



PRE FEASIBILITY REPORT

for

Proposed Sanitary Landfill, Okhla, New Delhi

Project Proponent



South Delhi Municipal Corporation

Room No. 16, Ambedkar Stadium

New Delhi-100 002



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1. EXECUTIVE SUMMARY

This Summary presents the highlights of the proposed project for setting up of Municipal Solid Waste Landfilling at Okhla Dump site. It has been decided to close the existing Okhla Dump site and to establish an Engineered Landfill site at the recently allotted space. New Sanitary Landfill at Okhla, Delhi is being proposed and the existing Landfill Site at Okhla is to be closed scientifically. The project is a very high priority project and in the interest of the Nation having Prime Minister's Office Intervention (Ref. Annexure I attached). South Delhi Municipal Corporation (SDMC) is the Proponent of this project.

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. The project is Category A due to general condition applied and will require Environmental Clearance from Ministry of Environment, Forest & Climate Change (MoEF&CC), New Delhi.

Table 1

| S.NO. | Information | Details | | | | |
|-------|----------------------------------|--|-------|--------------------|-----------------|--|
| 1. | Project name | Proposed Sanitary Landfill At Okhla | | | | |
| 2. | Area | Total Project Area-32 Acres | | | | |
| 3. | Name of Proponent | South Delhi Municipal Corporation | | | | |
| 4. | General Conditions | <p>Following are falling within 5 Km radius of the project site:</p> <ul style="list-style-type: none"> • 'Delhi-Haryana Interstate Boundary' • 'Asola Wildlife Sanctuary' • Okhla Industrial Area is Notified Critically Polluted Area • ESZ around Asola Wildlife Sanctuary & Aravalli Range | | | | |
| 5. | Site Location | | | | | |
| | Village | Tekhhand, Okhla | | | | |
| | Zone | South East Delhi | | | | |
| | State | Delhi | | | | |
| 6. | Water Requirement and its Source | Water Requirement is given below: | | | | |
| | | <table border="1"> <thead> <tr> <th>Phase</th> <th>Construction Phase</th> <th>Operation Phase</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | Phase | Construction Phase | Operation Phase | |
| Phase | Construction Phase | Operation Phase | | | | |
| | | | | | | |



| | | | | |
|-----|-----------------------------|--|---------------|----------------|
| | | Construction/ Operation | 8 KLD | 400 KLD |
| | | Dust Suppression & Greenbelt development | 2 KLD | 6 KLD |
| | | Total | 10 KLD | 406 KLD |
| | | #Source of the water will be treated water from existing ETP in Okhla & Delhi Jal Board. Water balance chart will be incorporated in EIA Report. | | |
| 7. | Power Supply and its Source | Electricity supply Grid | | |
| 8. | Project Cost | Rs. 45 Crores | | |
| 9. | Nearest Railway Station | Tuglaqabad Railway Station-approx. 1 km in the E | | |
| 10. | Nearest Metro Station | Tuglaqabad Metro Station-approx. 1.5 km in the ESE | | |
| 11. | Nearest Highway | NH-2- approx. 1.5 km in the E | | |
| 12. | Nearest Airport | Indira Gandhi International Airport- approx.. 17 km in the WNW | | |

2. INTRODUCTION OF THE PROJECT/BACKGROUND INFORMATION

2.1 Identification of Project and Project Proponent

New Sanitary Landfill at Okhla, Delhi is being proposed in an Area of 32 Acres and the existing Landfill Site at Okhla is to be closed scientifically. The project is a very high priority project and in the interest of the Nation having Prime Minister's Office Intervention (Ref. Annexure I attached). South Delhi Municipal Corporation (SDMC) is the Proponent of this project.

Name & Address of the Project Site:

Proposed Sanitary Landfill at Okhla
 Tehkhand, Okhla, SouthEast Delhi

Name and Address of the Project Proponent:

South Delhi Municipal Corporation
 9th Floor, Dr. SPM Civic Centre, JLN Marg,
 New Delhi, Central Delhi, Delhi, India, 110002

Name & Address of Contact Person

Mr. Ajay Kumar Agrawal (Authorized Signatory)



Executive Engineer (Store)
South Delhi Municipal Corporation
Room No. 16, Ambedkar Stadium,
JLN Marg, New Delhi – 110 002

2.2 Brief description of nature of the project

South Delhi Municipal Corporation intends to close the existing Landfill Site at Okhla and to facilitate a new Municipal Solid Waste Management facility by creating an efficient waste segregation, collection, transportation, processing (processing is part of interlinked WtE Project) and disposal mechanism in conformity with the SWM, 2016. The total area designated for landfilling activities is 32 acres. The project process are as follows:

- Landfill Base - Sealing System
- Leachate Collection & Treatment
- Landfill Gas Management
- Covering of waste:- a. Daily Cover, b. Cover in Monsoon

2.3 Need for the project and its importance to the country or region

There is already an existing Landfill in Okhla which is used to dump the Municipal Solid Waste in the region which is on the verge of getting exhausted and its closure needs to be processed as soon as possible. To manage the waste which is presently being dumped into the existing landfill, a new landfill is needed to be constructed and operated.

The Project is presently high priority at regional, State and Country Level due the following major reasons:

- Close association with Environment of Capital City of India
- To avoid recent accident occurred in the Region (Ghazipur Landfill Collapse, 2017)
- Air Pollution being caused by existing Landfill Site adding to the Delhi Air Pollution

In light of all the above, this project has the prime requirement in the area.

The principles which govern the future approach to provision of Municipal Solid Waste Management Landfill services include the following:

- Promoting awareness of waste management principles among citizens and other stake holders
- Minimizing multiple and manual handling of waste and designing a system to ensure that MSW does not touch the ground till treatment and final disposal.
- Defining the roles and responsibilities of various stakeholders and putting in place an operational frame work, which would include appropriate contractual structures.
- Developing systems for effective resources utilization and deployment.



- Promoting recovery of value from MSW; developing treatment and final disposal facilities, which, while adhering to the statutory requirements are sustainable, environmental friendly and economical.

2.4 Demands-Supply gap

This point is not applicable to this project as it is not a manufacturing or production unit. However, It has been decided to close the existing Okhla Dump site and to establish an Engineered Landfill site at Tehkhand, Okhla. Therefore, South Delhi Municipal Corporation has proposed sanitary landfill at Okhla for scientific disposal of inert waste of the area having life of approx. 5 years which is planned to be increased by installation of waste reduction/augmentation techniques.

2.5 Imports vs. Indigenous Production

This point is not applicable.

2.6 Export Possibility

The project is Municipal Solid Waste Management Landfill facility and is used to manage the Solid waste. Thus this point is not applicable.

2.7 Domestic/ Export Markets

The project is only use to facilitate the sanitary or solid waste does not require any big export to the market, only recyclables such as metals, plastics, polythene, glasses etc. is purchased by Kabadiwalas or further sold by rag pickers to local or private agencies/markets.

2.8 Employment generation (Direct and indirect) due to the project

For construction of landfill sites there would be requirement of local unskilled, semiskilled and skilled people. Also during operation period there would be requirement of unskilled, skilled and semi-skilled 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. Approx. 20-25 individuals will be benefitted directly and approx. 250 individuals will be involved indirectly (supply chain). The project might also open prospects for business startup units interested in dismantling/recycling waste.

3. PROJECT DESCRIPTION

3.1 Type of project including interlinked and interdependent projects, if any.

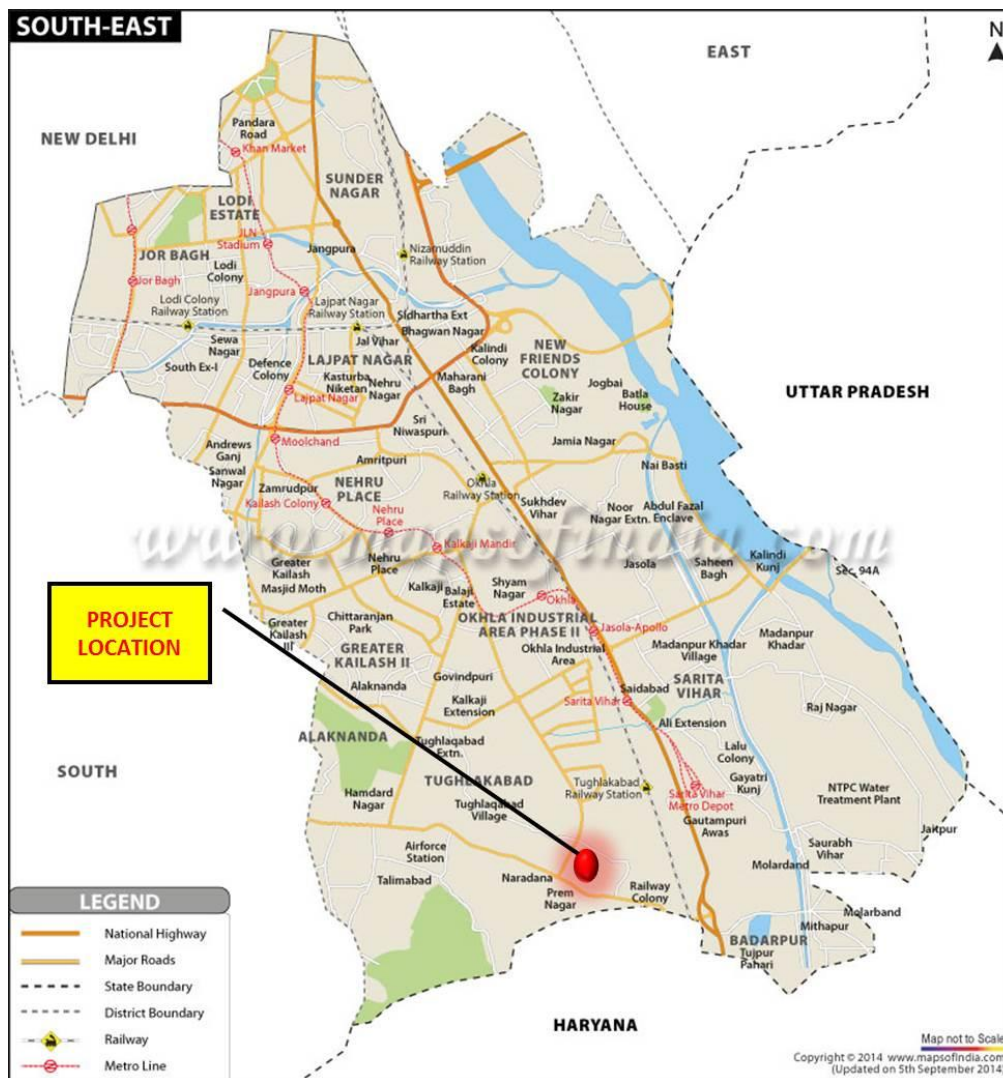


The proposed project is a municipal solid waste, as this dump site is proposed for the setting up of Landfill facility at Okhla. The landfill project has an interlinked project being Proposed (25 MW Waste to Energy Plant) by “Tehkhand Waste to Energy Project Limited” in allotted land at Okhla, adjacent to the proposed landfill. (Ref. Annexure I)

3.2 Location

The proposed Municipal Solid Waste Management Landfill site is located at Tehkhand, Okhla, Southeast Delhi, New Delhi.

Fig. 1 Location of the Project on South-East Zone Map of Delhi



Coordinates of the project site:

| | |
|----------|-----------|
| Latitude | Longitude |
|----------|-----------|



| | |
|---------------|---------------|
| 28°30'23.06"N | 77°16'56.86"E |
|---------------|---------------|

Map showing general location of the project site is given in Figure below on topographical map of 5km radius is provided.

Fig. 2 Location of Project on Sol Toposheet

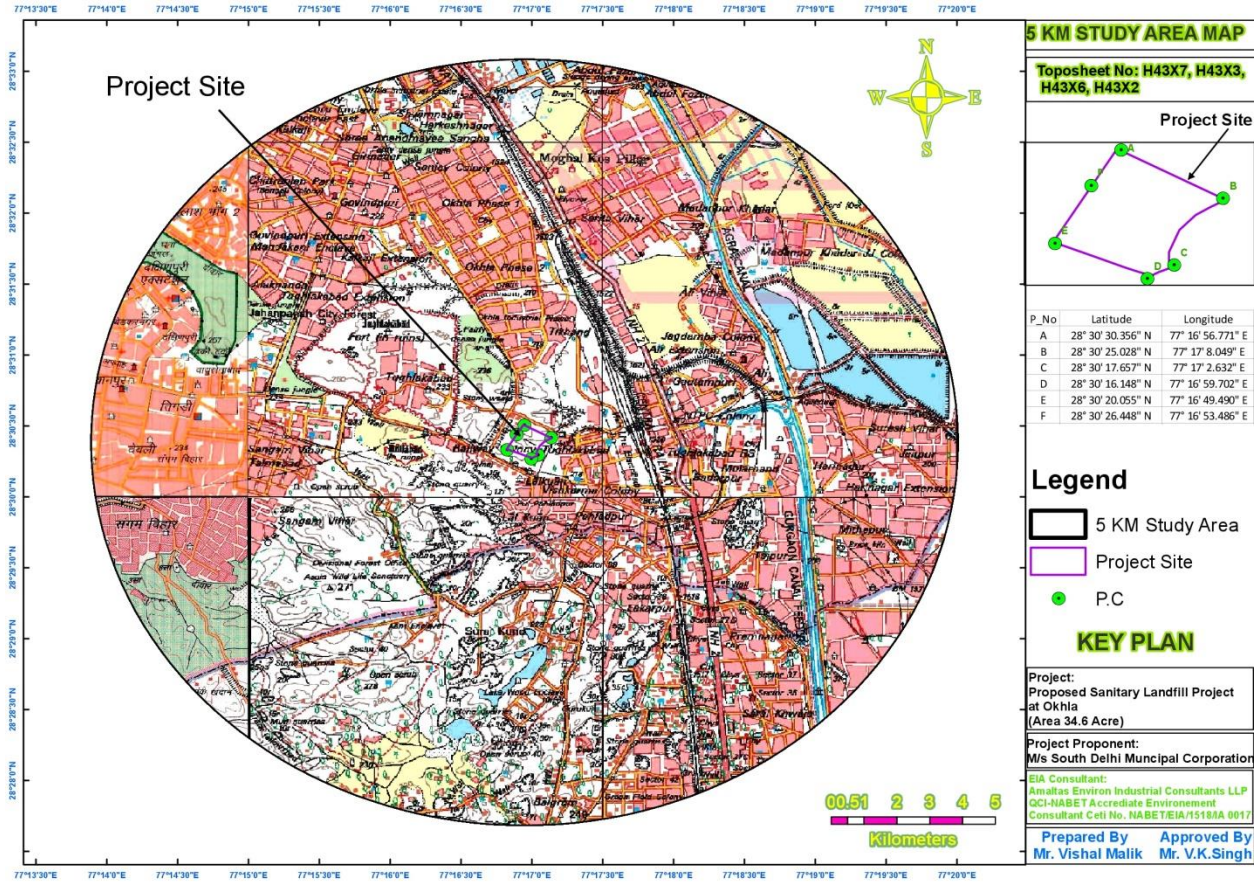
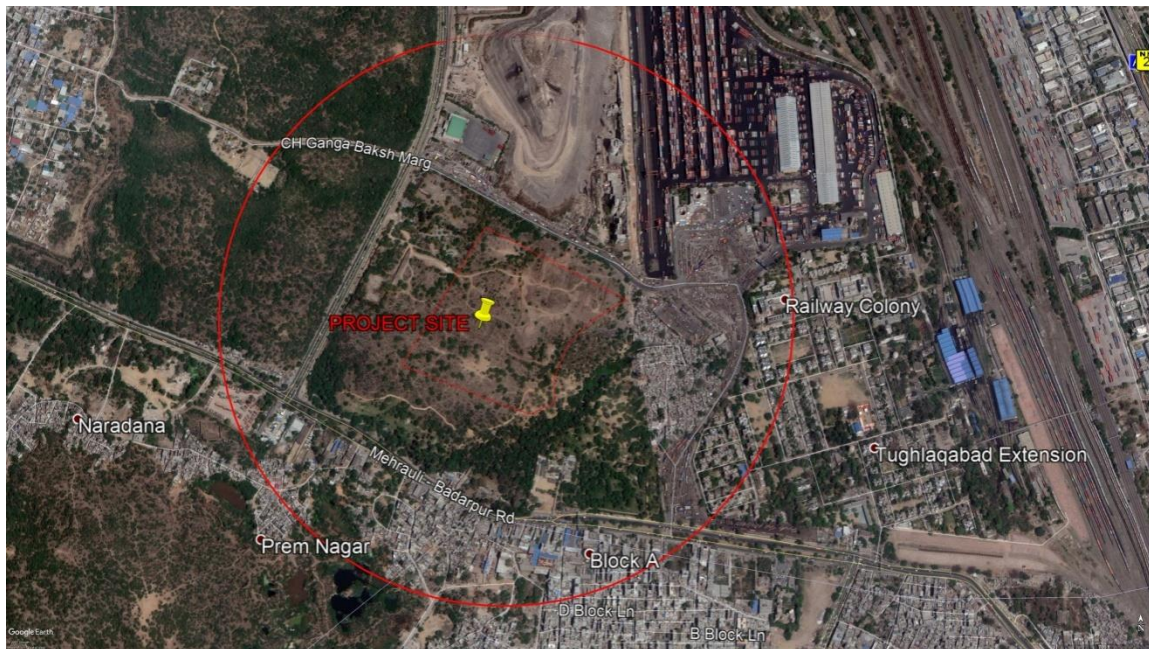




Fig 3. Google Image showing Site Location & Area in close vicinity



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

Due to following reasons, location of Okhla is suitable for the development of Sanitary Landfill Site:

- Availability of authorized land with SDMC
- The Site is accessible by Roads Network.
- Okhla has an existing Sanitary Landfill site which is North to new proposed Landfill site which has been decided to close.
- After extensive deliberation this site has been finalized.

**Table 1: Compliance to Schedule I Of SWM Rules, 2016
 Specifications for Sanitary Landfills (A) Criteria for site selection**

| S. No. | Criteria | Compliance |
|--------|--|--|
| 1. | The department in the business allocation of land assignment shall provide suitable site for setting up of the solid waste processing and treatment facilities and notify such sites. | Delhi Development Authority has allotted the site to South Delhi Municipal Corporation |
| 2. | The sanitary landfill site shall be planned, designed and developed with proper documentation of construction plan as well as a closure planning a phased manner. In case a new landfill facility is being established adjoining an existing landfill site, the closure plan of existing | The sanitary landfill Detailed Project Report, Environment Impact Assessment, Environment Management Planning; Landfill Closure Planning is being prepared by ECO DESIGNS INDIA PRIVATE LIMITED, Pune. |



| | | |
|----|---|--|
| | landfill should form a part of the proposal of such new landfill. | |
| 3. | The landfill sites shall be selected to make use of nearby wastes processing facilities. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site. | Landfill site has been selected keeping in mind nearby existing wastes processing facilities. |
| 4. | Landfill sites shall be set up as per the guidelines of the Ministry of Urban Development, Government of India and Central Pollution Control Board. | As per guidelines of MoUB, CPCB, site has been selected by Delhi Development Authority |
| | <p>As per CPCB Guidelines and Check-list for evaluation of MSW Landfills proposals with Information on existing landfills, - August, 2008</p> <p>Landfill identification shall be done by 'Development Authorities' for the area falling under 'Development Authority', otherwise it shall be done by the concerned Municipal authority. The site selection shall be done based on examination of environmental issues. The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan. The landfill facility shall be nearby waste processing plant or an integral part of it. The landfill site shall be designed for 20-25 years. The proposed landfill site should be away from habitation clusters, forest areas, water bodies, monuments, national Parks, Wetlands and places of important cultural, historical or religious interest. Also, approval shall be taken from the concerned authorities in case the landfill site is located within 20 km from the airport/airbase.</p> <p>As per MoUD MUNICIPAL SOLID WASTE MANAGEMENT MANUAL, 2016</p> <p>The selection of a suitable site for sanitary landfill is governed by the strategy identified in the state SWM strategy or policy and the MSWM plan of the ULB. The SWM Rules, 2016 provides criteria for the location of the sanitary landfill. CPCB's guidelines for the selection of site for landfilling should be used as a guiding document.</p> | <p>Delhi Development Authority has allotted the site to South Delhi Municipal Corporation with Hon'ble PMO's intervention. The sanitary landfill Detailed Project Report, Environment Impact Assessment, Environment Management Planning; Landfill Closure Planning is being prepared by ECO DESIGNS INDIA PRIVATE LIMITED, Pune. The life of landfill site is approx 5 years which is planned to be increased by installation of waste reduction/augmentation techniques</p> <p><u>Nearest JJ Cluster:</u> Adjacent to proposed site. <u>Protected Area:</u> Nearest WLS is Asola WLS Approx. 3.5 Km away in SW. <u>Nearest Historical Monument:</u> Tuglaqabad Fort, 2Km WNW.</p> <p>Approval from all the concerned authorities will be taken and incorporated in EIA Report.</p> |
| 5. | The existing landfill sites which are in use for more than five years shall be improved in accordance with the specifications given in this Schedule. | Closure of Existing Landfill will be done in accordance with SWM Rules, 2016; CPCB Guidelines and Check-list for evaluation of MSW Landfills proposals with Information on existing landfills, - August, 2008 and MoUD, Municipal Solid Waste Management Manual, 2016 |



| | | |
|-----|---|---|
| 6. | The landfill site shall be large enough to last for at least 20-25 years and shall develop 'landfill cells' in a phased manner to avoid water logging and misuse. | The life of landfill site is approx approx 5 years which is planned to be increased by installation of waste reduction/augmentation techniques. Development of 'Landfill cells' will be incorporated in the plan. |
| 7. | The landfill site shall be 100 meter away from river, 200 meter from a pond, 200 meter from Highways, Habitations, Public Parks and water supply wells and 20 km away from Airports or Airbase. However in a special case, landfill site may be set up within a distance of 10 and 20 km away from the Airport/Airbase after obtaining no objection certificate from the civil aviation authority/ Air force as the case may be. The Landfill site shall not be permitted within the flood plains as recorded for the last 100 years, zone of coastal regulation, wetland, Critical habitat areas, sensitive eco-fragile areas. | Distance from Project Site is as below: <u>Distance from nearest River: 5 Km</u> <u>Distance from Nearest Pond: 1 Km</u> <u>Distance from nearest habitation: 200 m</u> <u>Distance from nearest Airbase: 2 Km</u> Buffer Zone as per "Guidelines on the provision of Buffer Zone Around waste processing and disposal facilities", by CPCB, 2017 will be prepared to maintain required distance of Road, JJ Cluster from the location of the landfill within the project site. |
| 8. | The sites for landfill and processing and disposal of solid waste shall be incorporated in the Town Planning Department's land-use plans. | The site has already been incorporated in the DDA Landuse Plan |
| 9. | A buffer zone of no development shall be maintained around solid waste processing and disposal facility, exceeding five Tonnes per day of installed capacity. This will be maintained within the total area of the solid waste processing and disposal facility. The buffer zone shall be prescribed on case to case basis by the local body in consultation with concerned State Pollution Control Board. | Buffer Zone as per "Guidelines on the provision of Buffer Zone Around waste processing and disposal facilities", by CPCB, 2017 will be prepared to maintain required distance of Road, JJ Cluster from the location of the landfill within the project site in consultation with DPCB. |
| 10. | The biomedical waste shall be disposed of in accordance with the Bio-medical Waste Management Rules, 2016, as amended from time to time . The hazardous waste shall be managed in accordance with the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, as amended from time to time. The Ewaste shall be managed in accordance with the e-Waste (Management) Rules, 2016 as amended from time to time. | Noted |
| 11. | Temporary storage facility for solid waste shall be established in each landfill site to accommodate the waste in case of non- operation of waste processing and during emergency or natural calamities. | Considered in Plan |



3.4 Size or magnitude of operation¹

The total project area is 32 acres .

Proposed SLF is divided in two phases. Phase I has an area of 43574.00 sqm (10.76 acre) and Phase II has an area of 65044.39 (16.07 acres). Refer drawing No. 01 for layout plan of Landfill.

Phase I is planned in such a way that, it will last for approximately 1 year. This is to meet the temporary volume requirement. Phase I has an average depth of 5m.

Phase II is planned in rest of area available to have maximum volume capacity. Phase II has maximum depth of 9m and minimum depth of 4.5m. Maximum possible depth is provided to increase the capacity of SLF. Later Phase I & Phase II will be joined together to enhance the capacity further. Phase II will have similar base lining system.

Total volume available: 1670347 Cum

Life of SLF = approx. 5 years which is planned to be increased by installation of waste reduction/augmentation techniques

The volume capacity calculation are done after deducting 18m wide road area. When Proposed Sanitary Landfill will be connected to Existing dump closure the capacity will be enhanced further by 8.5- 9 Lac cum.

3.5 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. The project process are as follows

- Landfill Base - Sealing System
- Leachate Collection & Treatment
- Landfill Gas Management
- Covering of waste:- a. Daily Cover, b. Cover in Monsoon C. Final Cover

The Project Layout is attached as **Annexure-II**

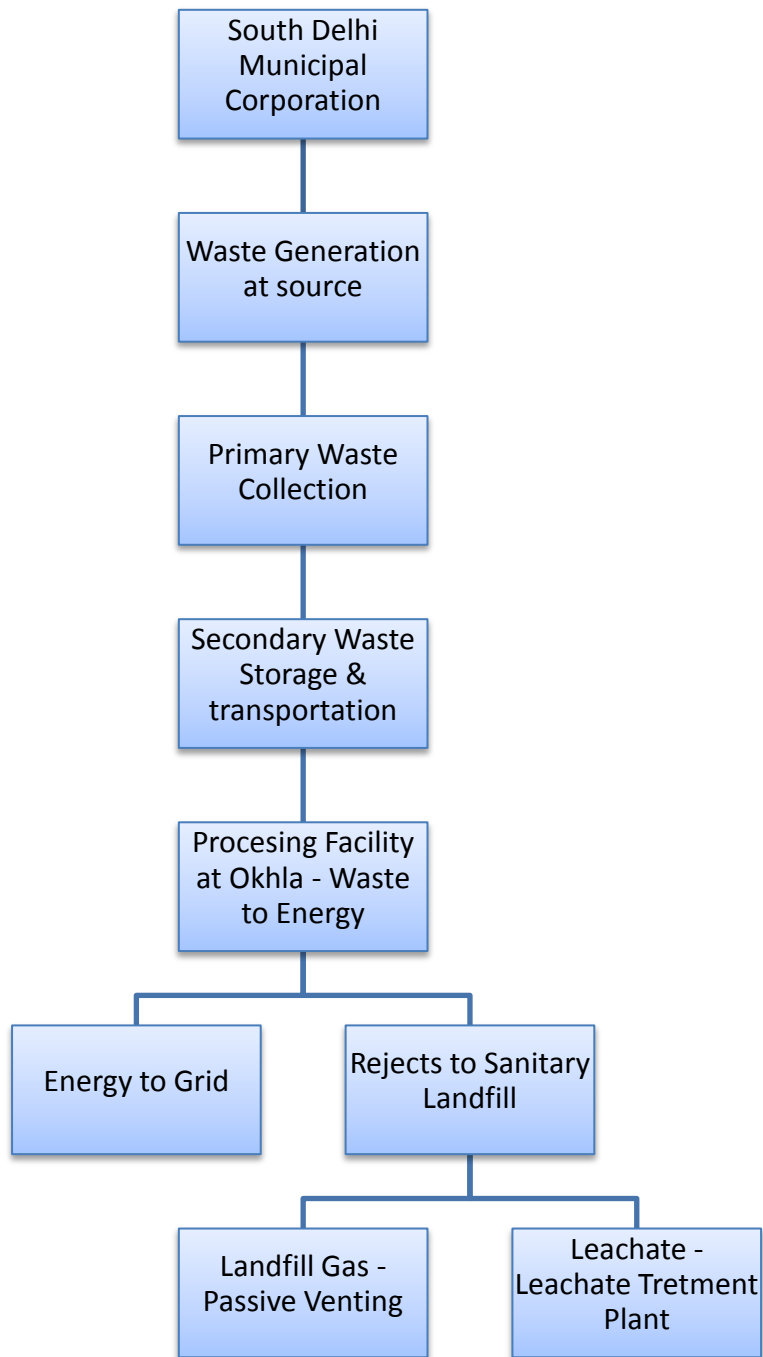
This concept has been developed keeping into considerations the following design criteria.

- Compliance to the SWM Rules (2016) for waste collection, transportation, treatment & disposal;

¹ Source: Detail Project Report of the Project



Figure 4: Process of Municipal Solid Waste Management Facility





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

This point is not applicable to this project as it is not a manufacturing or production unit. As this is MSW facility development project. For landfill site development, following material are required:

- Stones,
- Aggregates
- Cement
- Sand
- Bricks
- PVC sheets
- PVC pipes
- Steel
- Aluminum
- Compacted clay
- Geotextile
- Vegetative soil
- HDPE Pipes
- Geo-synthetic Clay

3.7 Resource Optimization/ Recycling and Reuse envisaged in the Project, if any

As the project is Municipal Solid Waste Management facility, the waste will be segregated into bio degradable and non-biodegradable waste. Bio-degradable waste will be processed and converted into compost and recyclable material will be processed by recyclers. Interlinked project (25 MW Waste to Energy Plant) is also proposed to optimize the capacity of the landfill and utilize waste energy.

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

3.8.1 Water Requirement

Water requirement given here is approximation and is including construction & operation of both proposed landfill & closure of existing landfill. Water balance chart will be added to EIA Report. Water Requirement is given below:



| Phase | Construction Phase | Operation Phase |
|--|--------------------|-----------------|
| Construction/ Operation | 8 KLD | 400 KLD |
| Dust Suppression & Greenbelt development | 2 KLD | 6 KLD |
| Total | 10 KLD | 406 KLD |

Source of the water will be treated water from existing ETP in Okhla & Delhi Jal Board. Water balance chart will be incorporated in EIA Report.

3.8.2 Power

Power consumption during the construction phase and operational phase will be supplied by nearest available Electricity supply Grid.

3.9 Quantity of wastes to be generated (liquid and solid) and scheme for their management/Disposal

3.9.1 Solid Waste Generation & its Disposal

As proposed project is itself Municipal Solid Waste Management Facility, the Municipal solid waste of the District is managed at the site. Presently, the total municipal waste generation in SDMC areas is approximately 3500 TPD, out of which only processing rejects of 1200 TPD will go Sanitary Landfill and projected quantity of waste generated from base year i.e.2018 to 2021 will be 1670347 Cum. (Source: DPR of the Project)

3.9.2 Liquid Effluent

Leachate generation per day is approx. 100 kilo litres/ day. Leachate will be collected through the network of HDPE Pipes by Gravity into Leachate pits. Then it will be pumped into Leachate collection tank further sent to Leachate treatment plant.

3.10 Schematic representation or the feasibility drawings which gives information of EIA Process.

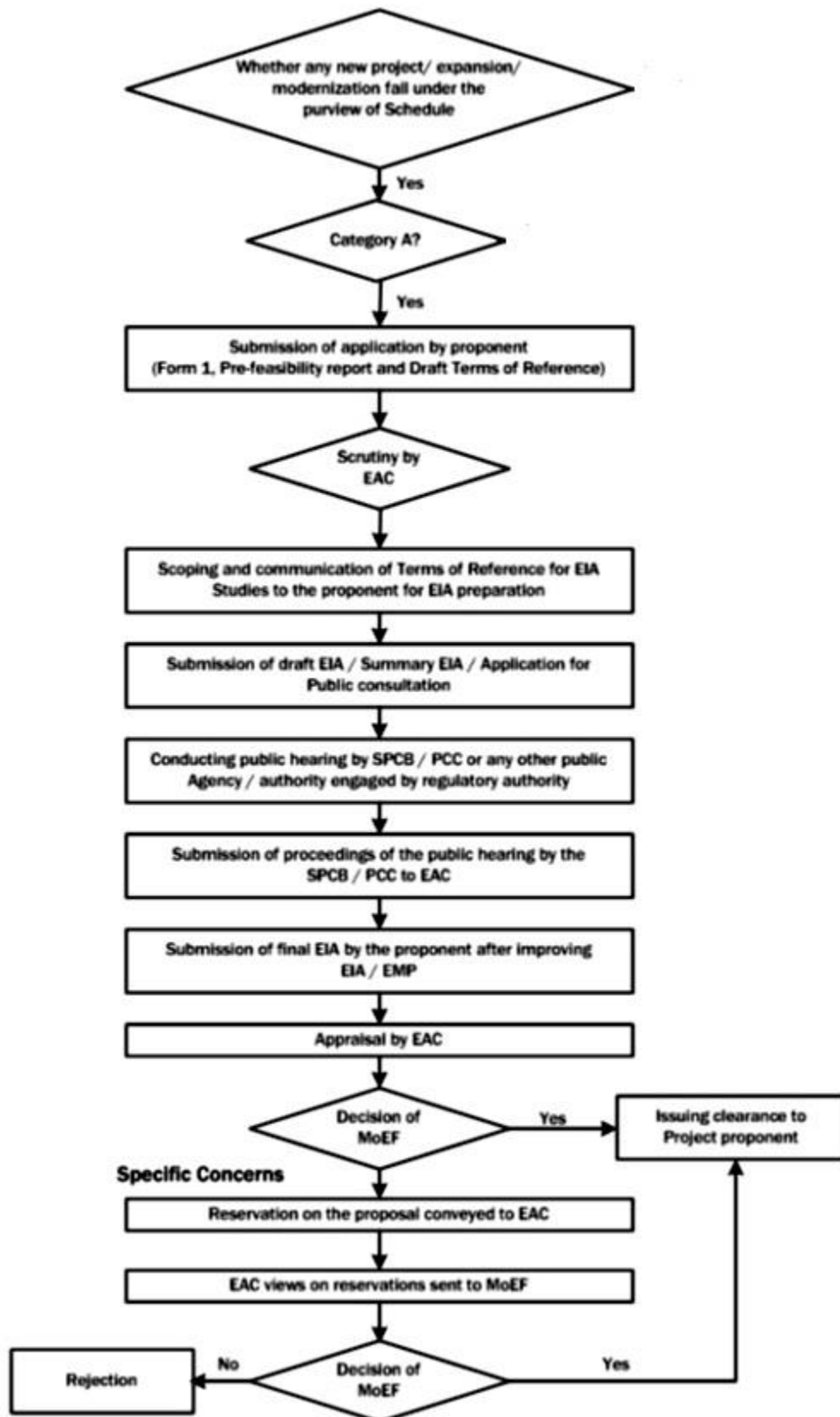
The proposed project falls under Item 7 (i) (Common Municipal Solid Waste Management facilities) as per Environmental Impact Assessment Notification dated September 14, 2006 and its amendments. The project is Category 'A' due to general conditions, (the site is within 5km radius of Asola Wild Life Sanctuary & ESZ, Delhi-Haryana Interstate Boundary and Critically Polluted Okhla Industrial Area) and will require Environmental Clearance from Ministry of Environment and Forest(MOEF), New Delhi.

Schematic representation of EIA Process is shown below²:

² Source: TGM for CMSWMF Prepared by MoEF



Fig 5: Prior Environment Clearance Process





4. SITE ANALYSIS

4.1 Connectivity

| | |
|-------------------------|--|
| Nearest Railway station | Tuglaqabad Railway Station-approx. 1 km in the E |
| Nearest SH/NH | NH-2- approx. 1.5 km in the E |
| Nearest Air port | Indira Gandhi International Airport- approx.. 17 km in the WNW |

4.2 Landform, Land use and Land Ownership

The project site is hilly. Currently, the site is being used for dumping of waste and no scientific disposal method is being followed. The land is already approved for the development of landfill under South Delhi Municipality.

4.3 Topography

Delhi is bounded by the Indo-Gangetic alluvial plains in the North and East, by Thar desert in the West and by Aravalli hill ranges in the South. The terrain of Delhi is flat in general except for a low NNE-SSW trending ridge that is considered an extension of the Aravalli hills of Rajasthan.

The ridge may be said to enter Delhi from the SW. The eastern part of the ridge extends up to Okhla in the South and disappears below Yamuna alluvium in the NE on the right bank of the river.

Physiography

The river Yamuna, the Aravalli range, and the plains in between both of these from alluvium deposits of recent formation dominate the physiography of Delhi. The Delhi Ridge and its four sections, the northern, the central, the south central and the southern constitute the farthest extension of the Aravalli range, its spurs meeting the Yamuna at two points, in the north and the east. Ecologically, the Ridge acts a barrier between the Thar desert and the plains and slows down the movement of dust and wind from the desert. This green belt, a natural forest, has a moderating influence on temperature, besides bestowing other known benefits on the people. The Yamuna river and terminal part of the Aravali hill range are the two main geographical features of the city. The Aravali hill range is covered with forest and is called the Ridges; they are the city's lungs and help maintain its environment. The Yamuna river is Delhi's source of drinking water and a sacred river for most of the inhabitants.



4.4 Existing Land Use Pattern and shortest distances from the periphery 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 the Gazette Notification should be given.

Currently, the site is Scrub land and will be used for scientific disposal of solid waste. The land is already approved for the development of landfill under South Delhi Municipal Corporation(SDMC).

Copy of Land documents and Authorization are attached as **Annexure-I**.

The distance of the Forest, National Parks, Wildlife Sanctuary, Eco sensitive area, water bodies are provided in **Table** below:

Table 2: Details of Forest and Water Bodies

| S.NO. | Description Name Distance from the periphery of | Description Name Distance from the periphery of | Description Name Distance from the periphery of |
|-------|--|--|---|
| 1. | Protected Forest | Jahanpanha City Forest | 3.5km in NW |
| 2. | Reserved Forest | Rajokri Protected Forest | 15 km in NW |
| 3. | Critically Polluted Area | Okhla Industrial Area | 2km in N |
| 4. | National Park/Wildlife Sanctuary/Biosphere Reserve | Asola Wildlife Sanctuary Okhla Bird Sanctuary National Zoological Park | 3.5 km in SW 6 km in NE 10 km in NW |
| 5. | Eco sensitive Zone | Okhla Bird Sanctuary Eco Sensitive Zone ESZ Aravalli Notification | 5 km in NE Within 5 Km |
| 6. | Water bodies | Yamuna River | 5km in NE |

4.5 Existing Infrastructure

Road Infrastructure available are as follows:

- Road-Meahroli-Badarpur Marg
- Road-Ma Anandmayee Marg
- Tuglakabad Metro Station
- Tuglakabad Railway Station

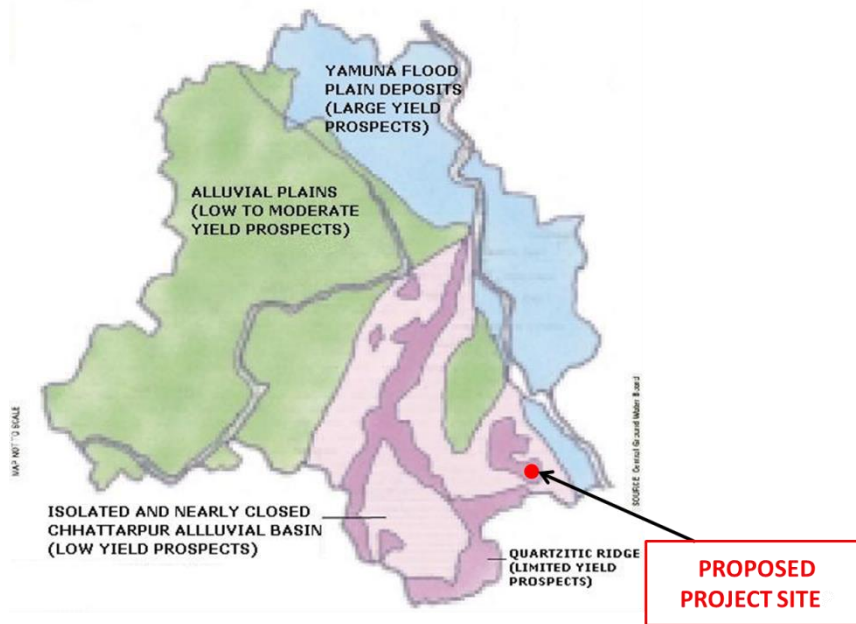
4.6 Soil Classification

The detailed soil investigation survey of the proposed MSW site is being done and will be added in the EIA Report. The detailed soil investigation survey of the proposed MSW site indicates that the texture of the core is sandy clay in nature. The Delhi ridge which is the northernmost



extension of Aravalli mountain consists of quartzite rocks and extends from southern parts of the territory to western bank of Yamuna for about 35 kilometers. The alluvial formations overlying the quartzitic bedrock have different nature on either side of the ridge. The Yamuna flood plain contain a distinct river deposit. The nearly closed Chhattarpur alluvial basin covering an areas of about 48 Km² is occupied by alluvium derived from the adjacent quartzite ridge. The map showing geological units is given in the picture.

Fig. 5. Soil Classification



4.7 Climatic Data from Secondary Sources³

The climate of district is mainly influenced by its inland position and prevalence of air of the continental type during major part of the year. Extreme dryness with intensely hot summer and cold winter are characteristics of the climate. The cold season starts towards the latter half of November when both day and night temperatures drop rapidly with the advance of the season. January is the coldest month with the mean daily maximum temperature at 21.3°C and the mean daily minimum temperature at 7.3°C. May and June are the hottest months. In May and June, maximum temperature may sometimes reach 46 or 47°C.

³ Source: CGWB, Ministry of Water Resources (March'2017)



4.8 Social Infrastructure Available

Table 3: Details of Social Infrastructure

| Items | Distance and Direction (Approx.) |
|-------------------------|--|
| Nearest School | Matri Sudha Gyan Vidya Peeth-250 m in S |
| Nearest Hospital | Kaya Maya Ayurvedic Hospital-1.0 Km in West Jain Charitable Hospital,1.0 km in SE |
| Nearest Worship | Guru Ravidas Mandir Lal Kuan approx. 400 m in the SE |
| Nearest Railway Station | Tuglaqabad Railway Station-approx. 1 km in the E |
| Nearest Highway | NH-2- approx. 1.5 km in the E |
| Nearest Airports | Indra Gandhi International Airport- approx.. 17 km in the WNW |
| Nearest Police Station | Pul Pehlad Pur Police Station-850 m in SE |
| Nearest Metro Station | Tuglaqabad Metro Station-approx. 1.5 km in the ESE |
| Bus Stop& Bus Station | Prem Nagar Bus Stop-approx. 200 m in the SW |

5. PLANNING BRIEF

5.1 Planning Concept

Type of Facility: Municipal Solid Waste Management Facility Project is initiative of South Delhi Municipal Corporation (SDMC) for betterment of Municipal Solid Waste Management of South Delhi.

Estimated Development Cost of the Project: Approx. Rs.45 Crores

Area of Project Site: 32 Acres

Planned Life of Landfill: Approx. 5 Years which is planned to be increased by installation of waste reduction/augmentation techniques

Facilities: Waste Collection & Transportation facility, Intermediate waste storage facility, Disposal Facility (Engineered Sanitary Landfill).

The Project Layout is attached as **Annexure-II**.

5.2 Population Projection

As per 2011 census, population of South Delhi has reached 2,731,929. Between the period of 2001 and 2011, the town has witnessed a growth of 20.51 %. There will be no increase in population due to project.



5.3 Land use planning (Break up along with green belt, etc.)

The total project area is 32 acres . Proposed SLF is divided in two phases. Phase I has an area of 43574.00 sqm (10.76 acre) and Phase II has an area of 65044.39.00 (16.07 acres). Area Statement is being worked upon and final Area Statement will be included in EIA Report.

Assessment of Infrastructure Demand (Physical & Social)

All facilities/amenities like medical, educational, housing, transportation, communication, shopping etc. are available nearby places. Since, local workers will be employed for this purpose therefore; no long term infrastructure will be required.

Amenities/Facilities⁴

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

- Paved internal roads to ensure free movement of vehicles and machinery and to avoid dust generation.
- Waste Inspection facility, office facility for record keeping, shelter for keeping equipment for machinery including pollution monitoring equipment.
- Fencing will be done with proper gate at entrance for monitoring incoming wastes/vehicles, to prevent entry of cattle, to keep record movement of vehicles and wastes, etc.
- Weigh bridge to measure quantity of waste broad to landfill.
- Arrangements for safe and healthy working conditions & temporary rest shelters.
- Provision of drinking water sanitary facility
- Provision of PPE.
- Health inspection of workers at landfill site shall be carried out .
- Conducting medical camps for workers and nearby villagers at regular interval.
- Provision of fire Extinguisher & fire protection equipment.

6. PROPOSED INFRASTRUCTURE

6.1 Industrial Area (Processing Area)

This point is not applicable to this project as it is a Municipal Solid Waste Management Landfill facility.

⁴ http://www.cpcb.nic.in/upload/NewItems/NewItem_133_MSW-REPORT.pdf



6.2 Residential Area (Non Processing Area)

As the local people will be given employment, there will be no facility for long term housing for operational workers. Temporary shelter shall be provided during construction phase while during operational phase one security room will be provided.

6.3 Green Belt⁵ & Plantation

The green belt development will be done according to “Guidelines on the provision of buffer zone around waste processing and disposal facilities by CPCB, April 2017” and in consultation with Delhi Pollution Control Committee (DPCC). Locally adopted non-edible perennial plants that are resistant to drought and extreme temperature shall be planted. Minimum 10 m greenbelt within and around the facility along the boundary is recommended in the said guidelines by CPCB. Vegetation, shrubs, trees, and berms with high density greenery will be incorporated into green belt within facility limits to serve as visual barriers and to reduce noise levels. Depending on the monitoring of level of pollutants in ambient air after the boundary of facility, on case to case basis, suitable technological measures/ barriers to check pollutants will be resorted. The important factors will be kept in mind for developing green belt for agro-climatic conditions are stated below:

Table 4: Important Factors for developing green belt for agro-climatic conditions as per Guidelines on the provision of Buffer Zone around waste processing and disposal facilities by CPCB

| | |
|-----------|---|
| a) | Criteria for Selection for Plant Species <ul style="list-style-type: none">• The plant species should be fast growing• They should have thick canopy cover• They should be perennial and evergreen• They should have high carbon – CO₂ sink potential• They should be effective in absorbing pollutants without significantly affecting their growth |
| b) | Recommended plant species: <p>Keeping in view the nature of pollutants expected from the disposal site, a green belt of minimum 10 meter width is recommended and the following plant species can be selected for plantation:</p> <ul style="list-style-type: none">• Acacia nilotica (Babul)• Deldergia Sissoo (Shishum)• Acacia auriculiformis (Australian Babul)• Azadirachta Indica (Neem)• Lagerstroemia speciosa (jamun)• Prongamia pinnata (Karanji) |

⁵ http://www.cpcb.nic.in/upload/NewItems/NewItem_133_MSW-REPORT.pdf
http://www.cpcb.nic.in/Final_Guidelines_on_Buffer_Zone_29052017.pdf

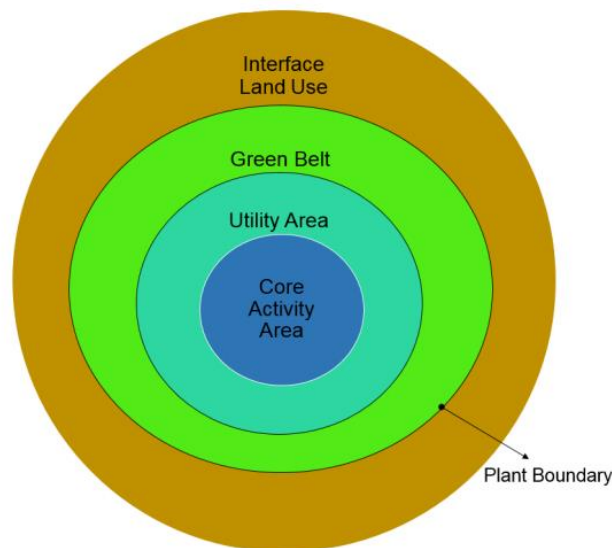


| | |
|----|--|
| c) | <p>Recommended plant species Density around Processing & Disposal/ Landfill site:</p> <p>These guidelines recommend the green belt width of minimum 10 meters within and all around processing and disposal facilities. The recommended minimum density of the green belt should be as discussed in the green belt model provided in the CPCB guidelines for developing green belts in 2000. These guidelines introduce the concept of a pollution attenuation coefficient for estimating the removal of pollutant while passing through the green belt. The formulation of pollution attenuation coefficient makes use of parameters such as leaf area, density of the tree plantation, deposition velocity of the pollutant on leaf surface and wind speed to the green belt. The model gives the dependence of the pollution attenuation factor of a green belt on various physical parameters of the green belt such as its height, width, distance from the pollution source and on atmospheric stability conditions and hence the model can be used to optimize the design of the green belt in obtaining the desired degree of attenuation of the pollution around an industry. The case to case basis CPCB guidelines for developing green belts (March, 2000) to be referred for optimal density applications.</p> |
|----|--|

Plantation for Landfill Closure: Plants with Adventitious roots will be preferred till the landfill is stabilized. For plantation done after closure of the landfill, adventitious roots plants will be used.

- (i) Selected species of locally adopted non-edible perennial plants that are resistance to drought and extreme temperature will be grown
- (ii) The plant species will be selected which have ability to thrive on low nutrient soil and
- (iii) The density of plantation will be sufficient to minimize soil erosion.

Fig 6: Depicting Location of Greenbelt in the buffer zone to be constructed





6.4 Social infrastructure

- Employment opportunity
- Medical camps
- Social awareness camps
- Safe & hygienic conditions

6.5 Connectivity

| | | |
|----|-------------------------|--|
| 1. | Nearest Highway | NH-2- approx. 1.5 km in the E |
| 2. | Nearest Railway Station | Tuglaqabad Railway Station-approx. 1 km in the E |
| 3. | Nearest Airports | Indira Gandhi International Airport- approx.. 17 km in the WNW |

6.6 Drinking Water Management

During the construction phase, 2 KLD of water will be required that will be met through water tanker. During the operational phase, 6 KLD of drinking water will be required that will also met through water tanker. Drinking water will be provided by SDMC.

6.7 Sewerage System

The Leachate generation is approx. 100 kilo litres/ day will be treated in the Leachate treatment Plant. The Waste water generated after washing of transport vehicle shall also be treated to meet prescribed standards. The treated leachate shall be recycled or utilized as permitted within the project, after meeting the standards specified in schedule 2 of SWM rules 2016

6.8 Industrial Waste Management

This point is not applicable

6.9 Solid Waste management

It is itself is a Municipal Solid Waste Management facility project.

6.10 Power Requirement & Supply/Source

Power consumption during the operational phase will be supplied by nearest available Electricity supply Grid.



7. REHABILITATION AND RESETTLEMENT (R&R) PLAN

The land is already approved for the development of landfill by South Delhi Municipal Corporation with intervention of Prime Minister's Office. The project will not result in displacement of any local population and hence, does not require a resettlement and rehabilitation study.

8. 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.

| | |
|---|--|
| Date of possession of the land. | 01.11.17 |
| Date of commissioning of construction | As soon as Consent to Establish from Delhi Pollution Control Committee will be received (Schedule: 01.02.18) |
| Date of completion / proposed date of Completion of construction. | As soon as Consent to Operate from Delhi Pollution Control Committee will be received (Schedule: May, 2018) |

8.2 Estimated project cost along with analysis in terms of economic viability of the project

The total cost of the project is Rs. 45 Crores which includes the C &T, processing facilities, common facilities, sanitary landfill cost.

9. ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)

9.1 Social Benefits

Better living conditions

This will reduce the chances of air, water & soil contamination and also will reduce emission odour. This will improve the living standard of society & will provide safe & hygienic surroundings.

Direct & indirect employment opportunities

Development of project will provide employment opportunity to local skilled, unskilled & semi-skilled people during both construction & operation phase.



Indirect employment may also generate during construction phase of project. Tea stalls, and food joints may come up around project site for workers. Prospects for new business like waste recycling/dismantling etc.

9.2 Economic Benefits

Waste is material that is being rejected as it has no use for the people. Project comprises of collection of waste & safe disposal. From waste following products can be recovered, which can generate revenue:

- 1) Recyclables
- 2) Compost
- 3) Inert waste as filler material

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.

9.3 Environmental Benefits

Prevention of air, water & soil contamination

No open dumping of waste will be carried out, which leads to soil, water & air pollution. Also littering waste is ground for breeding mosquitoes, which become agents of various deadly diseases.

This project involves scientific management of waste which will prevent environmental pollution & spread of disease.

Development of green belt

Green belt developed along with lawns & green buffer at site. This will help in attenuating dust & noise level at site. The green belt development will be done according to "Guidelines on the provision of buffer zone around waste processing and disposal facilities by CPCB, April 2017" and in consultation with Delhi Pollution Control Committee (DPCC). Locally adopted non-edible perennial plants that are resistant to drought and extreme temperature shall be planted. Minimum 10 m greenbelt within and around the facility along the boundary is recommended in the said guidelines by CPCB. Vegetation, shrubs, trees, and berms with high density greenery will be incorporated into green belt within facility limits to serve as visual barriers and to reduce noise levels. Depending on the monitoring of level of pollutants in ambient air after the boundary of facility, on case to case basis, suitable technological measures/ barriers to check pollutants will be resorted.



10. ENVIRONMENTAL MONITORING

10.1 Ambient Air Quality Monitoring

Ambient Air Quality Monitoring will be carried out with a frequency of 24 hourly samples twice a week at each location. The site-specific background air quality monitoring program will be conducted within 10 km on the basis of following considerations:

- Topography
- Physical Features
- Micro-meteorology data of the region
- Representation of regional background
- Proper representation of upwind and downwind directions
- Ecologically Sensitive Locations
- Archeological Monument as per notified by Archeological Survey of India(ASI)

| Monitor | Location | Dist. from center of site (km) | Direction | Criteria for Selection |
|---------|--------------------------|--------------------------------|-----------|--|
| AAQ1 | Project Site | 0 | - | - |
| AAQ2 | Asola Wildlife Sanctuary | 2 km | SW | Wildlife Sanctuary |
| AAQ3 | Tughlaqabad Village | 1.87 km | NW | Archeological Site |
| AAQ4 | Badarpur Village | Approx. 2 km | E | Downwind |
| AAQ5 | Tughlaqabad Extension | Approx. 600 m | E | Residential Zone |
| AAQ6 | Jasola Vihar | 4.5km | NE | Eco Sensitive Zone |
| AAQ7 | Okhla Phase-2 | 1.5 km | N | Critically Polluted Area/Industrial Zone |
| AAQ8 | Sukhdev Vihar | 5.5 Km | N | Ref. NGT Order |

Following Parameter are taken for the Ambient Air Pollution are PM₁₀, PM_{2.5}, So_x, NO_x, CH₄, H₂S, CO₂, CO, C₆H₆, Ni.

10.2 Ambient Noise Monitoring

Ambient noise level measurement survey will be undertaken in the study area during post-monsoon season to assess the existing ambient noise level in different area viz; Residential, Industrial, Commercial and Silence zones as per the Noise Pollution (Regulation and Control)



(Amendment) Rules 2010 of MoEF. Details of the tentative measurement location are presented in Table below. The parameters are L_{10} , L_{50} , L_{90} , L_{day} , L_{night} .

| Monitor | Location | Dist. from center of site (km) | Direction | Criteria for Selection |
|---------|---|--------------------------------|-----------|------------------------|
| N1 | Project Site | 0 | - | - |
| N2 | Asola Wildlife Sanctuary | 2 km | SW | Sensitive Zone |
| N3 | Tughlaqabad Extension | Approx. 600 m | E | Residential Zone |
| N4 | Jasola Vihar adjacent to Okhla Bird Sanctuary | 5km | NE | Sensitive Zone |
| N5 | Okhla Phase-1 | 1.5 km | N | Industrial Zone |
| N6 | Tughlaqabad Village | 1.2 km | NW | Residential Zone |
| N7 | Badarpur Extension | 2.8 km | SE | Commercial Zone |
| N8 | Sukhdev Vihar | 5.5 Km | N | Ref. NGT Order |

10.3 Water Quality

The surface and ground water quality characteristics of the study area will be established through monthly monitoring of the following parameters:

- Physical Parameters-** pH, Conductivity, TSS & DO
- Chemical Parameters-**TDS, Alkalinity, Hardness, NO_3 , Cl, SO_4 , Na, K, Ca, Mg, Silica, oil & Grease, PO_4 , Phenolic compounds, BOD & COD
- Heavy metals-**Cd, Total Cr, Cr^{+6} , Cu, Fe, Pb, Zn, Hg, Se & As.
- Bacteriological characteristics-** Total Coliform

The Ground Water & Surface Water sampling location are describe in table below

| S.No. | Location | Dist. from center of site (km) | Direction |
|-------|---------------------|--------------------------------|-----------|
| GW1 | Near Project Site | 0 | - |
| GW2 | Badarpur Village | 2km | N |
| GW3 | Jasola Vihar | 4.5km | NE |
| GW4 | Okhla Phase-2 | 3.3 km | N |
| GW5 | Tughlaqabad Village | 1.2 km | NW |



| | | | |
|-----|--------------|--------|----|
| SW1 | Yamuna River | 6 km | E |
| SW2 | CITM Lake | 6.6 | SW |
| SW3 | Canal | 3.3 km | SE |

10.4 Soil Sampling

Impacts on land environment from construction activities can be mainly attributed to disposal of solid/hazardous waste and discharge of wastewater either onto land (direct impacts) or into water bodies, which are also used as irrigation water resources (indirect impacts). Moreover impacts on land/vegetation are also expected due to fall out of air pollutants. Accordingly for environmental impact assessment it is pertinent to study the characteristics of soil, the resulting changes in soil due to disposal of harmful substances on land and the resultant behavior of the surrounding soil environment.

The basic considerations for designing soil quality surveillance programme include:

- Physical & Chemical properties of the area
- Erosion Potential
- Storm water run-off quality
- Agricultural productivity of land

Soil quality analysis has been done at project site from 7 locations up to 30 cm depth in and around the project site. The details of soil monitoring locations are given below

| Monitor | Location | Dist. from center of site (km) | Direction |
|---------|--|--------------------------------|-----------|
| S1 | Project Site | 0 | - |
| S2 | Asola Wildlife Sanctuary | 2 km | SW |
| S3 | Tughlaqabad Village | 1.87 km | NW |
| S4 | Badarpur | Approx. 2 km | East |
| S5 | Yamuna River Bank | 5.6 km | East |
| S6 | Jasola Vihar Near Okhla Bird Sanctuary | 4.5km | NE |
| S7 | Okhla Phase-2 | 1.5 km | North |
| S8 | Sukhdev Vihar | 5.5 Km | North |

The parameters to be monitored, frequency and methodology of sampling are as follows

| Particulars | Details |
|-------------|---|
| Frequency | One *grab sample from each station– once during the Study Period |
| Parameters | Texture, % Moisture, % Sand, % Silt, % Clay, % Organic Matter, Bulk Density, pH, Electrical Conductivity, NKP, Sodium Absorption Ratio, B, Na Pb, Fe, Zn and Water Holding Capacity |



Methodology

Composite grab samples of the topsoil were collected from 3 depths, and mixed to provide a representative sample for analysis. They were stored in PET containers and analyzed at the laboratory