts flies, rats, and other creatures that in turn spread disease in society. This leads to unhygienic conditions and thereby to a rise in the health problems. Open dumping of waste also creates an unpleasant view and leads to emission of mal odour. Through this project a scientific technology of waste management shall be developed. An entry gate & wired

fence will be provided around the project site to prevent entry of stray animals & cattle. A thick green belt will also be developed around project site. The project will successfully lead to improvement in aesthetic and environmental value of the area and society.

b) Direct & indirect employment opportunities

About 13employees will be employed during project operation phase. About50-60 indirect employment will be generated for primary/secondary collection, transportation etc.

9.2 Economic Benefits:

a) Revenue from Waste:

Waste is material that is generally being rejected as it has no use for the people and society. This project comprises of collection of waste, waste processing & safe disposal. From the municipal waste following products will be recovered, which can generate revenue.

1) Recyclables
2) Compost
3) Inert waste as filler material.
4) Waste to Energy Generation

b) Improved economic status

Project will generate both direct & indirect employment. Local people will be preferred for giving employment. This will improve economic status of the area. Emigration of local people to other parts of state/country due to unavailability of employment will be reduced. It will improve to generate in house employment for the local resident. Also some secondary job and associated business opportunities shall be generate, which in turn will be the economic benefits for the society.

c) Conservation of natural resource

Compost produced is rich in nutrient & serves as organic manure. An application of this manure saves fertilizers and simultaneously reduces the fertilizers load on agriculture land. This is cost effective for farmers as it is cheaper than fertilizers & also prevents soil salinity & eutrophication. This is itself a good soil conditioner for enriching the organic matter and nutrients contents to the agriculture field. It will gradually improve the physiochemical and biological properties of soil of agricultural land where compost

application will be induce in practices. Conservation of our natural resources like ground water is fully protected on priority basis. Liner system is proposed in landfill base part in order to fully control of leaching of leachate and contamination of underground water. Hence our precious natural resources underground water is keep on full protection.

9.3 Environmental Benefits:

It will ensure the prevention of air, water & soil contamination. No open dumping of waste will be carried out, which leads to soil, water & air pollution. Also littering of waste and waste leachate is the major sources for breeding of mosquitoes and other disease vectors in the local areas. This project involves scientific management of waste which will prevent spreading of diseases and environmental pollution. Also during the whole process of waste processing, provision for leachate management has been ensured scientifically, so contamination of ground water due to waste handling has been made totally under controlled. It will definitely improve the aesthetic and environmental view of city.

Almost all the environmental and social ill effects and adverse impacts will be controlled by scientifically managing the waste at the processing plant and disposing of the rejects emanating from the treatment plant at the engineered sanitary landfill.

a) Development of green belt:

Green belt will be developed along the periphery of facility. Also development of grass lawns, local herbs and shrubs will be planted to develop green buffer at the landfill site. This will help in mitigating dust & noise pollution and improving the aesthetic and landscaping view of facility.

b) Landfill Closure:

The exhausted landfill shall be capped scientifically and further grasses and vegetation shall be developed on the capped landfill accordingly the closure plan, which will be further rehabilitate as a recreational site.

The landfill capping system shall be followed as per the approved drawing. The maximum height of the waste dumping would be up to 10 m above the bund. The Landfill will be capped as per the SWM 2016 Rules. The waste will be graded to the necessary stable slopes by placing of various layers which will be placed for the landfill capping.

Passive Gas wells will be suitably placed in this layer so that the quantity of gas that is formed would be released into air. The possibility of having large quantity of landfill gases will be very less as the waste going into the landfill would be of inert nature. A soil layer of 300 mm thick will be placed over waste.

The Geosyntehic Clay Liner (GCL) will be placed on top of the soil layer and above that 1.5 mm thick HDPE liner will be placed to reduce the infiltration of rainwater into landfill. A 5mm thick Geonet layer will be placed as a drainage layer over which a soil layer of 450 mm thick will be placed for vegetation. A geotextile of 350 gm/M2 will be placed on the geonet layer to separate the soil layer. The geonet layer will be helpful in draining of the excessive water entering the topsoil layer.

10 Conclusions:-

Overall the project is more feasible for the development of solid waste management facility at the proposed site at Mauja-Kapasada, Thana No.-255, Khata No- 114, Plot No-123, Rakba-10.0 Acre District-Dhanbad (Jharkhand) Rakba-10.0acre. This is sufficient for the establishment of proposed project for the 20 years of projection from the base year 2018.