INTERIM PROGRESS REPORT OF THE JOINT COMMITTEE

constituted by the Hon'ble National Green Tribunal vide Order Dated 27/04/2022 in O. A. No. 300/2022 in the matter of News Item Published in News 18 dated 26th April, 2022 titled "Delhi: Massive Fire at Bhalswa Dump Yard, Fourth This Year; 13 Fire Tenders on Spot."

Justice (Retd.) S. P. Garg
Chairman
Joint Committee

Dated 21st September 2022

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 300/2022

In the matter of:

News item published in News 18 dated 26th April, 2022 titled "Delhi: Massive Fire at Bhalswa Dump Yard, Fourth This Year; 13 Fire Tenders on Spot"

INTERIM PROGRESS REPORT REGARDING BHALSWA LANDFILL

Most respectfully showeth:

1. The instant Interim Progress Report is being filed in pursuance of the Order dated 27.04.2022 of Hon'ble National Green Tribunal in the captioned matter. Para No. 4 and 5 of Order dated 22.04.2022 in O.A. 288/2022, whereby the Joint Committee was constituted for Ghazipur landfill were reproduced as:

> *"4. Situation in Delhi may be more serious having regard to the size of the garbage dump and its location in densely populated area. This requires constitution of a multi-departmental Committee of the concerned departments and responsible prompt action at higher levels of the administration.*
>
> *5. Accordingly, we constitute a joint Committee headed by Justice S.P. Garg, former judge, Delhi High Court, with members from CPCB, DPCC, Department of Urban Development, Delhi, EDMC, Delhi Disaster Management Authority and District Magistrate and DCP, East Delhi. DPCC will be the Nodal Agency for coordination and compliance. The Committee may hold its first meeting within one week, undertake visit to the site, interact with the stakeholders, ascertain the factual situation and suggest further course of action after interaction with the concerned stakeholders. It may consider the landfill dump as isolated and vulnerable site which requires On-site and Off-site fire and other disaster management plans..."*

2. Para 4 of the order dated 27.04.2022 in O.A. 300/2022 reads:

"4.Accordingly, we request the Committee already constituted, vide order dated 22.04.2022 in O.A. 288/2022, with modification of replacement of EDMC with NDMC and jurisdictional District Magistrate and DCPs for District Magistrates of East Delhi to ascertain factual situation in respect of present incident also and suggest further course of action after interaction with the concerned stakeholders. It may consider the landfill dump as isolated and vulnerable site which requires On-site and Off-site fire and other disaster management plans and furnish its report within one month by email…"

3. After the constitution of the Joint Committee, four meetings have been held till date. First meeting was held on 07.05.2022 to deliberate upon the issues with the members of the Committee. DM (North), SDM (Model Town) Sh. Mukesh Verma, DO, Delhi Fire Services, Sh. P.K. Raja, Superintendent Engineer (North DMC), Sh. Padmakar Ram Tripathi, ADM (North District) and representative of DDMA, Sh. Rajesh Kumar, Deputy Secretary, UD Department, Sh. Ashok Kumar, ACP (Swaroop Nagar), Sh. M.C. Yadav, E.E., (DJB) and Sh. D.K. Singh, SEE (DPCC) attended the meeting.

4. The participants were apprised about the directions of the Hon'ble NGT in the order dated 27.04.2022 in O.A. No. 300/2022. It was emphasized that the main object of the Committee was to suggest measures to be taken for prevention and control of fire incidents at the Bhalswa dump-site. Mr. P.K. Raja, SE, (North DMC) was requested to brief about the dump-site and the fire incidents there.

5. Mr. Raja informed that Bhalswa dump-site is not an Engineered Sanitary Landfill (SLF). It is spread over 70 acres of land and is in use since 1994. It was having about 80 lakh metric tonnes of legacy waste (Old MSW) in July, 2019. Total generation of Municipal Solid Waste (MSW) in the area under the jurisdiction of North DMC is 4500TPD out of which 2300TPD is processed at Integrated MSW Facility at Bhawana (having WTE Plant, Compost Plant and Engineered SLF) and rest of 2200TPD is dumped at Bhalswa site as no other

feasible land is available with North DMC. He further informed that earlier the height of the dump-site was 60 meters which has now been reduced to 54 meters. Presently, Bio-remediation is being carried out through 40 trommels and 4 kleeman machines. Bio-mining operation has generated huge quantities of Refused Derived Fuel (RDF) which is not of good quality. RDF generated is approximately 2000TPD out of which 800-900TPD is processed at Waste To Energy (WTE) plant at Bhawana. It was also informed that NHAI has agreed to take 14 lakh MT of Inert. About 1 lakh MT Inert has already been given to NHAI for use in its projects (UER).

6. The Committee enquired from Mr. Raja about the cause of fire incident which took place on 26.04.2022. He informed that the reason for fire incident on 26.04.2022 was methane generated from decomposition of organic matter present in the fresh MSW dumped at the site. Formation of methane gas is a natural phenomenon specifically in fresh waste. On 26.04.2022 fire was caused due to extreme heat and emission of uncontrolled methane and it spread due to strong winds. Fire incidents are more prominent during elevated temperature levels in the months of April to June. When enquired as to what steps have been taken to douse the fire, he informed that 4 water tankers of capacity 9000 litres (2 Nos.) and 3000 litres (2 Nos.) have been deployed at site besides Jetting Machines, Bulldozers, Excavators, JCBs etc. For prevention of fire, round the clock patrolling is done by the staff including JEs, 3 AEs and 70 Beldars. He further informed that there was no boundary wall along the periphery of dump-site. Proposal of boundary wall has been given; fencing is cut by rag-pickers. Due to measures taken by North DMC, fire incidents have reduced from 98 in 2016-17 to 2 in 2021-22 and further to 1 in 2022-23. He informed that routine activities carried out to prevent and control fire were as:

   - Use of C&D for stablization of waste and construction of kachha paths.
   - Step cutting of fresh waste mound by excavators.

- Round the clock patrolling around the site to check unauthorized entry.
- Bio-mining/remediation of legacy waste.
- Dust mitigation by spraying water by water tankers and anti-smog guns.

7. The grievance of the officer was that fresh waste was being dumped at Bhalswa despite its reaching saturation. Only 6-7 acres of land was available for dumping of fresh waste. He further informed that the local police has been requested to depute police personnel for preventing unauthorized entry of waste pickers inside the dump-site.

8. The Committee was surprised to know that still fresh MSW was being dumped at site on regular basis. It asked the representative of North DMC as to what efforts have been made to get land for MSW processing facility/Engineered SLF. Mr. Raja informed that DDA had allotted land at Rani Khera (about 50 acres) in 2017. It is, however, lying vacant and has not been utilized being close to habitation and there is no buffer zone of 200 meters; there is strong public resistance too. He further informed that land has also been allotted at Bhawana but the same has not been utilized due to presence of High Tension Line. There is a 49 acre of land in Sultanpur Dabas which was allotted in 2018. North DMC is planning for development of the Engineered SLF there. Representative of DMC and UD Department informed that they have written letters to DDA regarding requirement of land for waste processing facilities including land required for North DMC. The Committee asked them to provide correspondence with DDA regarding requests for allotment of land for MSW processing facilities.

9. Regarding the issue of rag-pickers, the Committee asked the representative of North DMC about authorization of rag-pickers for their entry at the dump-site. He was also asked to inform about requirement of number of CCTV camera along with the location of each camera. The Committee also suggested to use

water tankers to mitigate dust pollution and sprinkling of water on the susceptible areas for methane generation.

10. ACP (Swaroop Nagar) who attended the meeting on behalf of DCP (Outer North) was directed to provide all support and security required by North DMC for prevention of unauthorized entry at the dump-site. It was directed that the police department will deploy adequate number of beat constables and explore possibility of providing police picket at the site. North DMC will assess the requirement of CCTV cameras along with locations in consultation with the police department.

11. Divisional Officer, Delhi Fire Service informed that the fire station was situated within a radius of 1km and there was no need of stationing a dedicated fire tender at dump-site. He informed that it is difficult for fire tenders of 9-10kl capacity to reach the top of the dump-site. He suggested some preventive/remedial measures to avoid fire incidents as under:

- Entry of unauthorized persons/rag-pickers should be prohibited.
- Dump-site should be strictly ‘match-box free’ area.
- Persons entering the premises of dump-site should not carry any inflammable material.
- For suppression/mitigation of dust, water tankers available at the site should be used.
- Spark Arresters be provided with the exhaust system of the vehicles/trucks entering the dump-site to prevent fire due to spark on vehicles. The cost of the Spark Arrester is about Rs.2000-3000.
- Water storage tank of 5 lakh liters capacity be set up along with at least 3 pumps at the dump-site.

12. The Committee asked Mr. Singh from DPCC about the visit of team of officials from North DMC, EDMC and DPCC to landfill sites in Mumbai. The observations made by the said team were briefed to the Joint Committee and it

was informed that the report of the team would be submitted soon. Mr. Singh was requested to share the report regarding their visit at Mumbai.

13. DM (North) suggested that North DMC should authorize some NGO for regulating the entry of rag-pickers at the site. She offered to explore possibility of deploying Civil Defense Volunteers at the dump-site for preventing unauthorized entry. ADM (North) representative of DDMA informed that DDMA should be immediately informed about any fire incident at the site so as to coordinate with concerned departments for immediate action for dousing of fire and to avoid damage to the nearby habitants/property. It was also suggested to have Standard Operating Procedure (SOP) for controlling fire in case of fire incidents and Mock Drill should be conducted in this regard. Emergency Response Plan be prepared at the concerned Municipal Corporation in consultation with DDMA.

14. After detailed discussions and deliberations, following decisions were taken:

- North DMC to suggest measures for utilization of RDF accumulated at the site.
- It shall immediately inform DDMA and DM (North) regarding any fire incident at the site. It shall prepare short term and long term plans for prevention of fire incidents at site. It shall also make assessment of the entire area of the dump-site and prepare on site Emergency Disaster Management Plan.
- In consultation with DM (North), it will explore possibility of authorizing some NGO/agencies for regulating the entry of rag-pickers at the site.
- It shall assess the requirement of CCTV cameras along with locations in consultation with Delhi Police.
- It shall implement the suggestions given by Delhi Fire Services for prevention of fire.
- DDMA in consultation with DM (North) shall conduct Mock Drill at the Bhalswa dump-site. DDMA shall also prepare Standard Operating Procedure (SOP) to be followed in case of fire incident.

- Police Department will deploy adequate number of beat constables and explore possibility of providing police picket at the site.
- Joint Committee to visit Bhalswa dump-site on 11.05.2022.

VISIT TO BHALSWA DUMP-SITE

15. On 11.05.2022 at around 11:00AM, the Joint Committee visited the Bhalswa dump-site to ascertain the prevailing situation. DM (North), Ms. Harleen Kaur, Addl. Commissioner (North DMC), Addl. DCP (Outer North District), ADM (North) as representative of DDMA (North), Sh. Rajesh Kumar, Dy. Secretary, UD Department, Sh. C.K. Dikshit, Scientist "C", CPCB, Sh. V.K.Gupta, Director in Chief (North DMC) along with Sh. M.P. Gupta, CE (North DMC) and Sh. P K Raja, SE (C) (North DMC), Sh. Roop Chand, SE (E&M) (North DMC), Sh. A S Yadav, EE, SLF and Sh. D.K.Singh SEE, DPCC were present at the site.

16. The Committee visited peak site of the dump-site and surveyed the surrounding areas minutely. The landfill is adjacent to NH-1 and Bhalswa Diary. It is accessible through the internal roads adjacent to the Delhi-Chandigarh section of NH-1. Addl. Commissioner, Director-in-Chief (North MCD) briefed the Joint Committee about the site as:

Area of dump-site	: 70 Acres
Year of start of use of the dump-site	: 1994
Legacy Waste Dumped	: 80 Lakh Tons (As in July, 2019)
Height of dump-site	: 65 meters (As in July, 2019)
Municipal Solid Waste (MSW) Generation in North DMC Area	: 4500 TPD
Fresh MSW being dumped at the dump-site	: 2200 TPD (49% of Total MSW Generated)
MSW being processed at Integrated MSW Management Facility at Bawana	: 2300 TPD (51% of Total MSW Generated)
Legacy Waste Bio-mined/Processed (till 11.05.2022)	: 14 Lakh Ton (17.5% of Total Legacy Waste)
CCTV Camera	: 29 CCTV Cameras were operational out of 31

	CCTV Cameras installed
Status of Bio-mining of Legacy Waste	: 40 Trommels (30mm & 6mm Screen Size) 4 Kleeman Machines
Water Tankers Jetting Machiines Excavators Backhoe Loaders Bulldozers	: 4 (2 of 9000l capacity+2 of 3000l capacity : 6 : 3 operational out of 6 deployed : 2 : 5
Boundary Wall around the periphery of the dump-site	Yet to be constructed

17. It was informed that as per orders of the Hon'ble NGT dated 17.07.2019 in O.A. No. 519/2019 and O.A. No. 386/2019, legacy waste dumped at the 3 dump-sites including Bhalswa is to be disposed of by bio-mining using trommels instead of capping the site. Bio-mining of legacy waste started in October, 2019. It was further informed that the fire incidents occur only in fresh waste dumped 1-2 years before. The legacy waste is dumped in an area of 60 out of 70 acres and the fresh waste is dumped in 6-7 acres of the area. Due to space constraints, the mound of fresh waste is being piled up over and over.

18. Addl. Commissioner (North DMC) stated that water tankers (with treated waste water from Rithala STP) and mounds of Inert have ben maintained at the fire prone area so that in case of fire, the fire affected waste can be excavated out and fire could be doused by cutting off oxygen.

19. It was informed that bio-mining of legacy waste was being carried out using 2 types of trommels (30mm & 6mm screen size) and Kleeman machines. 40 trommels and 4 keleeman machines have been installed for this purpose. C&D Waste is used at the site itself to construct approach roads etc. MoU of 14 lakh MT of Inert has been signed with NHAI. The disposal rate of Inert to NHAI is 2000 TPD for its UER-II project. Till date, 1.5 lakh ton of Inert has been sent to NHAI.

20. The Committee viewed the LED screens installed at the office of North (DMC) at site showing live footage received from CCTV cameras installed at various sites/locations at the dump-site. The Committee also visited crucial points of the site where fresh MSW was being dumped and previously dumped waste was being covered with Inert using machinery. The Committee also observed that mixed MSW was being dumped indicating lack of segregation at source. Site/location of fire incident on 26.04.2022 was also shown to the Joint Committee. It also saw the trommels installed at the site for bio-mining of legacy waste and RDF and Inert accumulated at site. Many rag-pickers were seen at the dump-site; animals were also seen roaming.

21. North DMC has installed a board in the office at site mentioning roaster duty of officers and status of machinery deployed at site. Power Point Presentation was given to the Joint Committee during the visit.

22. Other issues mentioned in the presentation and discussed with the officers of North DMC were:

- **Unauthorized entry of rag-pickers** – it was observed that there was no boundary wall constructed at the periphery of dump-site due to which there was infiltration of unauthorized rag-pickers. DM (North) informed that around 200-300 people work at the site and they are in the process of mainstreaming the rag-pickers and preliminary work has already started.

- **Absence of police picket** – There was no police picket at the site due to which it was difficult to prevent unauthorized entry of rag-pickers. JJ Colonies/clusters were observed by the Joint Committee near the dump-site. Addl. Commissioner (North DMC) informed that people living in those clusters tend to enter the dump-site to take recyclables out of the waste dumped at the site.

- **Disposal of RDF** – Addl. Commissioner (North DMC) informed that disposal of RDF was the main issue and for that North DMC has received technical bids from 3 agencies for RDF Pellets Manufacturing Plants at the site only and they would start operation within 4 months. RDF generation is 3000 TPD when the trommels and Kleeman machines are operated at full capacity. It was further informed that 11 waste management agencies have been empaneled with North DMC and 5 were working with them but their scale was very low due to low ERP. As the EPR is around 70% now, they were ready to work with North DMC.

23. After detailed discussion and deliberation, following decisions were taken:

- DDMA (North) will conduct Mock Drill at site.

- North DMC will explore possibility of utilization of high capacity fire extinguishers to douse fire.

- Police department will deploy adequate number of beat constables and provide a dedicated police picket at site.

- Concerned officer from DDA be requested to attend the next meeting to inform about allotment of land to North DMC.

- North DMC to explore use of perforated pipes to release methane into the atomosphere.

- It shall patrol the fire prone area of 6-7 acres where fresh waste is being dumped. It shall explore possibility to construct boundary wall of adequate height along with proper wire fencing all around the periphery of the site to prevent unauthorized entry.

- North DMC will submit suggestions for various issues being faced by it in disposal of RDF and prevention and control of fire at site.

SECOND MEETING

24. To assess the progress of the decisions taken, 2nd meeting of the Joint Committee was held on 03.06.2022. All the members of the Joint Committee along with Sh. Kamal Gupta, Deputy Director (IL) (DDA) and Sh. Amit Chaudhary, Addl. Director (IL) (DDA) participated in the meeting. They were requested to brief about the progress made in respect of the Bhalswa dump-site. DM (North) informed that 30 Civil Defense Personnel have been deputed at the dump-site. The preliminary work for integration of rag-pickers through 'Chintan' (NGO) has been done. Mock Drill is to be conducted soon and is proposed to be conducted every month. Representative of DDMA informed that DM was the Member Convenor of Disha Committee of DDMA and Bhalswa dump-site has been taken as an agenda point in the last meeting of Disha Committee. Additional DCP informed that contact details of beat constables have been shared with MCD officials. He also informed that police picket has not been provided yet as they were having police picket nearby within 300 meter from the site. Representatives of MCD informed that issue of unauthorized entry of rag-pickers was yet to be resolved.

25. The Committee expressed displeasure over the presence of rag-pickers and animals during the visit on 11.05.2022. Representative of MCD informed that there was no boundary or barrier to prevent the entry of rag-pickers and animals at the site. He further informed that there have been fire incidents and smoldering but MCD has been able to control it with the help of surveillance team, CCTV cameras, officials on roster duty and SOP designed for the prevention and control of fire incidents. The number of CCTV cameras have

been increased from 21 to 31 and a dedicated control room has been set up at dump-site.

26. When enquired about the disposal of Inert, representative of MCD informed that there was no issue in disposal of Inert generated from bio-mining of legacy waste. NHAI was utilizing the Inert in its project (UER). At present about 40000 TPD of RDF had accumulated which posed danger of catching fire. RDF re-generation rate is 2000 TPD and it is 3000 TPD when all the machines are in operation. Currently, 1000-1200TPD of RDF was being disposed through WTE plant at Bawana and 100-200 TPD through WTE plant at Murthal, Sonepat. They were in the process of awarding the work of installation of 3 RDF Pellets Manufacturing Plants at the site which is expected to be made operational within 2-3 months. In the past, possibility of disposal of RDF through WTE plants in neighbouring states and cement klins and industries was explored, however, it could not succeed due to high transportation cost and poor quality of RDF. On being asked about boundary wall, he informed that estimate for the cost of RCC boundary wall of 4 meter height has been prepared.

27. Representative of DDA informed that they have already allotted land to North DMC at Rani Khera and Sultanpur Dabas for setting up of MSW processing and disposal facilities and there was no issue pending regarding allotment of land to North DMC. The Committee asked MCD to utilize the land at Rani Khera and Sultanpur Dabas allotted to them long back. The Committee also asked MCD to check and inform if any issue regarding allotment of land was pending with DDA. Representative of UD Department informed that earlier a meeting was taken by the then Chief Secretary, GNCTD and land requirement up to the year 2050 of all the three DMCs considering future requirements for MSW processing facilities in Delhi was given to DDA and the copy of the

same has been provided to the Joint Committee. The Joint Committee handed over it to DDA representatives to inform about its status.

28. Representative of CPCB informed that CPCB vide letter dated 26.05.2022 has issued directions under Section 5 of the Environment (Protection) Act, 1986 for implementation of the Solid Waste Management Rules, 2016 regarding fire incidents at dump-sites to all State Pollution Control Boards/Pollution Control Committees including DPCC. Copy of the same was provided during the meeting.

29. Mr. D.K. Singh, SEE, DPCC informed that DPCC has issued Show Cause Notice for imposition of environmental compensation of Rs.50 lacs on 05.05.2022 regarding fire incident on 26.04.2022 at the dump-site. He also informed that report of the joint team of DPCC, EDMC and North DM officials on the visit to Gorai and Deonar dump-sites in Mumbai on 05.05.2022 and 06.05.2022 has been submitted to the Joint Committee. It was shared among the various departments. They were requested to examine the report and explore possibility of its implementation in Delhi. The report is annexed as **Annexure A**.

30. After detailed discussions and deliberations, following decisions were taken;

- DDMA in consultation with DM (North) shall conduct Mock Drill at site. It shall also prepare SOP to be followed in case of any fire incident.

- Police department will deploy adequate number of beat constables (at least 2 constables round the clock for 2 months) and provide dedicated police picket at site.

- MCD to check and inform the Joint Committee regarding pending request with DDA for allotment of land for setting up of processing and disposal facilities in Delhi.

- MCD to expedite the disposal of RDF accumulated at site through Waste to Energy Plants and proposed RDF Pellete Manufacturing Plants

- Submit copy of Action Plan submitted to Hon'ble LG for Municipal Solid Waste Management and Remediation of dump-sites in Delhi.

- MCD to workout on the following;

1. Provide sufficient number of watch towers of adequate height at various locations for surveillance.

2. Provide dedicated survelliance squad with adequate manpower and vehicles to have strict vigil over the activities going on at the site. Such survelliance squad may be constituted comprising of MCD staff, Civil Defense and Police Staff. They should take round of the dump-site frequently (at least every 2 hours).

3. Upgrade the existing water tankers with sufficient capacity and pumps to have adequate required pressure for extinguishing the fire. More number of water tankers with pumps are required at the site.

4. Installation of Spark Arresters with exhaust system of vehicles/truck entering/other machinery at dump-site to prevent fire incidents due to sparks from vehicles.

5. Provide Temperature Sensors, Fire Alarms and Infrared/Therman Imaging Cameras for early detection and control of fire.

6. To explore the possibility of insertion/laying down of perforated HDPE pipes at various locations at certain distances to release methane into the atmosphere.

7. Explore possibility of providing 50kld capacity water reservoir at the site for emergency purposes including dousing of fire and control of dust pollution.

THIRD MEETING

31. To have assessment of the progress, 3rd meeting of the Joint Committee was held on 22.07.2022. Officers of the Joint Committee along with K.C. Surender, Addl. Secretary, UD Department, Sh. R.P. Gurung, Scientist – D, CPCB, Sh. Sanjeev Kumar, Commissioner, (CLD), DDA, Sh. Kamal Gupta, Deputy Director, DDA attended the meeting. DM (North) informed that Mock Drill has since been conducted. She furnished Mock Drill report. It was shared among officers of different departments. Representative of MCD filed Action Taken Report in respect of Bhalswa dump-site.

32. The Committee enquired about the development/progress after the 2nd meeting of the Joint Committee held on 03.06.2022 and also about the fire incident that took place on that very day i.e. 03.06.2022. Mr. Raja informed that the methane generated from the waste and dry atmospheric conditions were the main reasons for the fire incident on 03.06.2022. He further informed that the dump-site was receiving 2200-2300 TPD of fresh Municipal Solid Waste. Perforated HDPE pipes for release of methane are proposed to be installed at various locations particularly at the vulnerable area. 50KLD capacity reservoir was yet to be provided at the site. Tender for collection and processing of 3000TPD MSW has been invited. The plant is expected to be constructed by December, 2024. In order to reduce fresh MSW at site, segregation of waste at

source is encouraged. Material Recovery Facility and Decentralized Plants were to be installed. He further informed that work has been awarded for setting up of three plants (2 at Bhalswa dump-site & 1 at Ghazipur dump-site) of 1000 TPD each for further processing/making pellets from the RDF generated from the dump-sites.

33. The Committee enquired about the status of drone survey and reduction of the height of the Bhalswa landfill. Mr. Raja informed that drone survey has been done and as per survey, area of Bhalswa dump-site is 78 acres (instead of 70 acres reported earlier) with volume of 73 lakhs cubic meters. Height of the dump-site was about 65 meter in July, 2019 with 2 mounds. First mound having height of about 11 meters has been completely removed and for the second mound, bio-mining work was under process.

34. Mr. Raja further informed that to achieve target of 100% bio-mining by December, 2023, a new Integrated Tender for bio-mining of 30 lakh tons of legacy waste is to be floated. About 25 lakh tons of legacy waste has been bio-mined so far. Inert is being sent to NHAI and there is no problem/issue regarding accumulation of bio-mined Inert at spot. Presently, there was 15000-20000 tons of RDF. It is being sent to WTE plant at Bawana and WTE plant at J.B.M. at Murthal, Sonepat, (Haryana). During rainy season, bio-mining operation has been reduced due to clogging of pores of trommels.

35. On enquiry about the status of rag-pickers, it was informed that DM (North) has taken initiative and involved M/s Chintan (NGO) for identification, verification, training and authorization of rag-pickers. When enquired about the steps taken for prevention and installation of Spark Arresters, Mr. Raja informed that SOPs have been prepared and instructions have been issued for Spark Arresters but the same are yet to be implemented. For construction of boundary wall, an estimate of about Rs.25 crore has been prepared and UD

department has been requested vide letter dated 15.07.2022 about it. It was further informed that fencing was done at the site but was cut and stolen.

36. Mr. Raja further informed that about 55 acre land at Rani Khera was allotted by DDA to North DMC in 2016, however, the said land is close to human habitation and not suitable as per the MSW manual for construction of Solid Waste Management Facilities. 33 acres of land at Narela-Bawana is available near the existing Waste to Energy Plant at Bawana, however, there was issue of High Tension Line passing over the land. This land is proposed to be used for Waste to Energy Plant. 49 acres of land at Sultanpur Dabas village was allotted by DDA in 2018. However, the said land is a protected forest land and has a large number of grown up trees, bushes etc. This land is proposed to be used for developing Engineered SLF. DDA was requested to provide some other alternative land in place of this land which required tree cutting permissions from the forest department. The Committee asked the representative of MCD to inform about the communication to forest department, if any, regarding request for tree cutting permission on the said land.

37. Representative of DDA informed that alternative land in place of 49 acres land at Sultanpur Dabas was not possible and suggested that MCD should communicate with the Forest Department for getting tree cutting permission. It was also informed that a meeting was held with Commissioner, MCD in June, 2022 regarding allotment of land for waste processing facilities. The Committee asked DDA representatives to submit copy of the minutes of the said meeting and also response of DDA with respect to letters/communications from MCD and UD Department regarding request for allotment of land.

38. The Committee asked the police department to check locations of CCTV cameras installed at dump-site and inform whether they were installed at appropriate locations. The representatives from police department informed

that two beat constables have been deployed (1 in each shift of 8 hours). However, police picket has not yet been provided.

39. The Committee asked the representative of MCD about the measures taken to avoid sliding of waste near the road. Mr. Raja informed that in order to stop the sliding of waste near the road, dumping of waste has been stopped there. He further informed that there are four water tankers for sprinkling of water out of which one has been permanently stationed at the top of the dump-site. Mr. Singh informed that DPCC has issued directions under Section 5 of the Environment (Protection) Act, 1986 read with Solid Waste Management Rules, 2016 regarding prevention and control of fire incidents at the MSW dump-sites in Delhi to MCD, UD department and DDMA on 10.06.2022 seeking Action Taken Report within 15 days. It is awaited.

40. Representative of DPCC informed that expansion of WTE plant at Okhla (from 1950TPD to 2950TPD) has been proposed for which public hearing is scheduled on 16.08.2022. Terms of Reference has been given by MoEF and CC vide letter dated 29.06.2022 for expansion of existing WTE plant at Bawana (from 24MW to 60MW). DM (North) informed that 30 Civil Defense Volunteers have been deployed at the dump-site. M/s Chintan (NGO) has been involved for identification, verification, training and authorization of rag-pickers. First stage work i.e. identification of rag-pickers has been done and the rest of the work was under progress. The Committee asked her to check the background of the rag-pickers before giving authorization; they should not be from criminal background. The Committee asked the DM (North) to submit updated progress report and suggestions for prevention and control of fire incidents at dump-site. DDMA representative was asked to submit general SOPs for taking measures in case of fire incidents at the dump-site.

41. The Committee asked representative of MCD about treatment of Leachate generated from the dump-site and proposal of MCD, if any, in that regard. Mr. Singh informed that DPCC has already given directions to all the three DMCs regarding treatment of leachate generated from the dump-sites. The Committee asked the representative of MCD to take necessary action for treatment of leachate.

42. After detailed discussion and deliberations, following decisions were taken:

- MCD shall submit Action Taken and Updated Progress Report with respect to decisions taken in the earlier meetings of the Committee and during the visits of Bhalswa dump-site on 11.05.2022 including present scenario, steps/measures taken/efforts made after the constitution of the Committee, difficulties faced, future plans along with SOP, suggestions etc. for prevention and control of fire incidents.

- MCD shall also submit drone survey report, communication to forest department regarding request for tree cutting permission at Sultanpur Dabas and proposal regarding treatment of Leachate.

- DDA shall submit copy of the Minutes of the Meeting with Commissioner of MCD held in June, 2022 and its response to various letters and communications from MCD and UD department for allotment of land.

- DM (North) to submit updated progress report and suggestions for prevention and control of fire incidents. DDMA (North) also to submit SOPs for taking measures in case of fire.

- Police department shall deploy adequate number of beat contables and provide police picket at the dump-site. It shall also check the location of

CCTV cameras and inform whether these were installed at appropriate locations.

- DM (North), DCP (Outer North), DDMA (North), UD department to submit their Action Taken Reports and Updated Progress Reports.

FOURTH MEETING

43. To assess the progress of the work, fourth meeting of the Joint Committee was held on 20.08.2022. DM (North), SDM (Model Town), Sh. Uma Shankar, Addl. DCP (Outer North), Sh. K.C. Surender, Addl. Secretary, UD Department, Sh. Mayank Purvey, Scientist D,CPCB, Sh. K. Kannan, Superintendent Engineer, MCD along with Sh. Suraj Bhan, Executive Engineer and Sh. H.D. Bhrawaj, Asst. Engineer, MCD, Sh. Kamal Gupta, Director (IL) DDA and Sh. D.K. Singh, SEE, DPCC attended the meeting. Mr. K. Kannan, SE, (MCD) informed that Mr. P.K. Raja, SE, (MCD) has since been transferred and now he was the Nodal Officer from MCD in the Joint Committee. He further informed that he joined MCD as SE on transfer of Mr. P.K.Raja in the last week of July, 2022. When the Committee enquired about the development and progress report of MCD since the 3rd meeting held on 22.07.2022, representative from MCD informed that they were recently posted and were not fully aware of the past developments and latest status. The Committee advised them to go through the previous minutes of meetings and submit action taken report within 3-4 days.

44. About the status of Inert and RDF disposal at Bhalswa landfill, the representative of MCD informed that approximately 5500 to 6000 tons of Inert was lying at the dump-site. Inert generation was about 1500TPD and out of that, about 1100 TPD is being disposed through NHAI and there was, thus, no problem of Inert disposal.

45. The MCD representative further informed that due to new tender for disposal of RDF, current agencies engaged in RDF disposal including Waste to Energy plant at Bhawana have been disengaged. There was no lifting of RDF by M/s Delhi MSW Solutions Ltd. from the dump-site since 29th July, 2022. Presently, RDF was being stored at the dump-site. The Committee expressed concern over it and directed the representative of MCD to inform about the reasons for not lifting of RDF from the dump-site. It was further informed that earlier proposed tender for installation of 3 RDF Pellet Manufacturing Plants of 1000 TPD each (2 at Bhalswa and 1 at Ghazipur) has been foreclosed due to various reasons. For bio-mining of 30 lakh tons of legacy waste, a tender has been floated and date of opening of the tender is 2nd September, 2022. There was proposal for signing of MoU between MCD and JK Cement for disposal of RDF whereby minimum 3000 tons of RDF shall be disposed of from 3 dump-sites in Delhi every month.

46. Representative of MCD further informed that a case was pending before the Hon'ble High Court which has been filed by an agency engaged for disposal of RDF and the next date of hearing was 5th September, 2022. The Committee asked them to submit copy of writ petition. It was also decided that a letter be sent to WTE plant at Bawana seeking reasons for not lifting the RDF from Bhalswa dump-site.

47. Representative of MCD further informed that 14 trommels were working at site and 23 trommels have been disengaged/closed. The Joint Committee expressed concern about reduction of trommels for bio-mining without any intimation to it and asked the representative to produce the relevant orders by the Competent Authority relating to closure of trommels. The Committee also enquried about the installation of Spark Arresters on the vehicles/trucks/machinery at the dump-site. It was informed that most of the

vehicles entering the dump-site did not require Spark Arresters (since having catalytic converteor) and for rest of the vehicles, notice has been issued for instalation of Spark Arresters and it would be installed within few days and details would be furnished to the Joint Committee. When enquired about the watch towers, the representative of the MCD had no information as to why these could not be provided.

48. About developments/progress in respect of other issues, the MCD representatives informed that installation of perforated pipes has started and 6 perforated pipes have since been installed. Drone Survey report has already been submitted to the Joint Committee.

49. The Committee enquired about the unauthorized entry of rag-pickers. The representative of Police department informed that two beat constables have already been deployed at the dump-site with duty of 8 hours each. The Committee directed MCD representatives to maintain attendance register of beat constables at the dump-site to ensure that they regularly performed their duties. When enquired about the police picket, the Addl. DCP informed that presently there was no police picket at the dump-site. The Addl. DCP assured that the police picket would be set up at the dump-site at the earliest. Addl. DCP further informed that they have given recommendations regarding installation of CCTV cameras at various locations in and around the dump-site. The copy of the recommendation was shared with all concerned and is annexed as **Annexure B**.

50. DM (North) informed that Action Taken Report has already been submitted vide letter dated 04.08.2022. 30 Civil Defense Volunteers have already been deployed at the site (10 CDVs in each shift) to check the unauthorized entry/movement of rag-pickers. For authorization of rag-pickers at the spot, M/s Chintan (NGO) has been involved for identification, verification, training

and authorization of rag-pickers. First stage work i.e. identification of the rag-pickers has been done and 300 rag-pickers have been identified. The second stage of providing training to them is under progress. DM (North) also informed that ADM (North) has since been transferred and for that reason there was no representative of DDMA in the meeting. The Action Taken Report dated 04.08.2022 is annexed as **Annexure C**.

51. Representative of DDA informed that they have submitted copy of the minutes of meeting with Commissioner, MCD held on 30.06.2022. Copy of the minutes was again provided during the meeting and was shared with the concerned departments. It was also informed that in Narela, 8.5 hectares land has been allotted for E-Waste Eco Park in July, 2022. The Joint Committee asked the officer to submit the allotment letter of the said land. MCD representatives informed that survey has been conducted by the Horticulture Department for the land available at Sultanpur Dabas village and about 2550 trees have been identified to be cut. It was informed that possibility will be explored for allotment of land out of the list of 37 sites identified by MCD for Decenterlized Solid Waste Management Plans.

52. DPCC representative informed that Action Taken Report was still awaited from MCD, DDMA and UD Department regarding directions under Section 5 of the Environment (Protection) Act, 1986 for prevention and control of fire incidents. Representative of UD informed that they have already released the balance amount in respect of Ghazipur dump-site from the Escrow Account. He assured that the request from Bhalswa dump-site for approval of 24 crore for construction of boundary wall shall be expedited as per rules.

53. After detailed discussions and deliberations, following decisions were taken:

- MCD shall submit Action Taken and Updated Status/Progress Report with respect to the decisions taken in the earlier meetings along with reasons for not lifting of RDF by WTE plant at Bawana, present scenario/status of bio-mining of legacy waste including number of operational trommels, reason for reduction of trommels and orders issued in this regard, disposal of RDF and Inert generated from bio-mining of legacy waste by 24th August, 2022.

- DM (North) to submit updated Progress Report along with suggestions for prevention and control of fire incidents at dump-sites and also inform about the measures taken by the concerned departments with respect to the deficiencies observed during the Mock Drill on 08.06.2022.

- Police Department shall deploy adequate number of beat contables and provide one police picket at dump-site to prevent unauthorized entry.

- DDA will submit report on further progress regarding allotment of land for Solid Waste Processing/Disposal Facilities. Copy of the allotment letter in respect of E-Waste Management Facility will also be submitted to the Joint Committee.

ACTION TAKEN REPORT

54. Pursuant to the directions in the meeting held on 20.08.2022, MCD furnished a comprehensive Action Taken Report dated 23.08.2022 regarding the steps taken for implemention of the decisions taken during the previous meetings of the Joint Committee.

55. About the reasons for WTE plant at Bawana not receiving RDF since 29th July 2022, it was informed that erstwhile North DMC had empaneled and engaged 5 agencies for disposal of plastic waste, incinerable waste recovered from bio-

mining process at dump-site @ 1746/- per MT on 03.12.2021 for a period of 12 months. The empaneled/engaged agencies were M/s DMSWSL (ii) M/s Pragati Builders (iii) M/s Dayacharan & Co. (iv) M/s RR Enterprises and (v) M/s Rekart Innovations Pvt. Ltd. These agencies could not lift the entire incinerable waste resulting in accumulation at site hindering with normal functioning of bio-mining process. Therefore, following five trommeling agencies were also engaged at the same time, after obtaining their consent with the approval of the Competent Authority.

- Thapar Engineering Works
- Greentech Environ Management Private Limited
- Enviro Zone Instruments & Equipments
- Sakhya Enviro Private Limited
- United Facilities & Logistics Pvt. Ltd.

56. The work of bio-mining was started at Bhalswa in October, 2019. Since then, 25 lakh MT of legacy waste has been processed. In-spite of all efforts, the desired progress has not been achieved due to various reasons i.e. lack of stacking space of recovered material within landfill; shortage of disposal sites of recovered material especially RDF; multiplicity of trommeling and transportation agencies etc. The contribution of 10 agencies towards RDF lifting was miniscule. As a result, recovered material had accumulated at landfill site itself which was creating issues in operation of already installed trommels and it was difficult to increase the capacity in line with action plan prepared by MCD for completion of bio-mining process at the dump-site. For that reason, all the 10 agencies including M/s Delhi Municipal Waste Solution (WTE at Bawana) engaged for disposal of plastic waste/incinerable waste have been disengaged. It was further informed that MCD was in process of calling fresh tenders to undertake the integrated work of bio-mining of 30 lakh MT of legacy waste including disposal of all the fractions recovered through bio-mining process i.e. Inert, RDF and C&D waste. It is further informed that as the work of bio-mining is presently hampered due to rainy season, the

generation of RDF is very less. Tenders have been invited and the pre-bid meeting was conducted on 16.08.2022. The bid opening date is 02.09.2022.

57. About the present status of bio-mining of legacy waste at dump-site including number of trommels operational, disposal of RDF and Inert, it was informed that out of 51 trommels, 23 were installed at lower level on a land area of approximately 5 acres. These machines were installed at a very close distance to each other causing lack of stacking space. As the offtake of RDF fraction was less than its generation, huge quantity of RDF had stacked near trommels as a result the trommels were not able to function at full capacity. For that reason, the department has disengaged 23 machines installed at the lower level for effective work management, to enhance efficiency and better regulatory checks. It was further informed that at present, 14 trommels, 4 kleeman machines and 1 rotor were functional at the site. The details of the disposal of RDF, Inert, C&D was as under:

S.No.	Detail	Cumulative qty. (MT)	Month of August (MT)
1.	Inert	369600	9391
2.	C&D	66000	5022
3.	RDF	227300	114

58. It was further informed that there was a proposal of signing of an MoU between MCD and JK Cement for disposal of RDF. Every month, JK Cement will dispose of RDF minimum 3000MT per month from 3 landfill sites including Bhalswa. There is a comprehensive tender of “Disposal of 30MT of legacy waste by bio-remediation and bio-mining at Bhalswa dump-site, Delhi.” and it is under process. The last opening date of the tender is 2nd September, 2022.

59. In the report, it was informed that 6 number of HDEP pipes have been provided at various vulnerable locations in fresh waste dumping site for release of methane. In future, it will be provided as and when required.

60. Regarding status of MRF facility, it was informed that an MoU has been signed with M/s 21 Century Polymers (WME) for setting up of 150TPD capacity MRF plant at Bhalswa diary. Land measuring 2000 sq meter was handed over to the agency on 25.05.2022. Since the land was marshy, Inert generated at dump-site was dumped there. Further, the agency was in the process of filling C&D waste so as to make firm base for the facility. Plant is likely to be made operational within 3 months.

61. Regarding disposal of RDF accumulated at site, it was informed that tenders for “Design, Finance, Build, Own, Operate and Maintain Processing facility to process minimum 1000TPD of incinerable waste fraction recovered from processing of legacy waste into RDF and its subsequent transportation and disposal on daily basis” were invited. The agencies were asked to provide GPS tracking system. The agency, however, declined to provide it being not part of tender condition. One of the agencies requested for much more land from 1.5 to 2 acre as per bid of RDF which was not available with the department. Hence, the work was foreclosed.

62. Regarding installation of Spark Arresters, it was informed that the concessionaire namely Metro Waste Handling Private Limited engaged for Karol Bagh Zone for door to door collection of MSW has given list of vehicles deployed for the work where it was mentioned that all the vehicles were equipped with catalytic converters and hence, there was no need to install Spark Arresters. They also enclosed the exemption list of vehicles and exemption certificate of Spark Arrester. Similarly, M/s IPMSW Solutions

Private Limited for Narela Zone and M/s AG Enviro furnished the list of vehicles exempted from installation of Spark Arresters.

63. Regarding construction of boundary wall, it was informed that an estimate amounting to Rs.23,03,11,300/- has been prepared to cover the probable cost of construction of RCC boundary wall of 4 meter height along with concertina coil fencing and the same has been sent to Addl. Secretary, UD Department for releasing adequate budget.

64. Regarding upgrading the existing water tankers with sufficient capacity and pumps, it was informed that two water tankers of 9000 liters and two water tankers of 3000 liters capacity remain deployed around the clock and sprinkle water regularly over the dry waste to maintain 5-25% moisture content. Jetting machines from zones were also deployed from time to time.

65. About treatment of leachate generated from the dump-site, it was informed that the proposal was being initiated as per directions of DPCC.

66. About status of 49 acres of land at Sultanpur Dabas village, 35 acres of land at Narela Bawana and 55 acres of land at Ranikhera, it was informed that in order to ensure scientific disposal of unprocessed MSW, MCD was in the process of setting up another waste plant processing facility (WTE) at Narela-Bawana which would cater to about 3000 MT of Solid Waste per day. Tenders have been invited and the plant is likely to be made operational by June, 2025. As per this tender, WTE plant will be set up at Narela Bawana and Engineered Landfill will be set up at 49 acres available land at Sultanpur Dabas. Request for cutting of trees will be sent to the forest department for grant of permission in due course of time. 55 acres land at Rani Khera is close to human habitation and not suitable as per the MSW manual for construction of Solid Waste Management Facilities.

67. Regarding watch towers, it was informed that once the estimate for construction of boundary wall was approved, there won't be any need to provide watch towers. About Temperature Sensors, Fire Alarms, Infrared/Thermal Imaging Cameras for early detection and control of fire at the dump-site, it was informed that the proposal was being initiated. Regarding 50KLD capacity water reservoir at the spot for emergency purposes including dousing of fire and control of dust solution, it was informed that submersible pump was available and was being utilized for refilling of water tankers/sprinklers deployed for mitigating dust and air pollution. The proposal for underground reservoir will be taken up as per the availability of space and budget.

68. It was further informed that Drone Survey of the dump-site has been carried out for the assessment of entire area of Bhalswa dump-site. During emergency, the DDMA, DM (North), Delhi Fire Services will be informed and necessary steps to handle the disaster will be taken by the MCD in coordination with the other departments. It was also informed that number of CCTV cameras have been increased from 21 to 31.

69. The MCD in the Action Taken Report also informed about constraints in managing dump-site; additional measures taken after the fire and long terms measures being taken to prevent fire incidents. The detailed Action Taken Report is annexed as **Annexure D**.

DRONE SURVEY

70. Drone Survey was conducted at Bhalswa landfill site in June, 2022. The MCD engaged Caritas Eco System Private Limited as consultant to conduct a drone based survey to monitor the progress of the process at Bhalswa landfill site. As per survey report, the actual site area of landfill site was about 78.5 acres

(about 31.71 hectare). The MCD officials had earlier reported the total area of the landfill to be 70 acres. The site area has thus increased by 12%. It was also seen that the waste has reached a height of 62 meter from the ground. The heightest point being more than 274m. The consultant has estimated the waste volume as per the table below as on 15.06.2022:

SLF site area	78.47 Acre	31.76 Ha.
SLF site area considered for volumetric assessment	76.87 Acre	31.11 Ha.
Waste Volume @ 212 m baseline level	73 Lakh Cubic Meter	
Waste volume @ 215 m baseline level	65 Lakh Cubic Meter	

71. As per the information given in the report about 25 lakh tons of legacy waste has been processed till date. Presently, MCD has 24 trommels operating at Bhalswa landfill site with 2200 tons waste being removed everyday. Presence of rag-pickers, including children atop the landfill busy with their work was also noticed during survey. The detailed drone survey report is annexed as **Annexure E**.

FIRE MOCK DRILL

72. The causes of eruption of fire at the landfill site have been detailed by the Fire Service Department in its report. To review the alertness and response time of different Emergency Support Functionaries (ESFs) in the North Delhi district for any disaster and to identify areas for further improvement, a surprise Fire Mock Drill was organized by DDMA (North) on 08.06.2022 at 11:57AM at Bhalswa landfill pursuant to the directions of the Joint Committee. The scenario was of fire. The report was shared with all the concerned departments. They were directed to rectify the deficiencies mentioned in the Mock Drill Report.

73. Several recommendations made for prevention of fire incidents were circulated to various stakeholders for implementation/compliance as:

- The entry and exit gates should be separate and proper record should be maintained of the entry/exit of persons/vehicles. Also, if two gates are there, the movements of ESFs can be better during any disaster.
- Regular awareness and training needs to be given to the staff at the dumping site. Delhi Fire Service has already offered to provide training to the officials. MCD shall depute sufficient number of officials for getting training to deal with fire incidents in coordination with Delhi Fire Service.
- MCD shall establish an emergency control room; it shall be operational on 24x7 basis. MCD shall prepare SOPs, Disaster Management Plan and Evacuation Plan and keep it at site.
- The area where the fire is recurring needs to be identified and observed in order to avoid any disaster.
- Internal mock drills be conducted on regular basis.

74. The Joint Committee appreciated the efforts of DM (North) to organize the Fire Mock Drill. The detailed report of Fire Mock Drill is annexed as **Annexure F**.

ADDITIONAL SUGGESTIONS

75. When the Joint Committee was constituted, there were three different Municipal Corporations. Mr. P.K. Raja, Superintendent Engineer had represented the erstwhile North MCD in various meetings till 3rd meeting held on 22.07.2022. After unification of the three corporations, there was change of the Nodal Officer and in the 4th meeting held on 20.08.2022 Mr. K. Kannan, SE (MCD) participated as Nodal Officer for Bhalswa landfill site. Action Taken Report was filed by him pursuant to the directions of the Committee on

23.08.2022. Lot of discrepancies in the functioning of the erstwhile MCD have been noted by the Committee:

- **Total area of landfill site** – From the very inception, the Committee was informed that the total area of the Bhalswa landfill site was around 70 acres. It is unclear as to on what basis and documents/evidence the area of the dump-site to be 70 acre was ascertained/assessed. In the Drone Survey Report, the land area of the dump site has been estimated to be 78.47 acres (31.76 Ha). This material inconsistency has remained unexplained. The Committee suggests that Commissioner, MCD should collect relevant documents to find out the exact area of the landfill site to make proper future plans for removal of the garbage at the dump-site.

- **Number of trommel machines** – Mr. P.K. Raja, SE had informed the Committee that the total number of functional trommel machines were 40 (30mm and 6mm screen size) besides 4 kleeman machines. The Drone Survey Report conducted in June, 2022 noted that presently, 24 trommels were being operated at Bhalswa landfill site. In the Action Taken Report dated 23.08.2022, Mr. K. Kannan, SE informed that the total number of trommel machines deployed at the site were 51. Presently 14 trommel machines were working at site and 23 trommels have been disengaged/closed. The reason for disengagement of 23 trommels were that they were installed at a very close distance to each other causing lack of stacking space. Apparently, different officers of MCD have given inconsistent and contradictory figures of trommel machines functioning at the spot. It is suggested that the Commissioner, MCD should conduct a through investigation as to how many trommel machines were in operation at the time of constitution of the Committee at landfill site; how many were in operation at the time of conduct of Drone Survey in June, 2022 and how many trommel machines were in operation in the last week of July, 2022

when 23 trommel machines were disengaged. He should also enquire as to how many trommel machines are functional at present at the landfill site. It should be ascertained with certainty as to how many trommel machines are required at the landfill site to achieve the object of flattening of garbage mounds.

- **Legacy waste bio-mined/processed** – Mr. P.K. Raja had informed the Committee that in July, 2019 the total quantity of legacy waste dumped was around 80 lakhs tons. 14 lakh tons (17.5%) of the total legacy waste had been bio-mined/processed till 11.05.2022. In the Drone Survey Report, it is stated that about 25 lakh meteric tons of legacy waste has been processed till June, 2022. In the Action Taken Report dated 23.08.2022 filed by Mr. K. Kannan, again the total quantity of legacy waste processed till date has been stated to be 25 lakh metric tons. Apparently, there is mismatch between the two quantities i.e. 14 lakh tons till 11.05.2022 and 25 lakh tons till June, 2022. Commissioner, MCD must enquire as to how much legacy waste has been processed till date. It should also be ascertained if proper record has been maintained at the landfill site regarding processing of the legacy waste and how the different figures have been arrived at. The target for the MCD for Bhalswa landfill is October, 2023. As per Drone Survey Report, waste volume @ 212 meter base line level is 73 lakh cubic meter. It is 65 lakh cubic meter @ 215 meter base line level. Fresh MSW is dumped at the landfill site which is around 2200TPD (49%n of the total MSW generated). As observed above, the number of trommel machines operating at landfill site have been drastically reduced to 14 trommel machines, 4 Kleeman and 1 rotor as disclosed in the Action Taken Report. The Committee is of the view that the Commissioner, MCD should assess the total requirement of trommel machines to be installed/operated at landfill site so that the huge quantity of legacy waste lying at the landfill site along with fresh MSW is

bio-mined or processed by the target date. Apparently, the process of bio-mining is very slow and tardy. No effective steps seem to have been taken for bio-mining the waste. Under this scenario, it is highly unlikely that MCD would achieve its target of flattening the garbage mountain by October, 2023. The situation becomes more serious and aggravated when fresh MSW is dumped at the site and its quantity is almost equal to the processed one. It will take years together to process the legacy waste at the current rate. No effective plans to reduce the height of the garbage mounds have been made. The Committee is of the view that segregation of the waste at source is the urgent need of the hour. Directions have been issued under Section 5 of the Environment (Protection) Act, 1986 read along with Solid Waste Management Rules, 2016 by CPCB vide letter dated 26.05.2022. DPCC has also issued directions vide letter dated 10.06.2022 to the Municipal Corporations. Some interim measures have been suggested to be implemented on priority by the Corporations till the time On-site/Off-site Emergency Plans were prepared and implemented. One of such direction is that fresh waste be not disposed at the dump-site. Organic waste from APMC and industrial waste be not disposed of at the dump-site. It be ensured that no industrial waste/e-waste/lithium battery is dumped at the site.

- **Disposal of RDF** – The Committee was informed that generation of RDF is 3000TPD when the trommels and Kleeman machines are operated at full capacity. It was further informed that currently, 1000-1200TPD of RDF was being disposed through WTE plant at Bawana. About 40000 MT RDF has accumulated at the dump-site which poses danger of catching fire. This situation was before the change of Nodal Officer at Bhalsawa landfill site. Mr. K. Kannan, the newly designated Nodal Officer for MCD informed in the 4th meeting held on 20.08.2022 that current agencies engaged in RDF

disposal including Waste to Energy Plant at Bawana have been disengaged and there was no lifting of RDF by M/s MSW Solutions Ltd. from the dump-site since 29.07.2022 and presently, it was being stored at the dump-site. The Committee was taken by surprise. Mr. K. Kannan was unable to disclose the specific reasons for disengagement of current agencies engaged in RDF disposal including WTE plant at Bawana. He was asked to furnish a detailed Status Report/Action Taken Report. In the Action Taken Report dated 23.08.2022, it was informed that erstwhile North DMC had empaneled and engaged 5 agencies for disposal of plastic waste, incinerable waste recovered from bio-mining process @ 1746 per MT on 13.12.2021 for a period of 12 months. These agencies, however, could not lift the entire incinerable waste resulting in accumulation at site hindering with normal functioning of bio-mining process. Therefore, all these agencies were disengaged. It was further informed that MCD was in the process of calling fresh tenders to undertake the integrated work of bio-mining of 30 lakh MT of legacy waste including disposal of all the fractions recovered through bio-mining process i.e. Inert, RDF and C&D. Tenders have been invited and bid opening date is 2nd September, 2022.

- The Committee is of the view that the matter needs to be thoroughly enquired as to why these agencies who were engaged in the disposal of RDF have been suddenly disengaged without making alternative arrangements for disposal of RDF which is being accumulated at the dump-site. Responsibility should be fixed for the lapses of the officers concerned and the agencies involved in the disposal of RDF including WTE at Bawana for irregularities, if any. The Committee is of the view that alternative arrangement must be ensured at the earliest to avoid accumulation of RDF at landfill site. It would prevent the possibility of catching of fire. As per Action Taken Report dated 23.08.2022, as on 22.08.2022, total quantity of

RDF at the landfill was 37000 MT which is quiet huge and is expected to increase in the absence of alternative arrangement.

- Earlier it was informed that North DMC was in the process of awarding the work of installation of 3 RDF Pellate Manufacturing Plants at the site which was expected to be made operational within 2-3 months. In the Action Taken Report dated 23.08.2022, it has been informed that the tenders for 'Design, Finance, Build, Own, Operate and Maintain processing facility to process minimum 1000TPD of incinerable waste fraction recovered from processing of legacy waste into RDF and its subsequent transportation and disposal on daily basis, has been foreclosed. Mr. K. Kannan was unable to furnish any valid reasons for foreclosing the said tender. It reveals that the problem to dispose RDF is not being taken seriously. The Committee is of the view that whole hearted approach is required to be adopted while making any proposal for disposal of RDF etc.

- MCD must comply with the directions issued by CPCB and DPCC. Instead of sending plastic waste to dump-site/WTE, the focus should be on minimization, segregation, recycling and reuse of materials. APMC must be encouraged to segregate the Municipal Solid Waste at source and have in house arrangement for their use/recycling. To discourage such big units to dump indiscriminately, Municipal Corporation can explore possibility of levying charges/penalty for dumping unsegregated MSW at site. RWAs be involved and it should be ensured that minimum waste reaches the landfill site. They be encouraged to segregate at home and compost at the colony level. The Solid Waste Management Byelaws for Delhi notified in 2018 place onus of waste segregation – into wet waste (bio-degradable), dry waste (non bio-degradable) and domestic hazards waste, directly on those who generate it including households. Violators are liable to pay a fine of

Rs.200/-. Waste processing infrastructure needs to be strengthened so that no organic waste reaches the landfill site.

- **Lands available with MCD for Bhalswa landfill** – The erstwhile North DMC was allotted 55 acres of land at Ranikhera in 2017. 49 acres of land in Sultanpur Dabas was allotted in 2018. Land measuring 35 acres at Narela, Bawana has been allotted. Recently, DDA has allotted 8.5 hectares land in Narela for E-waste Eco-park in July, 2022. The lands made available to erstwhile North DMC have remained un-utilized till date for various reasons. It is stated that the land at Ranikheda is lying vacant and can't be utilized being close to habitation and lack of buffer zone of 200 meters. Public resistance is also one of the factors. Again, the land at Bawana has remained un-utilized due to presence of high tension line. Land at Sultanpur Dabas has also not been used being in the forest protected area. The Committee noted with concern about the un-utilization of lands allotted to the MCD since long. There was no occasion for the MCD to have got allotted the land if these were not suitable. The Committee is of the view that the lands available with MCD should be utilized properly and impediments, if any, should be removed at the earliest. DDA has already informed that it was not possible to substitute/exchange the land at Sultanpur Dabas with any other land.

- **Waste to Engery Plant** – The Committee is of the firm view that more WTE plants are required to be established within the jurisdiction of MCD to process the huge MSW dumped at the site. Presently, around 2200TPD of fresh MSW is dumped at the site. The capacity of the WTE plant at Bawana if run at full capacity is around 2500TPD but it is processing RDF only in the range of 1000-1200TPD. Apparently, the WTE plant is inadequate to meet the requirements. Immediate steps are required to set up additional WTE plants at proper locations.

- Recently, the Hon'ble LG has visited Okhla Waste to Energy Plant. Direction has been given to civic officials to take steps immediately to increase its existing capacity to fully utilize legacy waste and free the city of the garbage menace on a long term basis. The plant at Okhla consumes 1950MT solid waste. Directions have also been given to complete the Tehkhand plant in South Delhi by August, 2022. The plant will use nearly 2000MT of Residual Derives Fuel (RDF), in addition to 500MT Construction and Demolition waste. The Committee noted that the space/facility at Okhla can be utilized to dump MSW to lessen the load at Bhalswa dump-site. After the unification of all the Corporations, there should not be any difficulty in exploring the utilization of Okhla land fill site/facility to dump MSW temporarily.

SOLID WASTE MANAGEMENT FACILITY AT SALIGAO (2016-2021)

76. DM (North) used her good office to get report from Saligao regarding the landfill site where appreciable work was done. The report is annexed as **Annexure G**. This report was shared with all concerned departments. They were asked to examine the report and implement the same to the extent it is feasible in Delhi.

BIO-MINING OF LEGACY WASTE IN GOA

77. Goa Waste Management Corporation was requested to furnish the information/report regarding successful bio-mining of the legacy waste and solid waste management/processing facilities in Goa. The detailed report dated 07/08.09.2022 is annexed as **Annexure H**. This report was also shared among all the departments. They were requested to examine the report in detail and implement the best practices adopted by them which can be replicated in Delhi.

GORAI AND DEONAR DUMP-SITES REPORT

78. Mr. D.K.Singh, one of the members in the team who had visited the Gorai and Deonar dump-sites in Mumbai on 05.05.2022 and 06.05.2022 submitted the comprehensive report which is annexed as Annexure B. The Committee has examined the report minutely and is of the view that various steps taken at the Gorai and Deonar dump-sites are very useful and can be replicated at land fill sites at Delhi. The stakeholders have been directed to examine the report and explore the possibility of its implementation. To prevent fire incidents, the following suggestions can be considered:

- For release of methane generated from dump-site, perforated HDPE pipes or of any other suitable material may be provided at the dump-site at suitable locations with proper spacing as per the site requirement.

- Declare the entire dump-site as 'No Smoking Zone' and 'Match-Box Free Zone'.

- Increase the number of tankers for sprinkling of water for control of dust and fire. Adequate water storage capacity at the dump-site for control of fire be ensured. Upgrade the existing water tankers with sufficient capacity and pumps to have adequate required pressure for extinguishing the fire.

- Deployment of adequate heavy machinery for dousing of fire (bulldozer, excavator, back-hoe loaders etc.)

- Construction of roads at periphery around the dump-site to facilitate movement of vehicles, patrolling teams and fire tenders.

- Adequate number of CCTV cameras should be installed in consultation with Delhi Police and DDMA at suitable locations covering vulnerable spots for fire. Proper control room with screens and adequate staff should be provided to moniter the activities through CCTV cameras.

- Spark Arresters should be installed with the exhaust system of the vehicles/trucks entering at the dump-site to prevent fire incidents due to sparks from vehicles.

- Security Watch Towers be installed at suitable locations to have proper watch and ward of the dump-site.

- Proper training on regular intervals should be given to the staff deployed at the dump-site.

- CO Monitors, Methane Detectors, Temperature Sensors, Fire Alarm be installed in consultation with expert agencies like IIT Delhi, NEERI etc.

- Mobile lightening system be installed at the places where regular light is not available.

- Regular plantation activities be undertaken over the capped area.

- Unauthorized entry of persons and rag-pickers be stopped. Dedicated police pickets can be provided at the dump-site for prevention of unauthorized entry. There should be frequent patrolling of the security personnel, Delhi Police and MCD Staff to prevent unauthorized entry/activities. Dedicated survelliance squad with adequate manpower and vehicles be provided to have strict vigil over the activities going at the site. They should frequently take round of the dump-site.

- The rag-pickers are frequent visitors to the land fill site and are stated to be helpful also. It has been suggested that NGO like ‘Chintan’ can be involved to regulate the entry of rag-pickers. The said agency can deploy specific number of rag-pickers for the purpose of segregation and recycling at the dump-site. The rag-pickers can be given identity cards. DM(North) has already taken initiative in this regard.

- The number of surface fires can be substantially reduced by covering the free land fill surface by a layer of non combustible material like earth/waste building construction materials.

- Limiting the footfall and through frisking the persons likely to operate in the area be prevented to carry materials capable of igniting the combustible materials.

- In order to keep the vulnerable areas wet/damp, jetting machines can be deployed for spraying of water as per requirement.

- In case of any fire incident, DDMA along with Delhi Fire Services be immediately intimated.

- UD Department to explore possibility of fulfilling the land requirement (if any) of the Corporation through Revenue Department also.

- Boundary wall with adequate height with barbed wire be constructed around the landfill site. The number of entry/exit be decreased at the site.

RECENT INITIATIVES

79. It is heartening to note that several steps have been taken recently to mitigate the huge problem. MCD has deployed Drones to survey the height of the landfills in every three months, to ascertain the exact extent of steps that need to be taken to shorten it. First such survey has been conducted at Bhalswa landfill site in June, 2022. MCD has also given 5% subsidy on property tax to colonies engaged in waste segregation to encourage the residents. As per newspaper report in The Times of India dated 29.07.2022, there was 100% door to door collection of Municipal Solid Waste in 297 wards out of the total 302 wards across the three municipal areas – MCD, NDMC and Cantonment Board. It also mentioned that there was 100% source segregation of waste in

295 wards which is nearly 97.7% of all the municipal wards. It was also informed that 90% of the Municipal Solid Waste generated daily in the city is processed. Another report published in the same newspaper on 29.07.2022 states that to prevent fresh waste being dumped at the landfills in future, MCD is establishing two more Waste to Energy (WTE) plants by 2024-25 taking the total to five, with a total processing capacity of 11800 tonnes a day. It also reports that MCD is also working on small projects, such as bio-CNG plants to ensure 100% processing of municipal waste. These are good and appreciable developments.

80. As per report in the newspaper 'The Times of India' dated 02.07.2022, the Hon'ble LG has invited suggestions from Delhites to get rid of the 'unseemingly mountains of garbage'.

81. The Joint Committee has appreciated the efforts made by Municipal Corporation of Delhi to supply Inert free of cost to the public at large. In this regard, an appeal has been made and published in the Newspapers by the Commissioner (MCD) to optimally use the C&D waste and Inert material for their construction activities. It is suggested that the Government agencies/Departments/RWAs be involved and mandatorily be asked to utilize Inert in their projects to the extent it is feasible.

82. As per report in newspaper 'The Times of India' dated 26.08.2022, the Municipal Corporation of Delhi's appeal to people to use inert and construction & demolition waste from the three landfill sites has started yielding good response. According to officials, in less than a month, orders for more than 10,000 metric tonnes of inert and C&D have been received from private entities of which 8421.75 metric tonnes had already been lifted. Hon'ble LG had asked government agencies involved in building and road construction like DDA, PWD, NDMC, CPWD to start using waste for their activities. DDA and

PWD have already decided to use the same. The Committee noted that this was appreciable beginning.

83. PWD is likely to start using inert material generated at the landfill sites in its various projects. One of the major PWD projects, wherein inert material is to be used is Barapula Phase – III work, which requires construction of elevated road segments over the Yamuna.

84. As per report in newspaper 'The Times of India' dated 03.09.2022, Hon'ble LG facilitated 56 Residents Welfare Associations (RWAs) and Group Housing Societies that had achieved the 'zero-waste' target and were contributing in minimizing the amount of waste getting dumped at landfills.

85. As per report in the newspaper 'The Times of India' dated 16.09.2022, it has been reported by MCD that 28 colonies had become zero waste areas and 30 more have become "Harit-Mitra". Many more colonies have joined the efforts to become zero-waste localities. The MCD has taken a slew of measures to reduce the height of landfills by deploying trommel machines, offering inert and C&D waste free of cost, sale of Refused Driven Fuel (RDF) to industry, coaxing the public to segregate waste at source and discouraging use of single-use plastic.

86. Times of India dated 30.08.2022 reported that Municipal Corporation of Delhi has signed a Memorandum of Understanding (MoU) with J.K. Cement for lifting the RDF lying at the 3 landfills. 5 trucks carrying approximately 100MT of RDF from Okhla landfill site was flagged off by the Hon'ble LG. It is further informed that J.K. Cement will be lifting 50,000 metric tons of RDF annually and MCD will be saving Rs.6.73 crore annually in the process.

87. The Joint Committee has identified several bottlenecks. It has suggested various measures to combat the menace of garbage after consultation with experts. Some success has been achieved, more is to be done. War scale efforts

are required to be undertaken by all the concerned agencies. The government must make sound policies to deal with the mammoth problem. As per report in the newspaper ‘The Times of India’ dated 19.09.2022, MCD is unlikely to meet its deadline for five waste plants. MCD’s proposal to expand the daily inceneration capacity of the Okhla plant from 1950 tons to 2950 tons has been rejected by an expert appraisal Committee constituted by the Union Environment Ministry. The Corporation has also shifted the deadline for completing the Tehkhand Project by a month to October end. Sincere and earnest efforts are required to deal with the mammoth problem which seems unresolved at present. Some plans made earlier have been foreclosed/abandoned and no effective alternative arrangements have been made. Possibility of aggravating the problem at Bhalswa landfill site cannot be ruled out. Steps taken so far are not adequate.

Submitted please.

Dated: 21.09.2022

Justice (Retd.) S. P. Garg

Report of the Joint Team of DPCC, EDMC and North DMC Officials on the Visit to Gorai and Deonar Dumpsites in Mumbai on 05.05.2022 & 06.05.2022.

1. Background

Ghazipur & Bhalaswa Dumpsites in Delhi are not an Engineered Sanitary Landfill and used for dumping of Municipal Solid Waste (MSW) since 1984 & 1994 respectively. Fire incidents have occurred at Ghazipur dumpsite on 28.03.2022, 09.04.2022, 20.04.2022 & at Bhalaswa Dumpsite on 26.04.2022. The Hon'ble Environment Minister, Govt. of NCT of Delhi took a meeting with Experts from IIT Delhi, Centre for Science & Environment, GAIL, IGL, TERI, ICAR- IARI etc. on 21.04.2022 regarding measures to control fires at MSW Dumpsites in Delhi. Officials from EDMC, North DMC, DPCC and Environment Department, Govt. of NCT of Delhi were also present during the meeting.

In the said meeting, Professor Manoj Dutta from IIT Delhi pointed out that Methane Gas is being emitted from all the 3 Dumpsites in Delhi (Ghazipur, Bhalaswa & Okhla) and suggested to establish Gas Wells at the Dumpsites with gas flaring system along with covering of dumping site with fine soil for controlling sudden fires. The slope of the dumpsite specifically at Ghazipur needs to be flattened. He further emphasized that even the short term solution will take at least one year to implement. Dr. Bhupinder Singh , Head of Environment Division , IARI , emphasized on the need of waste segregation at source in order to resolve the issue of fire incidents at dumpsites in Delhi on a long term basis. Reclaiming the dumpsites will take about 1-2 years at least and segregation of material is the prime need to ensure no waste decomposition takes place at the dumpsite.

After detailed discussions and deliberations on the various issues, Hon'ble Environment Minister,GNCTD, directed that a team of officers from Environment Department, DPCC and Municipal Corporations (EDMC & North DMC) to visit Mumbai to explore adoption of techniques on controlling fires, as opted at dumpsite of Mumbai.

Hon'ble Environment Minister, GNCTD, after the fire incident at Bhalaswa Dumpsite on 26.04.2022 again called a meeting on 28.04.2022 and directed for the visit of Gorai Dumpsite in Greater Mumbai to know about the existing Methane Capturing System and other details related to management of Dumpsite.

In view of the above, a team comprising of following officers visited the Gorai & Deonar Dumpsites in Mumbai on 05.05.2022 & 06.05.2022 respectively :

1. Sh. D. K. Singh, Sr. Env. Engr., DPCC
2. Sh. Rajeev Kumar Sharma, Env. Engr., DPCC
3. Sh. Roop Chand, SE (E&M), North DMC
4. Sh. Tarun Shankar Arya, AE, EDMC

2. Gorai Dumpsite

The team visited the Gorai Dumpsite in Mumbai on 05.05.2022. Concerned officials from Municipal Corporation of Greater Mumbai (MCGM) [Sh. Minesh Pimple, Chief Engineer, (SWM Project), Ms. Varsha Athalye, Executive Engineer (Gorai), Sh. Kamble, Asst. Engineer (Deonar Dumpsite)],

Maharashtra Pollution Control Board (MPCB) [Dr. J.B. Sangewar, RO (Head Quarters), Sh. S.R. Bhosale, RO (Mumbai), Sh. S.S. Dholam, SRO, Sh. A.S. Nandvate, SRO, Ms. Smita Vanave, Field Officer] and UPL Limited (United Phosphorus Limited) [Sh. Kamlesh Parikh and Sh. Debarish Mukharjee) were present during the visit.

The team interacted with aforementioned officials and a presentation was also given by MCGM on the Scientific Closure of Gorai Dumping Ground & its Subsequent Maintenance. Various issues related to Dumpsites including Fire Incidents, Management of MSW, Methane Generation & Preventive Measures were also discussed with the officials of MCGM, MPCB & UPL Ltd.

It was informed that about 6800 TPD of MSW is generated in Mumbai, out of which 84% is processed and rest is dumped. There are four sites for Disposal of MSW in Mumbai out of which two are closed, i.e., Gorai and Mulund Dumsites and MSW is being disposed at operational sites at Kanjur (Processing Facility) and Deonar (Dumpsite). It was informed that Bio-mining is being carried out at Mulund Dumpsite. Maximum Temperature in Mumbai is about 42°C this year however Maximum Temperature usually is 37 - 38°C.

The team visited the Gorai Dumpsite along with the officials of MCGM, MPCB & UPL Ltd. and following information was gathered from the officials and observation made during the visit:-

The Gorai site is located at Borival in the Western Suburbs of Mumbai. It spreads over an area of 19.6 hectare (ha) & was operational since 1972. The dumpsite is very close to Gorai Creek & habitation. 1200 TPD of MSW from Western Suburbs of Mumbai was received at the dumpsite till 31 December, 2007 after which MCGM had stopped dumping fresh waste at Gorai. About 2.34 Million of MSW was lying at the dumpsite. Average height of the Dumpsite was 26 meters. Before closure, Gorai Dumpsite was operated in an open manner causing emission of Green House gases. There were agitations by the local public against the Dumpsite due to its adverse effects on the health of nearby residents and surrounding environment. As the Gorai dumpsite was located close to Gorai Creek , the growth of the mangroves in the Creek was affected due to continuous flow of leachate generated from the Dumpsite. Gorai Dumpsite had frequent fire incidents , odour nuisance complaints etc.

To avoid further detrimental effects on the environment due to the waste dumped at the Gorai Dumpsite and as per the orders of the Hon'ble Supreme Court, MCGM decided to close the Gorai Dumpsite scientifically as per the then applicable MSW Rules, 2000. During closure no major challenges were faced except some small incidences of road accidents as the site involved constructional activities.

The Scientific Closure Plan of the Gorai Dumpsite envisaged scientific closure and converting about 19.6 ha of land into green landscaped space. The contract for scientific closure was awarded to M/s. United Phosphorus Limited along with Joint Venture partners M/s. Van Der Weil Strotgas B.V. of Netherlands in 2007. The work of closure of Dumpsite started in March, 2008 and completed in July, 2009 (16 Months). Operation and Maintenance of the closed Dumpsite started in July, 2009 for a period of 15 years. The cost of the project was Rs.62 Crores including post closure maintenance for 15 years..

The Scientific Closure Plan included the following components:-

- Relocation & Reformation of existing waste - Haphazardly dumped waste was shifted within the footprint area and it was compacted & reformed creating waste profiles as per design.
- Covering of reformed slopes & plain area with liner system & then with the soil cover.
- Liner system was comprised of the following layers.

i. Layer of Geo-Textile liner on the crushed earth material i.e., *C & D material for providing* cushioning layer. Geo-Textile liner prevented damage or puncturing caused due to the crushed earth material to the next layer of Geo-membrane i.e., HDPE (High Density Poly Ethylene) liner.

ii. Layer of Geo-membrane i.e., HDPE (High-Density Poly Ethylene) liner to prevent air, water and gases to enter or escape from the MSW.

iii. Layer of Geo-Composite liner which is a sandwich material of Geo-Textile liners with Geo-Net in between the two Geo-Textile liners. Geo- Composite liner is used as a drainage layer which allows the water to percolate and slide down through its surface without further interference.

- Landscaping - Greenery was developed over the capped area.
- Surface water drainage for channeling the storm water.
- Construction of compound wall, Sheet piling on the creek side to prevent leachate from entering the creek water.
- Installation of Landfill Gas (LFG) collection & leachate collection system Installation of flaring system.

❖ Station for Landfill Gas (LFG) capture & flaring has been installed so that methane content in the LFG is not directly emitted to the environment. This is a reliable and environmentally safe process to incinerate the LFG. The flare system consists of flare burner along with chimney of around 12 meter height.

❖ **Provided 19 leachates wells and 30 gas collection wells.** Leachates collected through leachate manifold system to leachate collection tanks provided capacity of 5000 liters and sent to Versova WWTP for further treatment and disposal. The treated waste water is disposed on land for gardening on Gorai dump site soil cover.

❖ Provided 30 gas collection wells. The gas collection system consists of manifold system with a common header of loop-1 and loop-2. Methane comes to gas flaring station via blower, moisture trapping, fume arrestor and through flow meter along with partial gas analyzer system connected after blower for measuring methane percentage. Depend upon availability of gas the flair system will running continuously with monitoring of sanction and discharge, temperature and pressure and flow as well. Capacity of flaring system is 1500 nm3/ hrs.). They have planted indigenous species and grasses in land scraping area for maintaining the site.

Methane collection system at the Gorai Dumpsite comprises of network of perforated Pipes (HDPE) laid down horizontally and vertically for collection of methane generated from the dumpsite. Gas Wells at various locations were provided for collection of methane and leachate from the wells. HDPE Pipes were provided from the wells to the Gas Flaring Station constructed near the Dumpsite for flaring methane gas. Leachate generated from the Dumpsite was being recirculated within the dumpsite using the pumps.

For flaring of methane gas, a stack of 12 meter height above ground has been provided. It was informed that the flaring system was commissioned in July, 2009 and approx. 1.6 Crore m^3 of methane has already been flared (burnt). It was informed that faring of methane is done with automatic system having pumps and methane flow meter. It was informed that in the beginning the methane concentration was 35-40%, now it is 20-25% and the H_2S concentration is less than 1%.

A study has been awarded by MCGM to IIT Mumbai to assess the quality of compost in the closed Gorai Dumpsite for its proposed Bio-mining in future.

❖ The operation and maintenance of the closed Dumpsite is being carried out by M/s. United Phosphorous Ltd & Vanderwell JVS (UPL), Madhuvan Park, Khar (W), Mumbai-52.

❖ **Benefits of Gorai Dump Site Closure:**

- Quality of life of people of Gorai improved.
- Quality of marine life improved.
- Market value of property in the area increased resulting in increases in property tax collection to MCGM.
- Fishermen's income increased because of better marine environment.
- Mangroves got rejuvenated resulting in healthy biodiversity.
- 19 Hectare of green lung added to the City of Mumbai.
- Green House Gases (GHG) emission stopped resulting in reducing carbon footprints in the city.
- Prevention in occurrence of problem like foul odour, fire, health hazards & breeding of flies & rodents.

Awards

- For Gorai Project, Maharashtra State won 1st prize for "All India Winner of "9th CONSTRU Excellence Award 2010" in Urban Infrastructure Development sector for case study received from several State Govt. from all over India on "Successful Registration of CDM project for Earning Carbon Credits-Gorai Closure Project.
- Gorai Scientific Landfill Closure Project was nominated as one of the top 10 Public Private Partnership (PPP) Projects in the East Asia, Pacific and South Asia region by the International Finance Corporation (IFC) in 2013.
- Gorai Project was awarded City to City Barcelona FAD Award 2014.

3. Deonar Dumpsite

It was informed by the officers of MCGM & MPCB that Deonar Dumpsite is active Dumpsite where 500-700 TPD MSW is being dumped. Area of the Dumpsite is about 300 Acre (120 Hectare) and the Dumpsite is in use since 1927. About 90 Million Tons of legacy waste is dumped at the Dumpsite. Height of the Dumpsite is about 30 meter above the ground and average height is about 18 meter. The team took a round of the dumpsite alongwith officials of MCGM & MPCB and observed that fresh waste was being dumped.

Following are the other salient information provided to the team during the visit :

- Construction of RCC Boundary wall of about 4 meter height at the periphery of the Dumpsite.
- 11 Nos. of Watch Towers for surveillance of the dumpsite.
- 40 Nos of CCTV Cameras at periphery.
- 15 Nos. of CCTV Cameras at weighbridges and other locations.
- No. of Perforated HDPE Vent Pipes of 6 meter length, (4 meter below dump & 2 meter above dump) at distance of 50-60 meter between the two pipes , provided at the old dumpsite area.
- Gas Wells of 4ft x 4ft size with height of 6-7 ft. provided at various locations in the dumpsite
- 12 Nos. of FRP Cabin at various locations inside Dumpsite.

- 04 Nos of operational Bore wells.
- 310 Nos. of Vent Pipes erected at various locations in the Dumpsites.
- 05 Nos. of FIREX Water tankers (Fire Engine cum Water Tanker) of 10000 Liters Capacity each along with Sprinkler System
- 106 Nos. of Maharashtra State Security Corporation Staff deployed at the Dumpsite for regular surveillance of the Dumpsite.
- 3 No. of 4x4 Patrolling vehicles for surveillance and other works.
- 40 Nos. of Rechargeable LED Flashlight
- 12 Nos. Mobile High Mast
- Solar operated Peripheral Lighting Arrangement at the dumpsite.
- The Database Management System Software is operational for online data entries of daily surveillance and fire observation report.
- Following machinery has been deployed at the dumpsite :

  - Bulldozer - 7
  - Excavator - 2
  - Backhoe Loader - 2
  - Poclain - 7
  - Hyva / Truck - 3
  - Sheep Foot Roller - 1 (for compaction of Waste)
  - Tractor - 2
  - Sprayer - 2

MPCB Representative informed that Ambient Air Quality in respect of PM, SO_2 & NOx is being monitored at the dumpsite on quarterly basis. Herbal Deodorant is sprayed for odour control at the dumpsite.

106 Security Personnel have been deployed along with patrolling vehicle in 3 shifts to prevent unauthorized entry into the premises of Dumpsite. The surveillance team takes round of the dumpsite every 2 hours for checking the unauthorized entry/ activities.

There are separate Standard Operating Procedures (SOPs) for dousing of Fire/ Smoke and also for security workforce at Deonar Dumpsite.

Parishar Bhagini Vikas Sangh an NGO has been authorized by the MCGM for Segregation / Recycling of the MSW at the dumpsite. It was informed that the said Agency has deployed about 50 Ragpickers for the purpose of segregation & recycling at the dumpsite. These Ragpickers have been authorized and provided Identity Cards. It was also informed that security personnel were deployed by Maharashtra State Security Council which is under the control of Mumbai Police.

It was informed that reforming of the dumpsite towards Thane creek has been done and average slope maintained is 1:3. NEERI has been appointed for Bio-remediation of Legacy Waste and other Environmental issues like leachate treatment, methane control etc.

A Monitoring Committee has been constituted by Maharashtra High Court w.r.t. major Fire Incidents at the Deonar Dumpsite in February, 2016.The Monitoring Committee is headed by Retd. IAS officer and having members (Retd. IPS officer, Prof IIT Mumbai, NEERI, Retd. Env. Expert, Petitioner (Raj Kumar Sharma) & Deputy Commissioner (MCGM).

4. Causes for Fire Incidents at Dumpsites

- Dumping of Unsegregated / Mixed Municipal Solid Waste containing organic Bio-degradable MSW.
- Landfilling of MSW in Unscientific manner at the Dumpsites.
- Generation of Methane Gas due to decomposition of the Bio-degradable organic waste in anaerobic condition releasing heat. Methane is explosive when its concentration varies from 5.3 to 13.9 % in the air. Heat gets accumulated in the voids created due to shrinkage caused by loss of moisture resulting into smouldering. Reduced moisture content is related to high thermal conductivity leading to spread of fire.
- Presence of combustible material in the dumped waste like Paper, Plastic, Cotton Rags, Rubber, Tyres, Dry Leaves, E-waste, etc.
- Hot Weather, Dry Atmospheric Conditions and high wind speed cause fire incidents and its spread over large area.
- Absence of Vent Pipes & Gas Collection Systems for safe release of Methane Generated from the Dumpsite.
- Sparks from Machinery, Equipment or Vehicles deployed at the Dump site.
- Failure to prevent Unauthorised entry of Persons & Ragpickers at the Dumpsite.

5. Comparative Table : Salient information about Deonar Dumpsite in Mumbai and Ghazipur & Bhalaswa Dumpsites in Delhi:

S. No.	Particular	Deonar Dumpsite	Ghazipur Dumpsite	Bhalawa Dumpsite
1.	Area of Dumpsite	300 Acres	70 Acres	70 Acres
2.	Year of start of use of the Dumpsite	1927	1984	1994
3.	Legacy Waste Dumped	191 Lakh Tons	140 Lakh Tons (As in July,2019)	80 Lakh Tons (As in July,2019)
4.	Height	30 meters (Appx.)	65 meters (Appx.) (July, 2019)	65 meters (Appx.) (July, 2019)
5.	Municipal Solid Waste Generation	6800 TPD (Mumbai)	2600 TPD (EDMC)	4800 TPD (North DMC)
6.	Fresh MSW being dumped at the Dumpsite	500–700TPD	2300 TPD	2500 TPD
7.	Legacy Waste Bio-mined / Processed	Proposed (Study given to NEERI)	About 10 Lakh Ton (As on 30.04.2022)	About 25 Lakh Ton (As on 30.04.2022)
8.	CCTV Cameras installed	55	21	31
9.	Water Tankers	5 Nos (10000 Liters each)	4 Nos (9000 Litres each)	4 (2 No – 9000 Litres each 2 No – 3000 Litres each)
10.	Boundary Wall with Fencing	Constructed	Yet to be constructed	Yet to be constructed

6. Recommendations

Based on the visit of closed Gorai Dumpsite & Active Deonar Dumpsite in Mumbai and Discussions held with the officers of MCGM, MPCB & UPL Ltd and also considering the present situation of Ghazipur and Bhalaswa Dumpsite following are the Short Term and Long Term measures recommended by the team :

Short Term Measures

i. Site specific detailed separate SOP should be prepared for prevention of fire incident and also for control of fire in case of fire incident.
ii. On-site Emergency Plan should be prepared for controlling fire in consultation with DDMA.
iii. Authorize some Agency (ies) at the Dumpsite for segregation of fresh MSW being dumped at the site to prevent unauthorized entry of ragpickers.
iv. For release of methane generated from the Dumpsite, perforated HDPE pipes or of any other suitable material may be provided at the Dumpsite at suitable locations with proper spacing (say 30m) as per the site requirement. Pipes should be of at least 6 meter height (4 meter below the dump and 2 meter above the dump).
v. Declaring and maintaining the entire Dumpsite areas as "No Smoking Zone" & "Match Box Free Zone".
vi. Covering of fresh MSW with inert / soil of at least 10 cm as per the SWM Rules, 2016. Top surface of the open dumpsite should be properly covered with soil/ inert to cut off the oxygen supply, prevent foul odour, stop the escape of methane from pores, enhance the decomposition of waste & control bird menace.
vii. Dedicated Police Pickets at the Dumpsite for prevention of unauthorized entry.
viii. Provide dedicated Surveillance Squad with adequate man power and vehicle to have strict vigil over the activities going on at the Dumpsite. Such Surveillance Squad may be constituted comprising of Municipal Staff, Civil Defense & Delhi Police Staff and should frequently take round of the Dumpsite (at least every two hours). .
ix. Frequent patrolling of the team of security Personnel, Delhi Police & MCD Staff to prevent unauthorized entry / activities.
x. Increase the number of tankers for sprinkling of water for control of dust & fire.
xi. Deployment of adequate heavy machinery for dousing of fire (Bulldozer, Excavator, Back Hoe Loaders etc.).
xii. Adequate water storage capacity at the dumpsite for control of fugitive dust & fire (at least 50 KL capacity).
xiii. Upgrade the existing Water Tankers with sufficient capacity and Pumps to have adequate required pressure for extinguishing/ dousing the fire. More No of Water Tankers with Pumps are required at the Dumpsites.
xiv. Construction of roads at periphery around the Dumpsite in order to facilitate movement of vehicles, Patrolling teams and Fire Tenders.
xv. Stepping & cutting of slope of garbage mound at regular intervals to avoid any slippage of garbage & formation of methane gas.
xvi. MSW Dumped at the site should be properly and regularly compacted by using Sheep Foot Roller etc.
xvii. Adequate no. of CCTV cameras should be installed in consultation with Delhi Police and DDMA at suitable locations particularly covering vulnerable spots for fire and entire area of the Dumpsite should be covered.
xviii. Proper Control Room with screens & adequate staff should be provided to monitor the activities through CCTV Cameras.
xix. Trained Operators should be deployed for handling and management of MSW and operation of related plant & machinery.

xx. Proper training on regular intervals should be given to all the staff deployed at the Dumpsite for management of MSW and adherence to the SOPs for prevention and control of fire incidents.

xxi. Odour suppressing agents (e.g. herbal deodorant) should be sprayed for control of odour at the Dumpsite.

xxii. Spark Arrester should be installed with the Exhaust System of the Vehicles / Trucks entering / Other Machinery at the Dumpsite premises to prevent fire incidents due to spark from vehicles.

xxiii. Security Watch Towers should be installed around the dumpsite at the suitable locations to have proper watch and ward of the Dumpsite for prevention of unauthorized entry.

xxiv. Strengthening of Staff at the Dumpsite.

Long Term Measures

i. RCC Boundary Wall of at least 4 meter height with proper barbed wire fencing should be provided at the periphery of the dumpsite to prevent unauthorized entry in the dumpsite.

ii. Ensure complete (100%) bio-mining of the legacy waste dumped at the Dumpsite within the time frame submitted by Local Bodies.

iii. Proper Segregation of MSW at the source and composting / bio-methanation/ vermi composting etc. of the biodegradable organic / wet waste to avoid dumping of biodegradable organic matter at the Dumpsite.

iv. Recyclable materials should be segregated at Material Recovery Facilities (MRFs) and sent to Authorized Recyclers.

v. MSW Processing Facilities with adequate capacity should be provided for managing the MSW as per the SWM Rules, 2016 and there should not be any gap in processing capacity and waste generation in Delhi.

vi. Engineered Sanitary Landfill of adequate capacity should be provided particularly in EDMC area for disposal of rejects generated from the Waste Processing Facilities.

vii. Stoppage of dumping of fresh waste at the Dumpsite.

viii. Inert generated from the Bio-mining of Legacy Waste at the Dumpsite should be properly managed at the Dumpsite and disposed through the Construction Agencies (NHAI, PWD etc).

ix. RDF generated from the Bio-mining of Legacy Waste at the Dumpsite should be properly managed at the Dumpsite and disposed through the RDF Manufacturing Plants / Waste to Energy Plants , Cement Kilns etc..

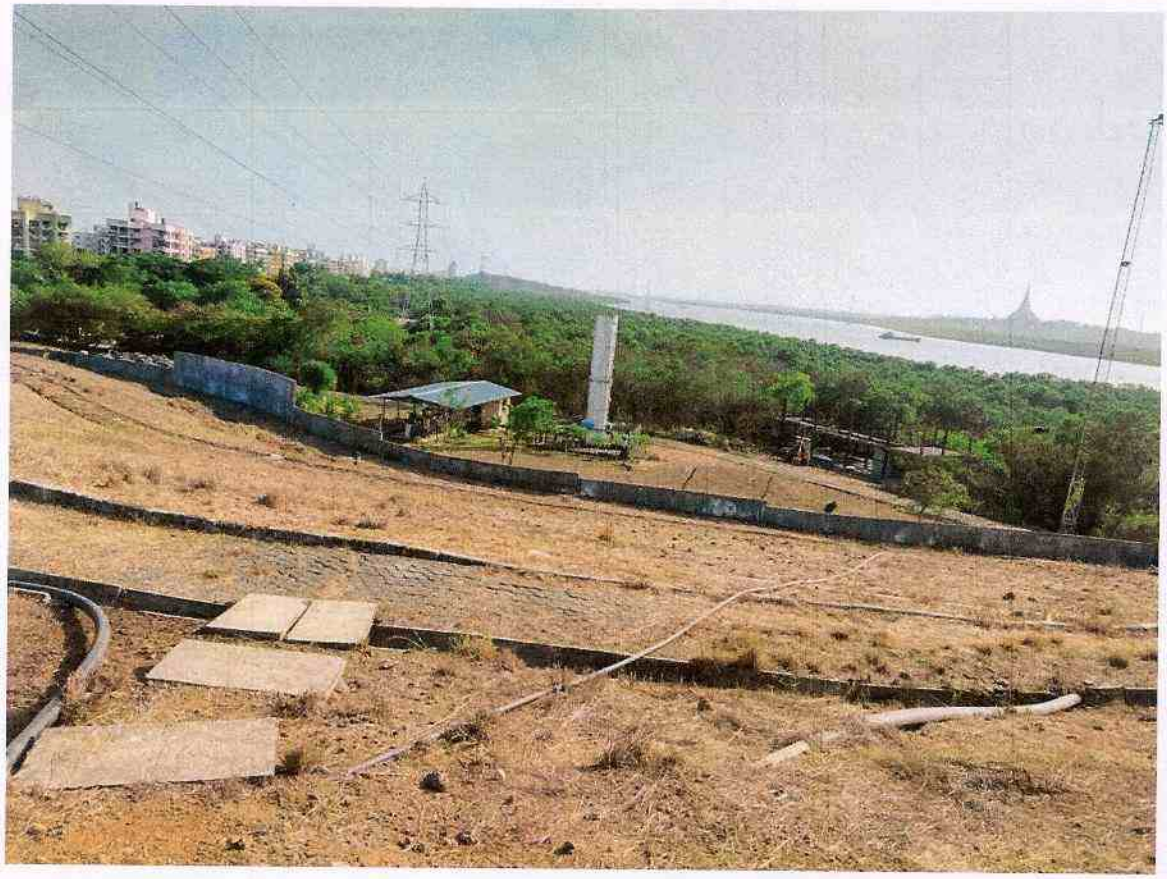
x. Installation of CO Monitors, Methane Detectors, Temperature Sensors, Fire Alarm may be explored by Local Bodies in consultation with Expert Agencies like IIT Delhi, NEERI etc.

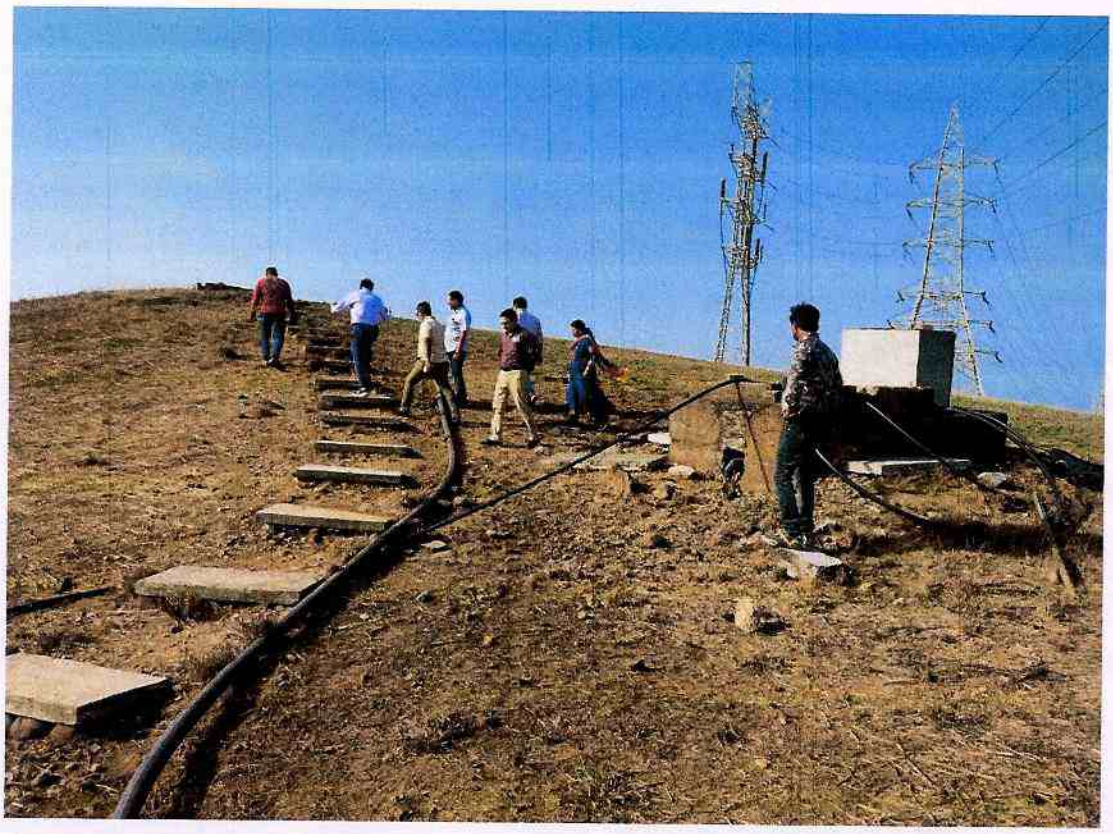
Photographs taken during the visit of Gorai and Deonar Dumpsites are enclosed.

(D. K. Singh)	**(Rajeev Kumar Sharma)**	**(Roop Chand)**	**(Tarun Shankar Arya)**
Sr. Env. Engr., DPCC	Env. Engr., DPCC	SE (E&M) North DMC	AE, EDMC

Top of the Closed Gorai Dumpsite

Discussions with the officers of MCGM, MPCB & M/s UPL Ltd. at Gorai Dumpsite





Methane Flaring Station at Gorai Dumpsite

Gas Well for Methane and Leachate Collection

Control Panel for Methane Flaring

Methane Pumping System at Flaring Station

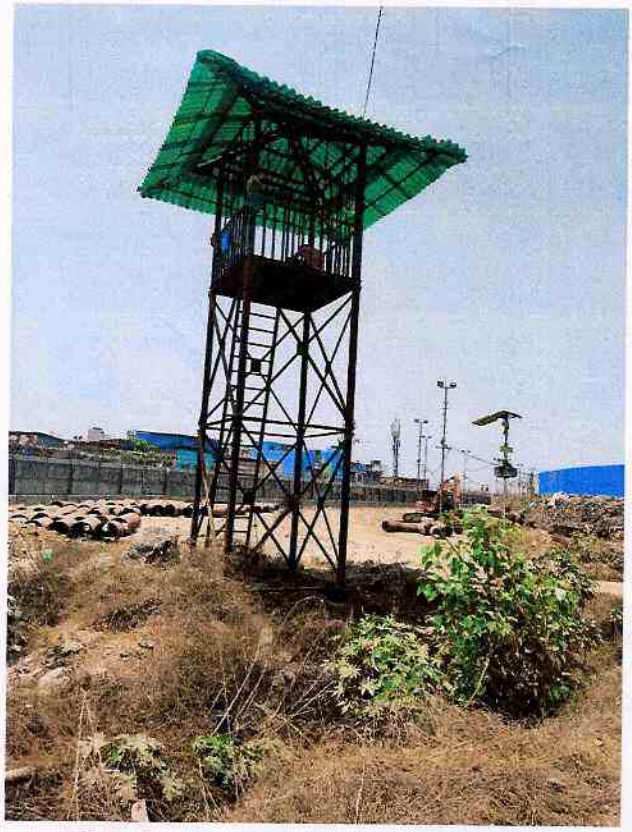
Methane Flow measurement

Methane Collection and Flaring System at Gorai Dumpsite

Team with officials of MCGM at the Dumping area at Deonar Dumpsite

Workers of Authorized Agency M/s Parishar Bhagini Vikas Sangh and Security personnel at Dumping area of Deonar Dumpsite

Perforated HDPE Pipes of 6 meter length inserted at Deonar Dumpsite



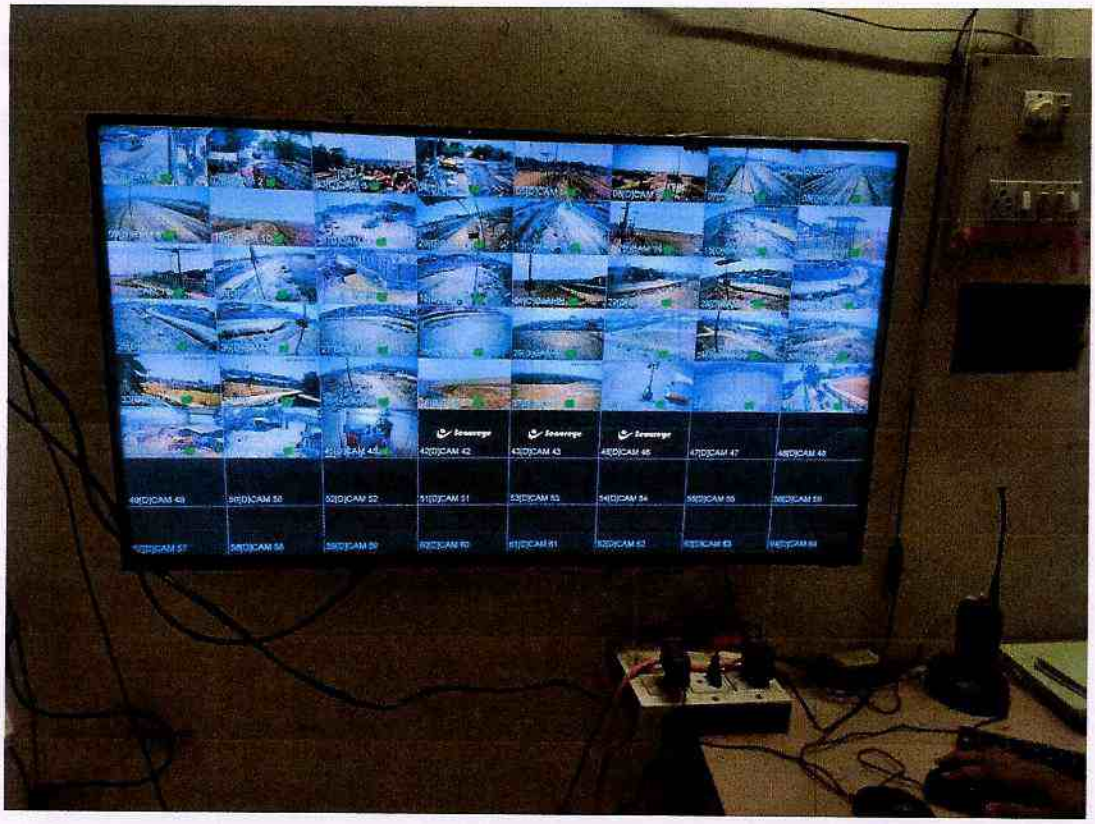
Watch tower at Deonar Dumpsite

RCC Boundary Wall with Barbed Wire Fencing towards residential area at Deonar Dumpsite

Mobile Lighting System at Deonar Dumpsite

Tractor mounted with spraying system for Spray of Herbal Deodorant at the Deonar Dumpsite

FIREX Water tankers (Fire Engine cum Water Tanker) of 10000 Liters Capacity each along with Sprinkler System



Control Room with Screens for CCTV Cameras at Deonar Dumpsite

Security Personnel at entry gate of the Deonar Dumpsite

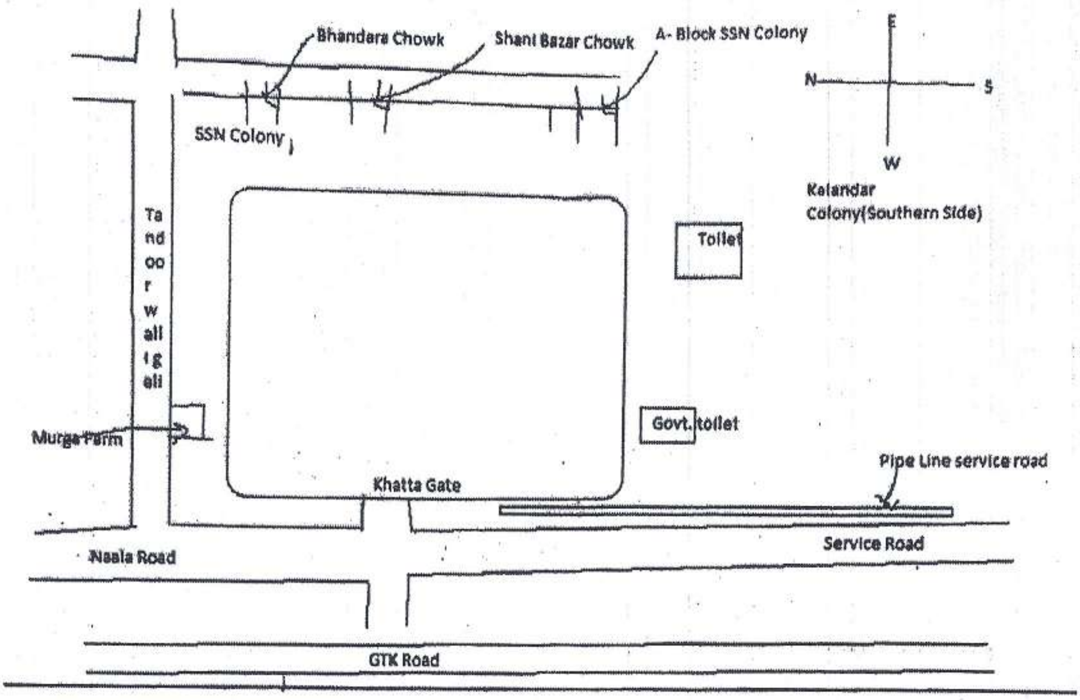
OFFICE OF THE STATION HOUSE OFFICER,PS BHALSWA DAIRY,OND.

Subject:- Regarding installation of CCTV Cameras at different location around the Bhalswa Landfill sit.

Places where CCTV Cameras to be installed is as follows:-

S.No	Location of CCTV Camera	No. of CCTV cameras required
1.	Pipe Line service road	08
2.	Entry gate Khatta road, Bhalswa Dairy.	08
3.	Khatt to Tandoor wali gali naala road, Bhalswa Dairy	05
4.	Tandoor wali gali (Near Murga farm), SSN Colony, Bhalswa Dairy.	04
5.	Tandoor Wali gali near shiv property, SSN Colony, Bhalswa Dairy.	04
6.	Tandoor wali gali near Bhandara Chowk, SSN Colony, Bhalswa Dairy.	04
7.	Sani Bazaar Chowk SSN Colony, Bhalswa Dairy.	04
8.	Bhandara Chowk SSN Colony, Bhalswa Dairy.	04
9.	Vishwanath Puri, near Govt. toiler near A Block, SSN Colony, Bhaswa Dairy	04
10.	Vishwanath Puri near Govt. Toilet near pipeline ,Bhalswa Dairy.	04

SHO/Bh. Dairy


Bhandara Chowk
Shani Bazar Chowk
A- Block SSN Colony
E
N
S
W
SSN Colony
Kalandar
Colony(Southern Side)
Ta
nd
oo
r
w
all
i g
ali
Toilet
Murga Farm
Govt. toilet
Pipe Line service road
Khatta Gate
Service Road
Naala Road
GTK Road

SHO/Bh-Dairy.

OFFICE OF THE DISTRICT MAGISTRATE (NORTH)
GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DELHI
DM OFFICE COMPLEX, GT KARNAL ROAD, ALIPUR, DELHI-110036
(Phone : 011-27203048)

No.F.1(7)/PA/DM(N)/2022/3846 Dated:- 04.08.2022

ACTION TAKEN REPORT

In continuation of the meeting of Joint Committee headed by the Hon'ble Justice (Retd.) Sh. S.P. Garg, Former Judge, Delhi High Court constituted by the Hon'ble NGT vide its Order dated 27.04.2022 in OA No. 300/2022 in the matter of massive fire at Bhalaswa Dump Yard and subsequent visit to the site, the following actions have been taken by the District North in the matter:-

1. For the purpose of surveillance & better monitoring 30 CDVs in 3 Shifts (10 CDVs in each Shift) has been deployed at Bhalaswa Dump Yard to check unauthorized entry/movement of rag-pickers at sanitary landfill site vide Office Order No. 724-732 dated 01.06.2022 as requisitioned by North MCD. These CDVs are also the first responders in case of any incident. Copy of the Order for deployment of 30 CDVs at Bhalaswa Dump Yard is enclosed herewith as **Annexure-A.**

2. District Magistrate office District North has engaged NGO Chintan for understanding the issues related to ragpickers community (dependent on Bhalswa Dumpyard site) and thereby to integrate these informal waste pickers in the formal waste management system. A draft proposal in this regard has been prepared wherein the complete exercise has been broadly divided into three 3 phases i) survey of waste pickers in Bhalaswa to understand their status and primary concerns ii) Training & other measures in consultation with stakeholder iii) integration & mainstreaming of waste pickers. First phase has already been completed and final submission of the Report will be done by 30th of September 2022. Copy of *'Proposal and Timeline on Integration of Waste Pickers in Bhalaswa'* is enclosed herewith as **Annexure-B.**

3. A Disaster Mock Drill to check and enhance the preparedness level of Emergency Squad Functionary was organized on 08th June of 2022 at 11.00 AM. More than 10 agencies viz DDMA, Police, Traffic Police, CATS, MCD, NDRF, Fire, DJB, Health

etc participated in the drill. . Copy of Mock Drill Report is enclosed herewith as **Annexure-A.**

4. Earlier the matter was taken in DDMA (District North) meeting on 12/05/2022, where in all concerned were informed about constitution of committee & action to be taken as per directions of committee.

Report is submitted.

Encl: As Above

4/8/2022

(R. MENAKA, IAS)
DISTRICT MAGISTRATE (NORTH)

To,

Sh. D.K. Singh,
Sr. Env. Engineer & In-charge WMC II, DPCC
Member Convener of Joint Committee
Delhi Pollution Control Committee,
Department of Environment, Govt. of NCT of Delhi,
5th Floor, ISBT Building, Kashmere Gate, Delhi-110006.

ATR / updated information w.r.t. Minutes of 3rd Meeting of Joint Committee headed by Hon'ble Justice (Retd.) Sh. S.P. Garg and constituted by Hon'ble NGT vide Order dated 27.04.2022 in O.A. No. 300/2022, held on 22.07.2022.

ATR in compliance of 4th Meeting of Joint Committee in NGT Case O.A. No. 300/2022 held on 20.08.2022

1. **Response/Representation on the reason for M/s Delhi Municipal Solid Waste Solutions Ltd. (Waste to Energy Plant at Bawana) not receiving RDF generated from Biomining of Legacy Waste at Bhalswa Dumpsite since 29.07.2022**

Erstwhile North DMC had empanelled and engaged five agencies for disposal plastic waste incinerable waste recovered from bio-mining process at of Bhalswa dumpsite @ Rs 1746/- per MT (payable to agencies by North DMC) on 03/12/2021 for a period of 12 months, through open tendering process. Approval of the same was accorded by the Standing Committee vide Resolution No. 157 dated 24/11/2021. The list of empanelled /engaged agencies is as under:

1. M/s DMSWSL
2. M/s Pragati Builders
3. M/s Dayacharan & Co
4. M/s RR Enterprises
5. M/s Rekart Innovations Pvt. Ltd.

The above agencies could not lift the entire incinerable waste resulting in accumulation at the site and hindering with normal functioning of bio-mining process. Therefore, following five trommelling agencies were also engaged at the same rate, terms and conditions after obtaining their consent with the approval of competent authority:

1. Thapar Engineering works
2. Greentech Environ Management Pvt. Ltd.
3. Envirozone Instruments & Equipments
4. Sakhya Enviro Pvt. Ltd.
5. United Facilities & Logistics Pvt. Ltd.

The work of Biomining was started at Bhalswa In October 2019. Since then, approx. 25 Lakh MT of legacy waste has been processed. In spite of all efforts, the desired progress has not been achieved so far due to various reasons viz., lack of stacking space of recovered material (Inert, RDF and C&D Waste) with in landfill, shortage of disposal sites of recovered material especially RDF, multiplicity of trommelling & transportation agencies etc. The contribution of 10 agencies towards RDF lifting is miniscule. As a result, recovered material is accumulating at landfill site itself, which is creating issues in operation of already Installed trommels and it is difficult to increase the capacity in line with action plan prepared by MCD for completion of bio-mining process at Bhalswa landfill.

In view of above cited reasons, all the 10 agencies including M/s Delhi municipal waste solution (WtE Plant at Bawana) engaged for disposal of plastic waste/incinerable waste recovered from bio-mining process at Bhalswa dumpsite in Delhi is disengaged.

Due to aforesaid reasons, MCD is in process of calling fresh tenders to undertake the integrated work of Bio-mining of 30 Lakh MT of legacy waste including disposal of all the fractions recovered through bio-mining process viz., inert, RDF and C&D waste.

As the work of bio-mining is presently hampered due to rainy season, the generation of RDF is very less. Tender have been invited and pre bid meeting was conducted of 16.08.2022 the bid opening date is 02.09.2022, the same is under process.

2. **Present scenario/status of Biomining of Legacy Waste at Bhalswa Dumpsite including no. of Trommels operational, disposal of RDF and Inert generated from Biomining of Legacy Waste**

Out of 51 Trommels installed at Bhalswa Dumpsite, 23 Trommels are installed at lower level on a land area of approx. 5 acers. These machines are installed at very close distance to each other causing lack of stacking space. As the off take of RDF fraction is less than its generation, huge quantity of RDF is stacked near trommels due to which trommels are not able to function at full capacity. Due to aforesaid reasons the Department disengaged 23

machines installed at lower level for effective work management, to enhance efficiency and better regulatory checks.

At present 14 trommels, 04 kleeman machines and 01 rotor are functional at Bhalswa dumpsite. The details of disposal of RDF, inert, C&D is are as follow

S. No.	Detail	Cumulative qty. (MT)	Month of August (MT)
1.	Inert	369600	9391
2.	C&D	66000	5022
3.	RDF	227300	114

There is a proposal for signing of MoU between MCD and JK Cement for disposal of RDF. Every month JK Cement will dispose off RDF minimum 3000 MT per month from 03 SLF site namely Ghazipur, Okhla and Bhalswa Dumpsite. There is a comprehensive tender of "Disposal of 30 Lakh MT of legacy waste by Bio-remediation and Bio-mining at Bhalswa Dumpsite, Delhi" is under process. The last opening date of tender is 02.09.2022, the same is under process.

3. Action Taken Report/updated information w.r.t. Minutes of 3rd Meeting of Joint Committee in said NGT Case

S.No.	Issues	Action Taken Report
1.	For release of Methane generated from the dumpsite, perforated HDPE pipes or of any other suitable material may be provided at the dumpsite at suitable location with proper spacing as per the site requirement. Pipes should be of at least 6 meter height (4 meter below the dump and 2 meter above the dump).	06 nos. of HDPE pipes have been provided at various vulnerable locations in fresh waste dumping site. In future it will be provided as and when require.
2.	Provide adequate water storage capacity at the dumpsite for control fugitive dust and fire (underground reservoir of at least 50 KL capacity).	Submersible pump is available at the dumpsite which is utilized for refilling of water tanker / sprinklers deployed for mitigating dust and air pollution. Further proposal for underground reservoir will be taken up as per availability space at dumpsite and budget.
3.	Status of MRF Facility	An MoU has been signed with M/s 21 Century Polymers (WMA) for setting up of 150 TPD capacity MRF Plant at Bhalswa Dairy. Land measuring 2000 sqm was handed over to the agency on 25.05.2022. Since the land was marshy, inert generated through Biomining of Legacy Waste at Bhalswa was dumped at site. Further, the agency is in process of filling C&D Waste so as to make firm base for the facility. Plant is likely to be made operational within 3 Months.
4.	MCD to expedite the disposal of RDF accumulated at Bhalswa dumpsite through waste to energy plant and proposed RDF pellets manufacturing plant at the dumpsite.	The tenders for "Design, finance, build, own, operate & maintain processing facility to process minimum 1000 TPD of incinerable waste fraction recovered from processing of legacy waste into RDF and its subsequent transportation and disposal on daily basis" were invited. The agencies were asked to provide GPS tracking system and agency has refused to provide the GPS tracking system as it is not part of the tender condition. As well as one of the agencies requested for much more land from 1.5 to 2.0 acre as per our bid of RDF which was not available with

		the department. Hence the work of "Design, finance, build, own, operate & maintain processing facility to process minimum 1000 TPD of incinerable waste fraction recovered from processing of legacy waste into RDF and its subsequent transportation and disposal on daily basis" was foreclosed.
5.	Ensure installation of spark arrestor with the exhaust system of the vehicles / trucks entering / other machinery at the dumpsite premises to prevent fire incidents due to spark from vehicles.	(A) The concessioner namely Metro Waste Handling Pvt. Ltd. Engaged for Karol Bagh Zone for door to door collection of MSW has given the list of vehicle deployed for the work where it is mentioned that all the vehicles are equipped with catalytic convertor, hence no need to install spark arrestor and has enclosed the exempt list of spark arrestor vehicles and exemption certificate of spark arrestor. Annexed as 'A'. (B) The concessioner namely M/s IPMSW solutions Pvt. Ltd. For Narela Zone inform that all their vehicles are BSUI model and are equipped with catalytic convertor which prevent fire incident. Therefore there is no need to install spark arrestor. The list of vehicles is enclosed here with for reference. Annexed as 'B'. (C) The concessioner namely M/s AG Enviro informed that their vehicles are equipped with catalytic convertor, hence no need to install spark arrestor. The list of vehicles is enclosed here with for reference. Annexed as 'C'.
6.	Construct RCC boundary wall of at least 4 meter height with proper barbed wire fencing at the periphery of the dumpsite to prevent unauthorized entry in the dumpsite.	An estimate amounting to Rs. 23,03,11,300/- has been framed to cover the probable cost of construction of RCC boundary wall of 04 meter height along with concertina coil fencing and the same has been sent to Addl. Sect. UD, GNCTD for releasing requisite budget.
7.	Upgrade the existing water tankers with sufficient capacity and pumps to have adequate required pressure for extinguishing/ dowsing the fire. Increase the number of water tankers with pumps at the dumpsite. Existing suction come jetting machine should also be used for extinguishing fire.	There are 02 Water Tankers of 9000ltr. and another 02 water tankers of 3000Ltr. capacity which remain deployed round the clock and water sprinkle regularly over the dry waste to maintain 5 – 25% moisture content. Jetting machine from Zones are also being deployed from time to time.
8.	Treatment of leachate generated from Bhalswa Dumpsite.	The proposal is being initiated as per direction of DPCC.
9.	MCD to check to informed the joint committee regarding pending request with DDA for allotment of land for setting up of MSW processing and disposal facilities.	Reply same as already submitted in 3rd Joint Committee Report.
10.	Status of 49 Acres of land at Sultanpur	In order to ensure scientific disposal of

	Dabas Village, 35 Acres of at Narela Bawana & 55 Acres of land at Rani Khera	unprocessed MSW (fresh waste coming to Bhalswa dumpsite), MCD is in process of setting up another waste processing facility (Waste to Energy Plant) at Narela-Bawana which shall cater to about 3000 MT of Solid Waste per day. Tenders have been invited for above said work and the plant is likely to be made operational by June 2025. As per this tender, WtE plant of capacity 3000 TPD will be setup at **Narela-Bawana** and engineered landfill will be setup at 49 Acres available land at **Sultanpur Dabas**. Survey has already been conducted by MCD for cutting of trees required for the aforesald land. The request will be send to forest department for granting permission in due course of Time. 55 Acres land at **Rani Khera** is close to human habitation and not suitable as per the MSW Mannual for construction of Solid Waste Management Facilities.
11.	Status of Environmental Compensation Report imposed by DPCC vide Letter No.DPCC/WMC-II/Bhalswa/2020/9954-9955 dated 10.06.2022	In this regard request letter has been sent to DPCC vide Letter No. 795 dated 18.08.2022 for withdrawing environmental compensation as there is no fault of MCD.

4. ATR / updated info w.r.t. Minutes of 2nd Meeting of Joint Committee held on 03.06.2022.

S.No.	Issues	Action Taken Report
1	Provide sufficient number of Watch Towers of adequate height at various location of the Dumpsite for surveillance to prevent unauthorized entry/activities at the Dumpsite.	An Estimate amounting to Rs.23.03 Crores has been framed to cover the probable cost of construction of RCC boundary wall of 4 meter height along with concertina coil fencing has been framed and the same has been sent to Additional Secretary UD, GNCTD for allocation of funds. If it is constructed there is no need of providing watch towers.
2	Provide dedicated Surveillance Squad with adequate man power and vehicle to have strict vigil over the activities going on at the Dumpsite. Such Surveillance Squad may be constituted comprising of MCD Staff, Civil Defence & Police Staff and should frequently take round of the Dumpsite (at least every two hours).	AEs & JEs have been engaged on SLF Site Bhalswa with the other staff deployed as patrolling parties in shifts for watch and ward of Landfill Site, check on any fire incident and take immediate action to control fire. Civil Defence is also engaged in the surveillance of dumpsite. Letter has been sent to SHO for installation of Police Post at Bhalswa Dumpsite.
3	Upgrade the existing Water Tankers with sufficient capacity and pumps to have adequate required pressure for extinguishing/dousing the fire. More no. of water tankers with pumps are required at the Dumpsite.	There are 02 Water Tankers of 9000Ltrs. and another 02 water tanker of 3000Ltrs. capacity are deployed and water sprinkles regularly in Bhalswa Dumpsite.
4	Installation of Spark Arrestors with the Exhaust System of the Vehicles/Trucks entering/other Machinery at the Dumpsite premises to prevent fire incidents due to spark from vehicles.	(A) The concessioner namely Metro Waste Handling Pvt. Ltd. Engaged for Karol Bagh Zone for door to door collection of MSW has given the list of vehicle deployed for the work where it is mentioned that all the vehicles are equipped with catalytic convertor, hence no need to install spark arrestor and has enclosed the exempt list of spark arrestor vehicles and exemption certificate of spark arrestor. Annexed as 'A'.

		(B) The concessioner namely M/s IPMSW solutions Pvt. Ltd. For Narela Zone inform that all their vehicles are BSUI model and are equipped with catalytic convertor which prevent fire incident. Therefore there is no need to install spark arrestor. The list of vehicles is enclosed here with for reference. Annexed as 'B'. (C) The concessioner namely M/s AG Enviro informed that their vehicles are equipped with catalytic convertor, hence no need to install spark arrestor. The list of vehicles is enclosed here with for reference. Annexed as 'C'.
5	Providing Temperature Sensors, Fire-alarms, and Infrared/Thermal Imaging Cameras for early detection and control of fire at the Dumpsite.	Proposal is being initiated.
6	To explore the possibility of Insertion / Laying down of Perforated HDPE Pipes at the various location of the Dumpsite at certain distances to release methane from the Dumpsite into the atmosphere.	06 nos. of HDPE pipes have been provided at various vulnerable locations in fresh waste dumping site. In future it will be provided as and when required.
7	Provide at least 50KLD capacity water reservoir at the Dumpsite for emergency purposes including dousing of fire and control of dust pollution.	Submersible pump is available at the dumpsite which is utilized for refilling of water tanker / sprinklers deployed for mitigating dust and air pollution. Further proposal for underground reservoir will be taken up as per availability space at dumpsite and budget.

5. ATR / updated info w.r.t. Minutes of 1st Meeting of Joint Committee headed by Hon'ble Justice (Retd.) Sh. S.P. Garg and constituted by Hon'ble NGT vide Order dated 27.04.2022 in O.A. No. 300/2022 held on 07.05.2022.

S.No.	Issues	Action Taken Report
1.	North DMC to suggest for utilization of RDF accumulated at the Bhalswa Dumpsite.	There is MoU between MCD and JK Cement for disposal of RDF is under process of approval. Every month JK Cement will dispose off RDF 3000 MT from 03 SLF site namely Ghazipur, Okhla and Bhalswa Dumpsite. There is a comprehensive tender of "Disposal of 30 Lakh MT of legacy waste by Bio-remediation and Bio-mining at Bhalswa Dumpsite, Delhi" is also under process. The last opening date of tender is 02.09.2022.
2.	North DMC shall immediately inform DDMA and DM (North) regarding any fire incident at the Bhalswa Dumpsite.	It will be complied with as and when noticed
3.	North DMC shall prepare Short Term & Long Term Plans for prevention of fire incidents at the Bhalswa Dumpsite.	Four water tankers are deployed at Bhalswa Dumpsite for dousing of fire and heavy machinery such as excavators, backhoe loader and Bulldozers have been deployed for step cutting and slope stabilization of waste. However, C& D Waste is being stacked for dousing of fire in long term plan. Delhi Fire Services will also be informed in the major incidents of fire as and when happens.

4.	North DMC shall make assessment of the entire area of Bhalswa Dumpsite & prepare onsite Emergency Disaster Management Plan	The Drone survey of the Bhalswa Dumpsite has been carried out for the assessment of entire area of Bhalswa Dumpsite. During emergency the DDMA, DM (North), Delhi Fire Services will be informed and necessary steps to handle the disaster will be taken by this department in co-ordination with other departments.
5.	North DMC in consultation with DM (North) will explore the possibility of authorizing some NGOs/Agencies for regulating the entry of rag pickers at the dumpsite.	It pertains to DM (North)
6.	North DMC shall assess the requirement of CCTV cameras along with locations in consultation with the Delhi Police.	The Number of CCTV Cameras installed have been increased from 21 to 31.

Rest of the Points pertains to other Departments.

The ATR has already been submitted in the last week of July, 2022

Constraints in Managing Dumpsite: -

- Fresh waste is continued to be dumped at Bhalswa despite reaching saturation.
- Only 6 to 7 Acres of land is available for dumping of fresh waste.
- Due to excessive height and boundaries being exceeded, slope stabilization by step-cutting is very difficult.
- Local police has been requested to depute police personnels & setup of permanent police picket at dumpsite itself for preventing unauthorized entry of waste pickers inside dumpsite.
- From trommelling of legacy waste RDF is being generated. The rate of generation of RDF is greater thatn disposal due to this there are accumulation of RDF at site.

Additional Measures Taken After Fire: -

- 04 water tankers, 06 jetting machines, 05 excavators and 05 bulldozers have been deployed at the dumpsite on permanent basis.
- Stacking of C&D and inert waste at fire prone locations for prompt action.
- SOP issued for prompt containment of fire at site.
- Patrolling of dumpsite by a dedicated team AEs & JEs of MCD and 30 Civil Defence Volunteers.
- Rosters duties of AEs & JEs issued for round the clock deployment of officials for overall surveillance of site.
- Control room equipped with monitoring of 31 CCTVs established at site.

Long Term Measures being taken to Prevent Fire Incidents: -

- In order to ensure scientific disposal of unprocessed MSW (fresh waste coming to Bhalswa dumpsite), MCD is in process of setting up another waste processing facility (Waste to Energy Plant) at Narela-Bawana which shall cater to about 3000 MT of Solid Waste per day. Tenders have been invited for above said work and the plant is likely to be made operational by June 2025. As per this tender, WtE plant of capacity 3000 TPD will be setup at **Narela-Bawana** and engineered landfill will be setup at 49 Acres available land at **Sultanpur Dabas**.
- Drone survey of Bhalswa dumpsite has already been done recently and report of the same is enclosed herewith for reference. This will further help efficient management of landfill.
- At present 14 traditional trommels, 04 Kleeman and 01 rotor are working at Bhalswa Dumpsite. Since October-2019, about 25.85 Lakh MT of Legacy Waste has been Biomined and processed.
- MoU has been signed with NHAI for disposal of about 21.50 Lakh MT of inert at their road projects. Till date, about 3.04 Lakh MT of inert has been disposed at its site.
- Further, integrated Tender is being invited for Biomining and processing of 30 Lakh MT through selected single agency whereby the disposal of inert, C&D Waste and RDF recovered through processing will be the responsibility of agency itself.
- An MoU has been signed with IGL for setting up of CBG Plant at Ghogha Dairy of 100 TPD capacity. This will reduce intake of wet waste at Bhalswa dumpsite.
- 06 Nos. decentralized Compost Plants of 1 TPD capacity and 04 Nos. Bio-methanation plant of 5 TPD capacity have been/ are being setup within the jurisdication of six zones of MCD namely CSPZ, RZ, CLZ, KBZ, KPZ & NZ for processing wet waste at local level. This will further reduce intake of wet waste at Bhalswa Dumpsite.

Approximate Quantity of Biomined fractions lying at Sites as on 22.08.2022: -

S.No.	Inert (MT)	C&D (MT)	RDF (MT)
1	1200	800	37000

It is pertinent to mention that approximate 7900 MT of C&D Waste obtained after Biomining has been lifted by private/public agency as per public notice for free C&D and Inert.

MCD is in process of calling fresh tenders to undertake the integrated work of Bio-mining of 30 Lakh MT of legacy waste including disposal of all the fractions recovered through bio-mining process viz., inert, RDF and C&D waste.

Submitted Please.

23/8/22

SE/SLF (Bhalswa)

23/8/2022

EE/SLF(Bhalswa)

ANNEXRE 'A'

Municipal Corporation of Delhi
Office of the Executive Engineer (DEMS)/ K.B.Zone
Nigam Bhawan, D.B.Gupta Road,
Anand Parbat, Karol Bagh, New Delhi – 110 005

No. D/EE/DEMS/KBZ/22-23/ 22 **Dated :** 22/8/22

Reference :- Concession Agreement dated 19.01.2022 for Door-to-door collection & transportation of MSW to disposal site and operation & maintenance of equipment's/ machineries for Karol Bagh Zone in North DMC

Please find enclosed herewith letter dated 19.08.2022 received from Metrro Waste Handling Pvt. Ltd. mentioning therein that "all the vehicles are equipped with catalytic convertor hence no need to install Spark Arrestor" and also enclosing the exempt list of Spark Arrestor Vehicle and Exemption Certificate of Spark Arrestor.

This is for your information and consideration please.

Encl.: As above

Executive Engineer (DEMS)
(Karol Bagh Zone)

E.E. (SLF) Bhalswa

METRRO WASTE HANDLING PVT.LTD.

Regd. Office : 8551/2, Roshanara Road, Delhi-110007
Correspondence Address : 8644 & 8669, Roshanara Road, Delhi-110007
Ph. : 011-23820009, 23823862 CIN : U74999DL2004PTC130867
E-mail : info@citylifeinfra.com

Date:- 19/08/2022

THE EXECUTIVE ENGINEER (DEMS)
KAROL BAGH
North Delhi Municipal Corporation
Delhi

REF.: Concession Agreement dated 19.01.2022 for Door-to-door collection & transportation of MSW to disposal site and operation & maintenance of equipment's / machineries for Karol Bagh Zone in North DMC.

Dear Sir,

With Reference No. F.No. MOE& F/2022/1754-1756 dated 08.06.2022. Our all the vehicles are equipped with catalytic convertor hence no need to install spark arrestor, the list enclosed for supporting documents.

1.Enclosed Document .. EXEMPT LIST OF SPARK ARRESTOR VEHICLES.

2.Enclosed Document.. EXEMPTION CERTIFICATE OF SPARK ARRESTOR.

Thanks and Regards

(Authorised Signatory)

CC to EE SLF Bhalswa Land Fill, NDMC, Delhi.

METRRO WASTE HANDLING PVT. LTD.

EXEMPT LIST OF SPARK ARRESTOR VEHICLES

S.NO.	VEHICLE NO.	Vendor	Model	Engine Type	EXEMPTED OF SPARK ARRESTOR (YES/ NO)
			Metro Compactor		
1	DL1GE1067	Metro Compactor	2823 K Tata Signa	BS6	YES
2	DL1GE0942	Metro Compactor	2823 K Tata Signa	BS6	YES
			TPS COMPACTOR		
1	DL1GE1004	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
2	DL1GE1050	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
3	DL1GE1037	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
4	DL1GE1021	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
5	DL1GE1099	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
6	DL1GE1048	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
7	DL1GE1033	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
8	DL1GE1090	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
9	DL1GE1070	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
10	DL1GE1060	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
11	DL1GE1203	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
12	DL1GE1225	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
13	DL1GE1299	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
14	DL1GE1204	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
15	DL1GE1254	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
16	DL1GE1219	TPS COMPACTOR	2823 K Tata Signa	BS6	YES
			GARBAGE TIPPER		
1	DL1GE0775	GARBAGE TIPPER	2823 K Tata Signa	BS6	YES
2	DL1GE0736	GARBAGE TIPPER	2823 K Tata Signa	BS6	YES
3	DL1GE0760	GARBAGE TIPPER	2823 K Tata Signa	BS6	YES
4	DL1GE0789	GARBAGE TIPPER	2823 K Tata Signa	BS6	YES
5	DL1GE0794	GARBAGE TIPPER	2823 K Tata Signa	BS6	YES

METRRO WASTE HANDLING
PVT. LTD.

HOOK LOADER					
1	DL1GE1081	HOOK LOADER	2823 K Tata Signa	BS6	YES
2	DL1GE1074	HOOK LOADER	2823 K Tata Signa	BS6	YES
3	DL1GE1016	HOOK LOADER	2823 K Tata Signa	BS6	YES
4	DL1GE1001	HOOK LOADER	2823 K Tata Signa	BS6	YES
5	DL1GE1063	HOOK LOADER	2823 K Tata Signa	BS6	YES
6	DL1GE1361	HOOK LOADER	2823 K Tata Signa	BS6	YES
7	DL1GE1267	HOOK LOADER	2823 K Tata Signa	BS6	YES
8	DL1GE1275	HOOK LOADER	2823 K Tata Signa	BS6	YES
9	DL1GE1330	HOOK LOADER	2823 K Tata Signa	BS6	YES
10	DL1GE1427	HOOK LOADER	2823 K Tata Signa	BS6	YES
11	DL1GE1404	HOOK LOADER	2823 K Tata Signa	BS6	YES
12	DL1GE1441	HOOK LOADER	2823 K Tata Signa	BS6	YES
13	DL1GE1494	HOOK LOADER	2823 K Tata Signa	BS6	YES
14	DL1GE1377	HOOK LOADER	2823 K Tata Signa	BS6	YES
15	DL1GE1342	HOOK LOADER	2823 K Tata Signa	BS6	YES
CNG COMPACTOR ECOMET STAR					
1	DL1GE1229	CNG COMPACTOR	1415 HE Ashok Leyland	BS6	YES
2	DL1GE1213	CNG COMPACTOR	1415 HE Ashok Leyland	BS6	YES
3	DL1GE1217	CNG COMPACTOR	1415 HE Ashok Leyland	BS6	YES
4	DL1GE1272	CNG COMPACTOR	1415 HE Ashok Leyland	BS6	YES
5	DL1GE1274	CNG COMPACTOR	1415 HE Ashok Leyland	BS6	YES
6	DL1GE1240	CNG COMPACTOR	1415 HE Ashok Leyland	BS6	YES
7	DL1GE1218	CNG COMPACTOR	1415 HE Ashok Leyland	BS6	YES

METRO WASTE HANDLING
PVT. LTD.

454/EE/SLFB
22/8/2022

ANNEXURE 'B'

Our Ref: IPMSW/MCD-NARELAZONE/043
Date: 20.08.2022

To,

The Executive Engineer (SLF)
Office of the Executive Engineer
Municipal Corporation of Delhi
New Delhi

Name of Work: Door to Door collection & Transportation of MSW to Sanitary Landfill, Operation & Maintenance of Equipment's/Machineries for Narela Zone in North DMC

Subject: Regarding exemption of Spark Arrestor Vehicles

References:

1. Contract agreement dated 19.01.2022
2. EE/SLF/B/MCD/2022-23/742, dated 11.07.2022

Dear Sir,

This is with reference to above subject and letter cited at ref. 2 above regarding installation of spark arrestor with exhaust system in vehicles/trucks/machinery at Bhalswa Dumpsite to prevent the fire incident.

We wish to inform that all our vehicles are BSVI model and are equipped with catalytic convertors which prevent the above fire incident. Therefore, there is no need to install spark arrestor. The list of vehicles along with model no. and other details are enclosed herewith for your reference.

We trust that you will find above in order and in compliance to your aforesaid letter.

Thanking you and assuring you of cooperation at all times.

Yours Faithfully,

For **IP MSW Solution Private Limited**

IP MSW SOLUTION PVT. LTD. Bawana Delhi-39

(Authorized Signatory)

L. Tarun AE SLF
22/8/2022

Encl.: As aforesaid

CC: EE DEMS Narela

S. No.	Details of Vehicles					
	Vehicle Number	Model	Fuel	MAKE	Chassis no	Engine no
1	DL1GC8726	1412 LPT BS6	CNG	TATA	MAT816004L5G04627	38SGI81FZX808559
2	DL1GC8642	1412 LPT BS6	CNG	TATA	MAT816004L5J06006	38SGI81JZX611735
3	DL1GC8675	1412 LPT BS6	CNG	TATA	MAT816004L5J06033	38SGI81JZX611703
4	DL1GC8652	1412 LPT BS6	CNG	TATA	MAT816004L5J06037	38SGI81JZX611756
5	DL1GC8696	1412 LPT BS6	CNG	TATA	MAT816004L5G04708	38SGI81GZX808819
6	DL1GC8676	1412 LPT BS6	CNG	TATA	MAT816004L5J06035	38SGI81JZX611712
7	DL1GC8694	1412 LPT BS6	CNG	TATA	MAT816004L5J06005	38SGI81JZX611911
8	DL1GC8639	1412 LPT BS6	CNG	TATA	MAT816004L5JO6060	38SGI81JZX611898
9	DL1GC8657	1412 LPT BS6	CNG	TATA	MAT816004L5J06008	38SGI81JZX611713
10	DL1GC8672	1412 LPT BS6	CNG	TATA	MAT816004L5J06036	38SGI81JZX611725
11	DL1GC8722	1412 LPT BS6	CNG	TATA	MAT816004L5J06032	38SGI81JZX611727
12	DL1GC8717	1412 LPT BS6	CNG	TATA	MAT816004L5J06302	38SGI81JZX612718
13	DL1GC8710	1412 LPT BS6	CNG	TATA	MAT816004L5J06007	38SGI81JZX611715
14	DL1GC8718	1412 LPT BS6	CNG	TATA	MAT816004L5J06031	38SGI81JZX611702
15	DL1GC8730	1412 LPT BS6	CNG	TATA	MAT816004L5G04575	38SGI81FZX808126
16	DL1GC8636	1412 LPT BS6	CNG	TATA	MAT816004L5J08064	38SGIB1JZX611901
17	DL1GC8685	1412 LPT BS6	CNG	TATA	MAT816004L5J06038	38SGI81JZX611726
18	DL1GC8693	1412 LPT BS6	CNG	TATA	MAT816004L5G04623	38SGI81FZX808454
19	DL1GC8719	1412 LPT BS6	CNG	TATA	MAT816004L5G04626	38SGI81FZX808486
20	DL1GC8695	1412 LPT BS6	CNG	TATA	MAT816004L5G04657	38SGI81FZX808455
21	DL1GC8633	1412 LPT BS6	CNG	TATA	MAT816004L5J06305	38SGI81JZX613104
22	DL1GC8705	1412 LPT BS6	CNG	TATA	MAT816004L5J05948	38SGI81JZX808936
23	DL1GC8704	1412 LPT BS6	CNG	TATA	MAT816004L5J06308	38SGI81JZX612796
24	DL1GC8653	1412 LPT BS6	CNG	TATA	MAT816004L5J06309	38SGI81JZX613068
25	DL1GE1261	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D08292	6B6A220D06122D63902913
26	DL1GE1215	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D08293	6B6A220D06122D63902921
27	DL1GE1248	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D09051	6B6A220D06122D63903209
28	DL1GE1256	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D08599	6B6A220D06122D63903191
29	DL1GE1334	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D08155	6B6A220D06122D63902618
30	DL1GE1205	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D08063	6B6A220D06122D63902655
31	DL1GE1309	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D07952	6B6A220D06122D63902200
32	DL1GE1351	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D08600	
33	DL1GE1373	SIGNA 2823 TATA BSVI	Diesel	TATA	MAT797034N2D08615	

ANNEXRE 'C'

CIN - U90001MH2004PTC150156

453/EE/SLF/B
22/8/2022

AG ENVIRO
INFRA PROJECTS PVT LTD

AG/LET/MCD/2022-23/107

20th Aug 2022

To,

Executive Engineer – City SP Zone
(DEMS)Municipal Corporation of Delhi
Room No. 403, Old Hindu College,
Kashmere Gate, Delhi-06

Dear Sir,

Sub: Door to Door Collection & Transportation of MSW to Disposal Site and Operation & Maintenance of Equipment/ Machineries for City-SP Zone in MCD – **Regarding Exemption of Spark Arrestor Vehicles.**

Ref: 1. Concession Agreement dated: 18-01-2022

With reference no. F.No. MOE& F/2022/1754-1756 dated 08-06-2022. Our all the vehicles are equipped with catalytic convertor hence no need to install spark arrestor, the list enclosed for supporting documents.

1. Enclosed Document: - **List of Exemption of Spark Arrestor Vehicles.**
2. Enclosed Document: - **Exemption Certificate of Spark Arrestor.**

Sh. Tarun AE (SLF)
22/8/2022

Thanking You,

Yours Sincerely,

For **A G Enviro Infra Projects Private Limited,**

Authorized Signatory

Copy for kind information to:
EE SLF Bhalaswa Landfill, MCD

AG ENVIRO INFRA PROJECTS PVT. LTD. (CITY SP ZONE)

EXEMPT LIST OF SPARK ARRESTOR VEHICLES

S.N	TYPE OF VEHICLE	VEHICLE REG. N	MAKE	MODEL	MANF.YR	EXEMPTED OF SPARK ARRESTOR (YES/ NO)
1	REFUSE COMPACTOR	DL1GE 1030	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
2	REFUSE COMPACTOR	DL1GE 1051	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
3	REFUSE COMPACTOR	DL1GE 1054	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
4	REFUSE COMPACTOR	DL1GE 1097	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
5	REFUSE COMPACTOR	DL1GE 1040	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
6	REFUSE COMPACTOR	DL1GE 1131	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
7	REFUSE COMPACTOR	DL1GE 1106	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
8	REFUSE COMPACTOR	DL1GE 1126	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
9	REFUSE COMPACTOR	DL1GE 1196	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
10	REFUSE COMPACTOR	DL1GE 1266	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
11	REFUSE COMPACTOR	DL1GE 1207	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
12	REFUSE COMPACTOR	DL1GE 1234	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
13	REFUSE COMPACTOR	DL1GE 1250	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
14	REFUSE COMPACTOR	DL1GE 1224	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
15	REFUSE COMPACTOR	DL1GE 1259	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
16	REFUSE COMPACTOR	DL1GE 1260	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
17	HOOK LOADER	DLIGE 1045	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
18	HOOK LOADER	DLIGE 1044	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
19	HOOK LOADER	DLIGE 1132	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
20	HOOK LOADER	DLIGE 1103	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
21	HOOK LOADER	DLIGE 1169	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
22	HOOK LOADER	DL1GE 1181	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
23	HOOK LOADER	DL1GE 1117	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
24	HOOK LOADER	DL1GE 1172	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
25	HOOK LOADER	DL1GE 1080	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
26	HOOK LOADER	DL1GE 1027	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
27	HOOK LOADER	DL1GE 1364	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
28	HOOK LOADER	DL1GE 1358	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
29	HOOK LOADER	DL1GE 1392	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
30	HOOK LOADER	DL1GE 1305	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
31	HOOK LOADER	DL1GE 1412	TATA MOTORS	SIGNA 2823.K BSVI.49W	2022	YES
32	REFUSE COMPACTOR 7CUM	DL1GE 1139	ASHOK LEYLAND	CA1415/42 H CC G	2022	YES
33	REFUSE COMPACTOR 7CUM	DL1GE 1144	ASHOK LEYLAND	CA1415/42 H CC G	2022	YES
34	REFUSE COMPACTOR 7CUM	DL1GE 1116	ASHOK LEYLAND	CA1415/42 H CC G	2022	YES
35	REFUSE COMPACTOR 7CUM	DL1GE 1149	ASHOK LEYLAND	CA1415/42 H CC G	2022	YES
36	REFUSE COMPACTOR 7CUM	DL1GE 1122	ASHOK LEYLAND	CA1415/42 H CC G	2022	YES
37	REFUSE COMPACTOR 7CUM	DL1GE 1119	ASHOK LEYLAND	CA1415/42 H CC G	2022	YES
38	REFUSE COMPACTOR 7CUM	DL1GE 1161	ASHOK LEYLAND	CA1415/42 H CC G	2022	YES
39	TIPPER	DL1GC7036	ASHOK LEYLAND	2818	2016	YES
40	TIPPER	DL1GC7098	ASHOK LEYLAND	2818	2016	YES
41	TIPPER	DL1GC7110	ASHOK LEYLAND	2818	2016	YES
42	HOOK LOADER	DL1GC 1203	ASHOK LEYLAND	2516	2013	YES
43	HOOK LOADER	DL1GC 1204	ASHOK LEYLAND	2516	2013	YES
44	TIPPER	UP85AT 2175	TATA MOTORS	LPK2518	2014	YES
45	TIPPER	HR74A 6974	TATA MOTORS	2518	2014	YES
46	TIPPER	DL1GC 5559	TATA MOTORS	2521	2015	YES
47	TIPPER	DL1GC 5629	TATA MOTORS	2521	2015	YES
48	TIPPER	HR38T 7611	TATA MOTORS	LPK2518	2014	YES
49	TIPPER	HR55V 5174	TATA MOTORS	LPK2518	2015	YES
50	TIPPER	HR55P 5855	TATA MOTORS	LPK2518	2011	YES
51	TIPPER	HR46F 1804	TATA MOTORS	SIGNA 2823.K BSVI.49W	2020	YES
52	TIPPER	HR46F 0976	TATA MOTORS	SIGNA 2823.K BSVI.49W	2020	YES
53	TIPPER	HR74A 5342	TATA MOTORS	2518	2013	YES
54	TIPPER	HR55X 8102	TATA MOTORS	LPK2518	2016	YES
55	TIPPER	HR55X 9000	TATA MOTORS	LPK2518	2016	YES
56	TIPPER	HR55P 6786	TATA MOTORS	LPK2518	2012	YES
57	TIPPER	HR55T 9692	TATA MOTORS	LPK2518	2014	YES
58	TIPPER	HR61C 9517	TATA MOTORS	LPK2518	2016	YES
59	TIPPER	DL1GB 7418	TATA MOTORS	LPK2518	2011	YES

AG ENVIRO INFRA PROJECTS PVT. LTD. DELHI

2022

Municipal Corporation of Delhi

Change Detection and Volumetric Assessment of Bhalswa SLF Using Drone Survey

REPORT – 1, JUNE 2022

SLF BHALSWA, EXISTING SITUATION

CARITAS ECO SYSTEMS PVT LTD

Contents

List of Figures

List of Tables

Sanitary Landfill Facility, Bhalswa

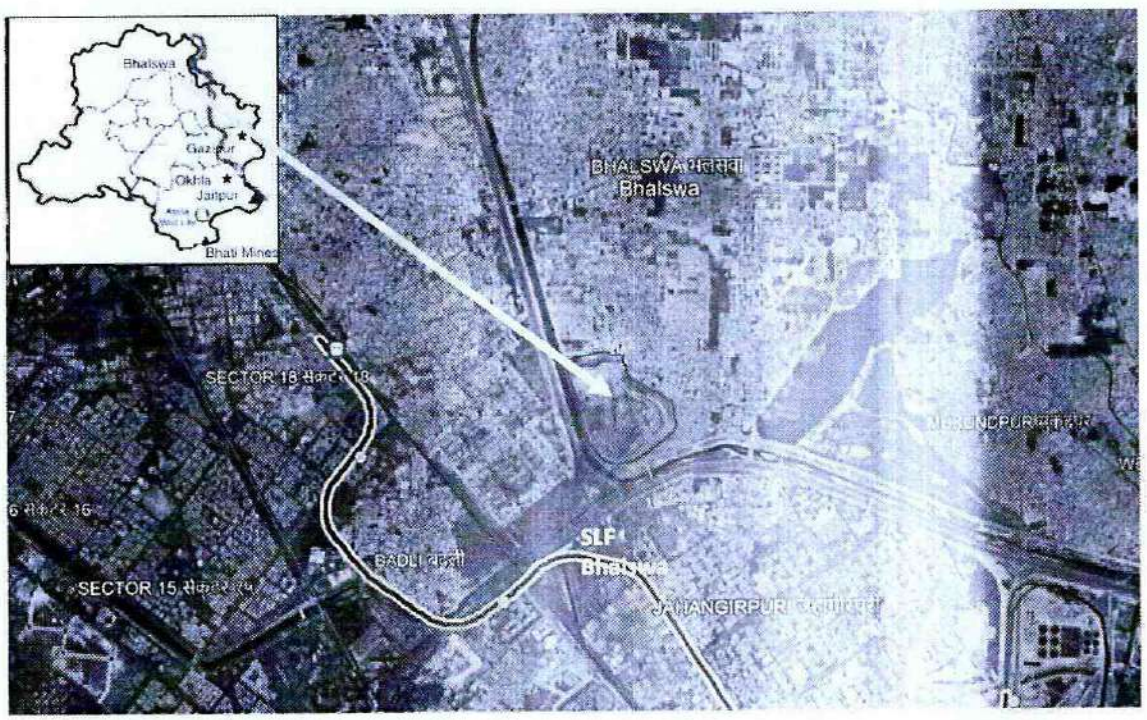
1 Introduction

With the increasing urbanization, there is tremendous increase in municipal solid waste. It is estimated that Delhi generates about 11,144 TPD[1]. Of this the MSW generated in North zone of MCD area is about 4500 TPD. Presently there are three dump sites in Delhi at Bhalaswa, Ghazipur and Okhla. The dump sites have exceeded their capacity and are required to be managed in a more scientific and environmentally sustainable manner.

1.1 Location

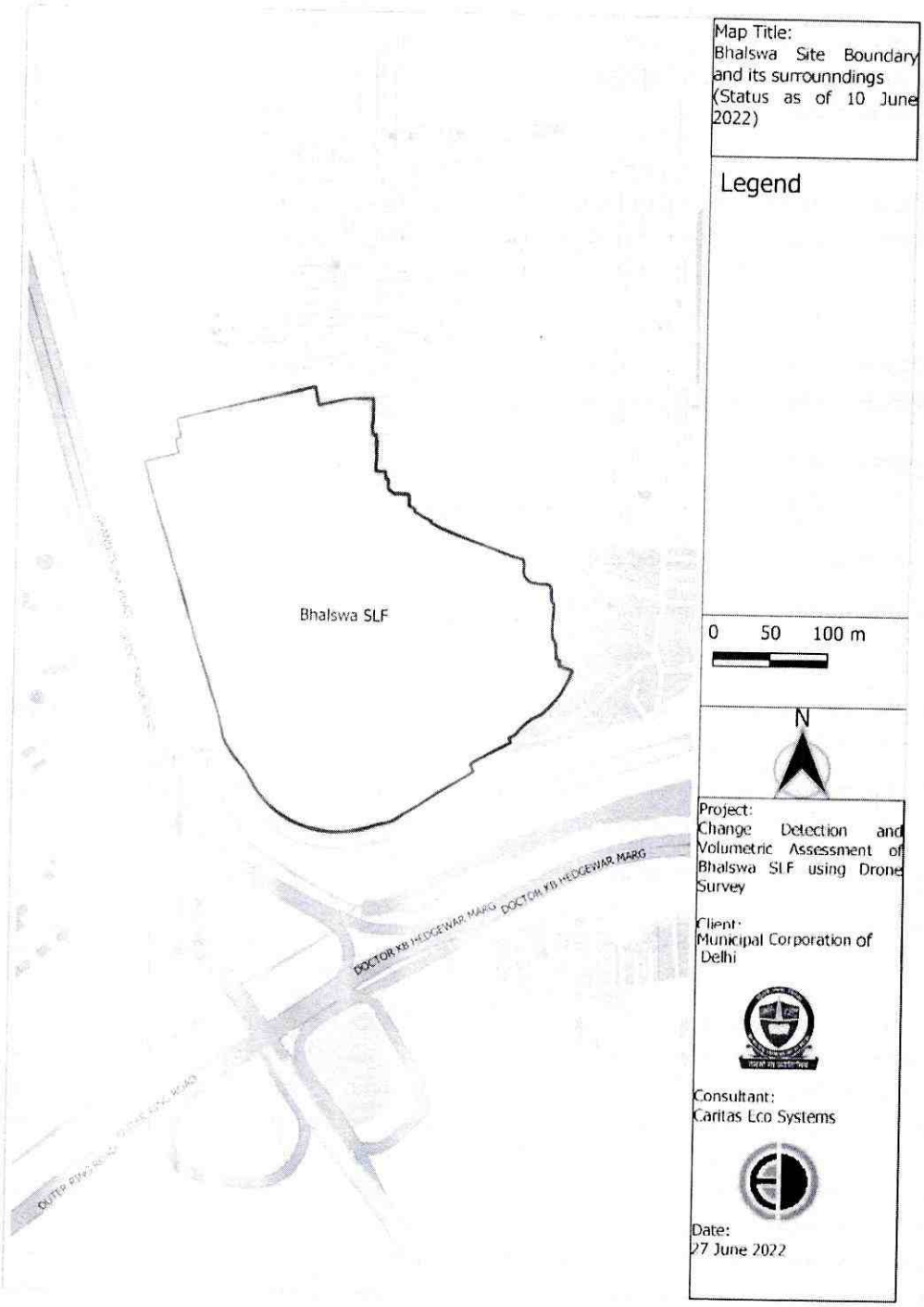
The current project focusses on the MCD's SLF located in Bhalswa. The dump site is located at 28°44'27.10"N and 77°09'26.40" E, it is adjacent to NH-1 and Bhalswa Dairy. The landfill is accessible from the internal roads adjacent to the Delhi Chandigarh section of the Asian highway – 1. The southern and eastern part of the site is next to the drain going towards eastern part of Delhi.

Figure 1: Location of SLF, Bhalswa



[1] Compliance Report of Govt. of NCT of Delhi in OA No. 673/2018 (August 2021)

Figure 2 Site Boundary and its surroundings



1.2 Existing Condition

The landfill site was started in 1994 and is officially spread over an area of 70 acres. The landfill is an unlined historical dump site which is owned and operated by the Municipal Corporation of Delhi. Waste lying on site has very steep slopes. The height of the dump site, as per official records is 65 m as on October 2019 with legacy waste of about 80 lakh MT. From October, 2019 to till date, It was informed that fresh waste was still being dumped continuously on the site and therefore at the time

of survey about 80 lakh metric tonnes of legacy waste was there including fresh waste. About 25 lakh metric tonnes of legacy waste has been processed until now. About 50% of the waste generated in 6 zones of north area is processed in the waste processing facility under MCD at Narela Bawana. Presently MCD has 24 trommels operating at Bhalswa landfill site, with 2,200 tons' waste being removed every day.

1.3 Project Objective

NDMC has decided to close the existing Bhalswa Dump site and to establish an Engineered Landfill site near to the existing site. The dump site is cleared through Bio-mining/remediation. For this purpose, NDMC has appointed the consultant to conduct a drone-based survey to monitor the progress of the process.

Project objective: To conduct a Drone based survey of Sanitary Landfill Facility (SLF) site at Bhalswa for volumetric assessment of waste.

The scope of the work is:

1. Conduct drone survey of existing Sanitary Landfill site.
2. Creation of 3D model and ortho image using the drone survey.
3. Volumetric assessment, slope analysis and change detection of the waste dump.

1.4 Benefits of Drone Survey

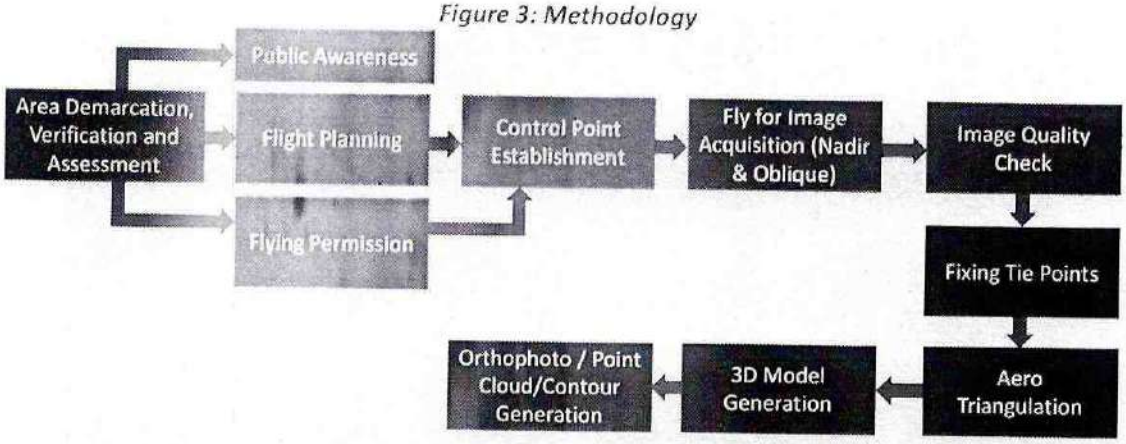
1. Time and Location stamped photographic record of "As Is" condition and thereby generating qualitative and quantitative baseline data.
2. Periodic data collection and comparative analysis will help in measurement of change in volume, average periodic volume etc.
3. Contouring and slope measurement of landfill site.

2 SLF Bhalswa Drone Survey

2.1 Methodology

The Consultant has adopted a detailed survey approach in order to get the best results. Once the LoA was received, multiple site visits were made and the site boundary was demarcated. The site area as per some past reports and informed by the Client was about 70 acres, however during the site visits and site boundary demarcation exercise it was observed that the actual area of the landfill site is more than 78.47 acres. Considering the existing situation, the consultant planned the aerial survey missions to cover the increased area. It is to note that there is about 12% increase in the actual site area. Subsequently, with Client's assistance, a letter was submitted to Delhi Police for their information and approval. Once the go-ahead was received, control points were marked and site images were captured using drone. Multiple missions were planned and executed with multiple camera angles and high image overlaps. The images captured were verified and put to processing to generate the desired results. The schematic view of the methodology adopted is presented in the Error! **Not a valid bookmark self-reference.**.

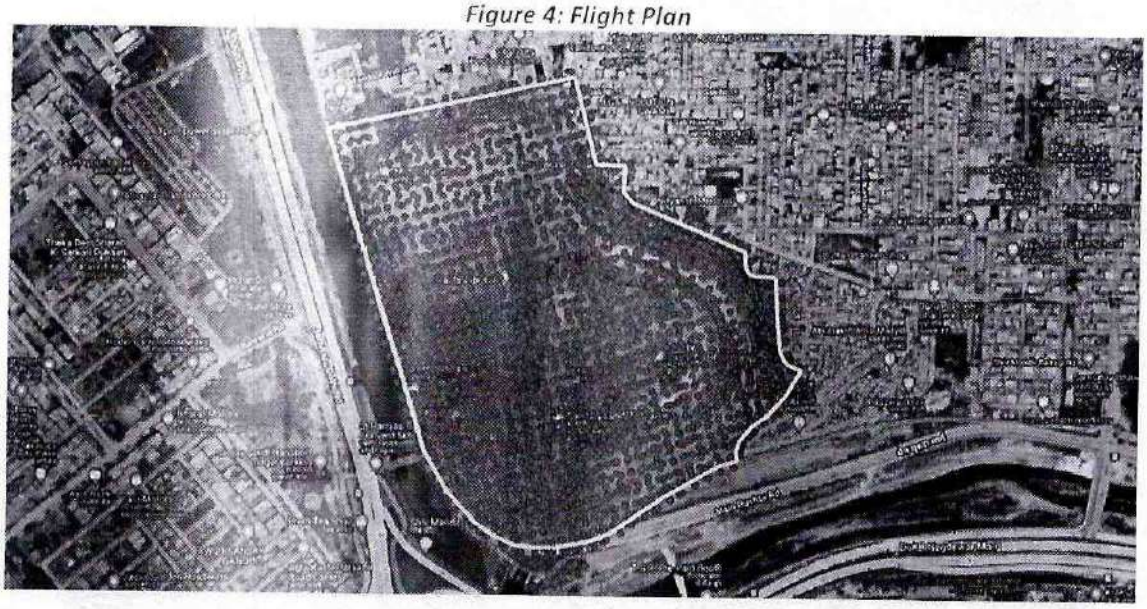
Figure 3: Methodology



2.2 Flight Planning and Image Capture

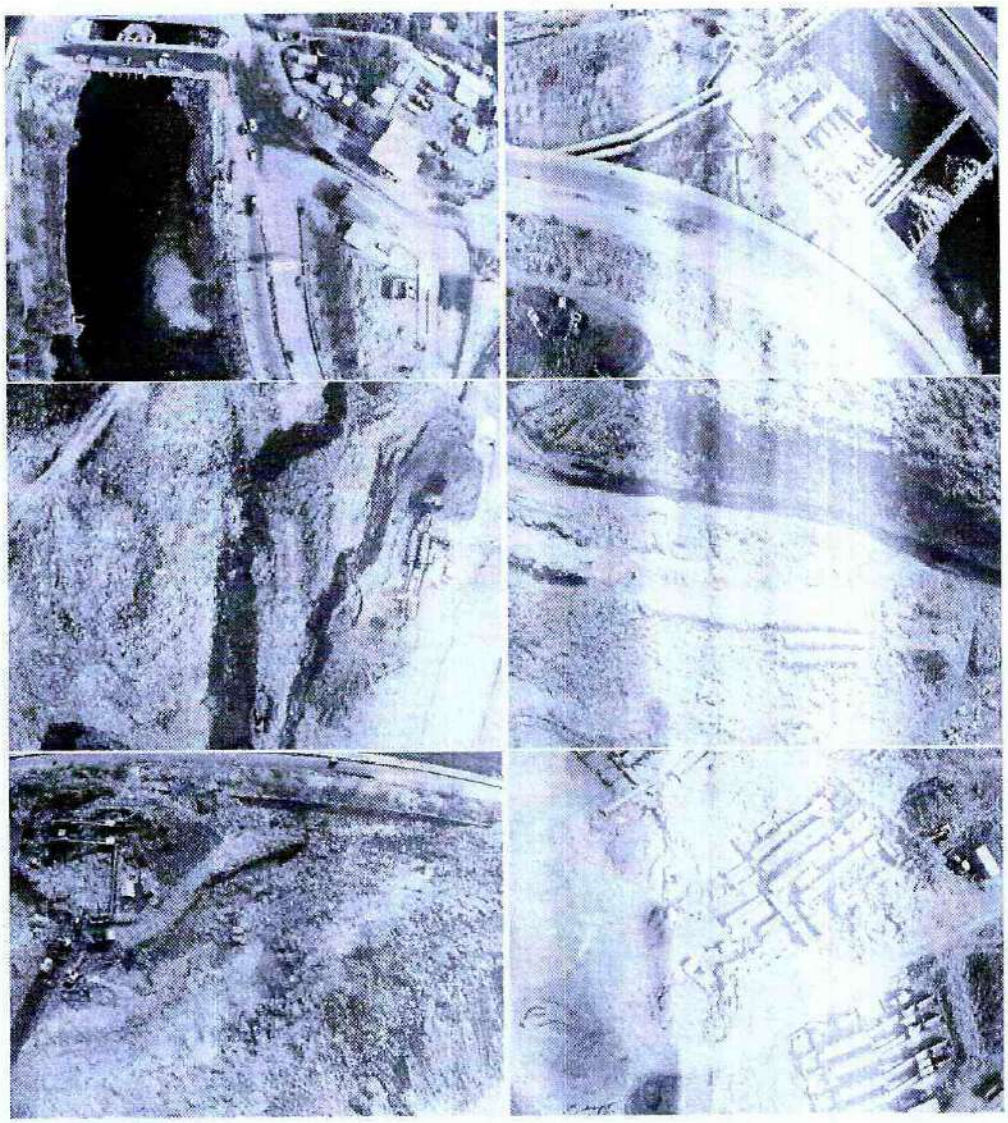
The Consultant has flown the drone as per the guidelines prescribed by DGCA. Multiple flight missions were planned to get the best quality and accurate output. As mentioned earlier, multiple missions are planned for drone flight. Flight plans are presented in Figure 44.

Figure 4: Flight Plan



About 3000 images of the SLF site were captured with multiple angles. Snapshots of some pictures are presented in Figure 5Figure 5.

Figure 5: Drone Images




100_0001_0001
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100_0003_0155
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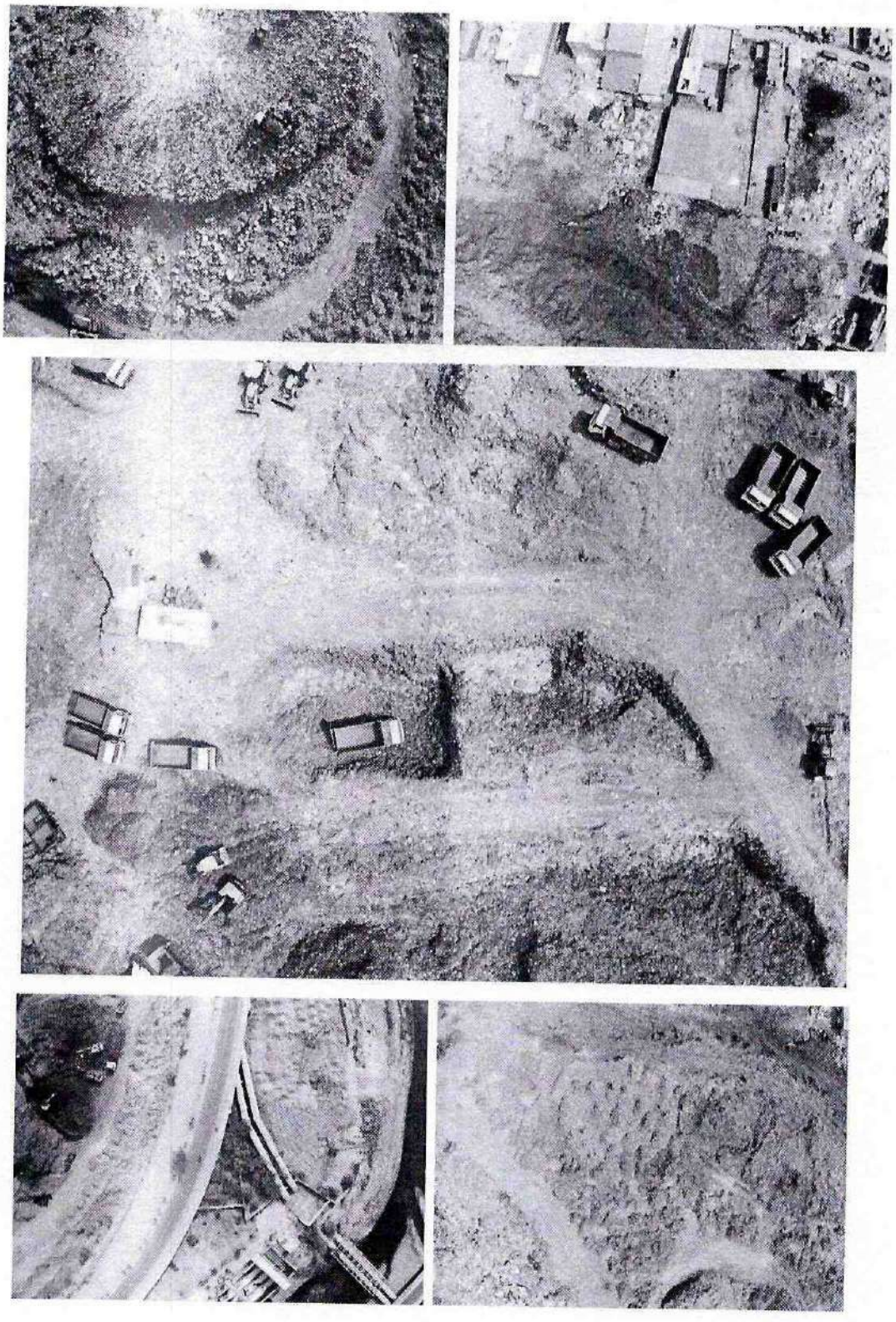
100_0008_0099
100_0008_0100
100_0008_0146
100_0009_0002

2.2.1 Continuous operation of trucks, movement of people (rag pickers)

Continuous operation of JCBs and other machinery was observed at the landfill site. There is regular movement of trucks within the landfill site. Also noticed the presence of rag pickers, including children, atop the landfill busy with their work.



2.2.2 Smell and Dust

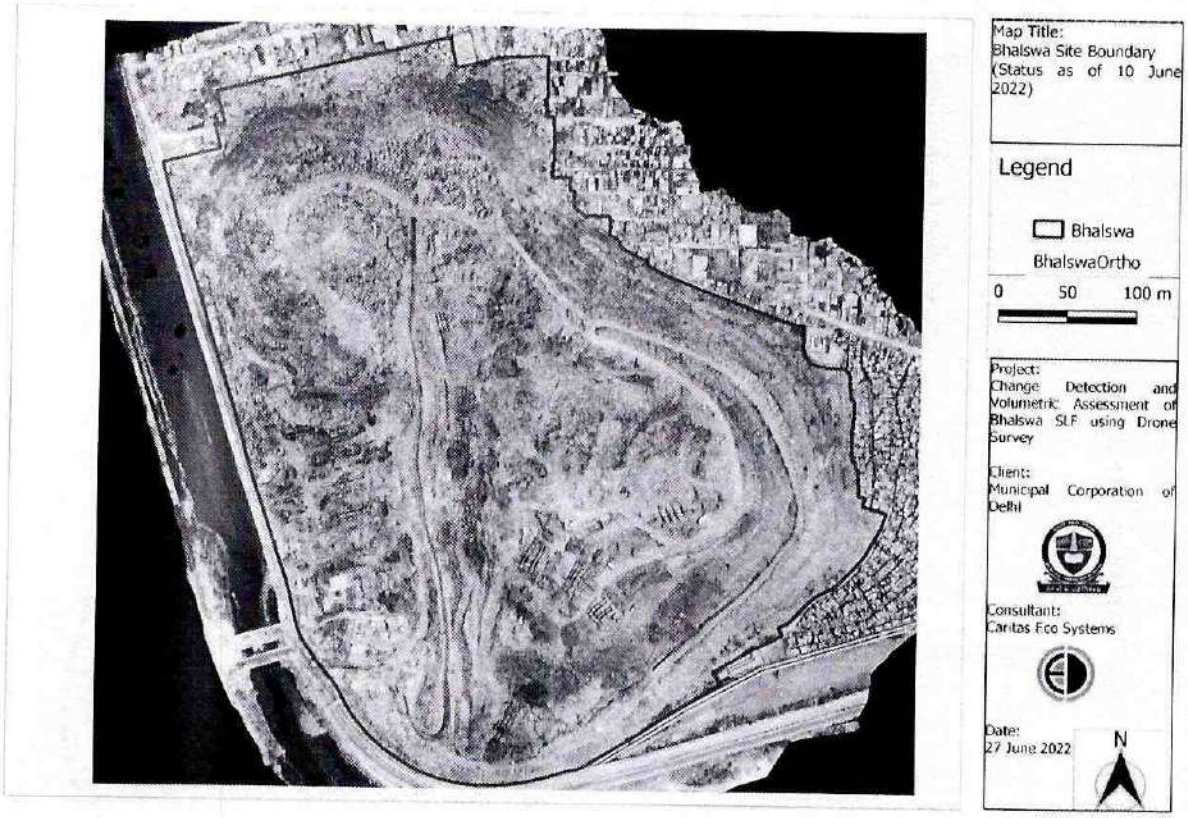
The landfill site is marked with stinking and foul smell. Moreover, due to movement of trucks and other machineries deployed onsite, there is too much of dust in the air. During the drone survey, the Consultant's team took all precautions like use of protective gear, sanitizer and following other hygiene protocols.

3 Output

3.1 Ortho photo

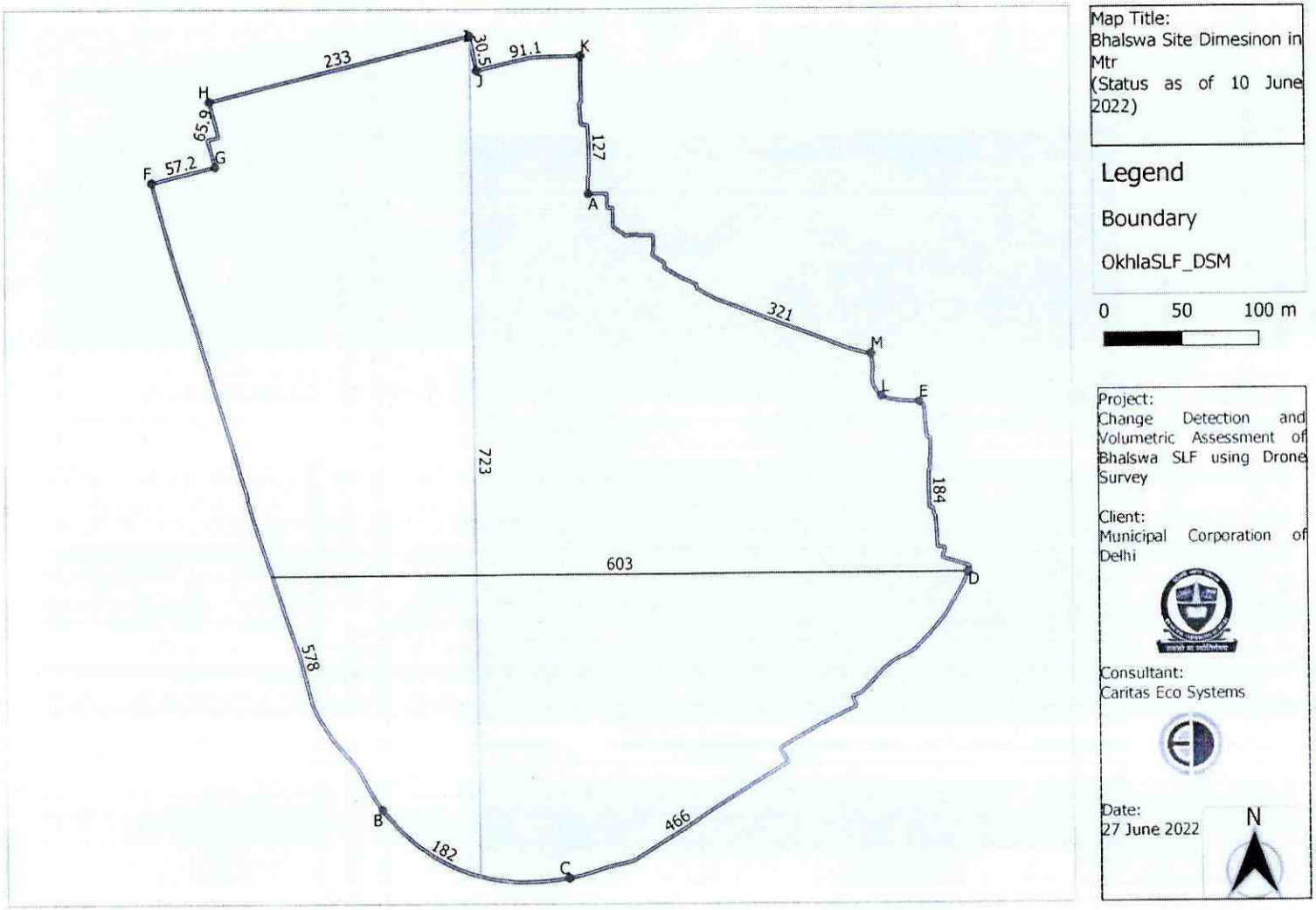
As per the records/reports available and discussions with MCD officials, the site area of SLF Bhalswa is reported as 70 acres. However, during the survey it is observed that the actual site area is about 78.5 acres (about 31.7 Ha.). The site boundary is presented in Figure 8. The site area has increased by 12% thereby resulting in significant increase in survey and processing time over what was originally envisaged.

Figure 6: SLF Bhalswa Site Boundary



For the purpose of waste volume estimation and analysis of SLF, the area occupied by buildings and at the entrance has been excluded. The analysis is focused on an area of 73 acres (about 31.11 Ha.). Figure 9 shows the site boundary and the dimensions .

Figure 7 Site Dimensions – SLF Bhalswa



3.2 3D Image

Some images of processed 3D model of the Sanitary Landfill Site.

Figure 8: Top View of the Sanitary Landfill Site, Bhalswa

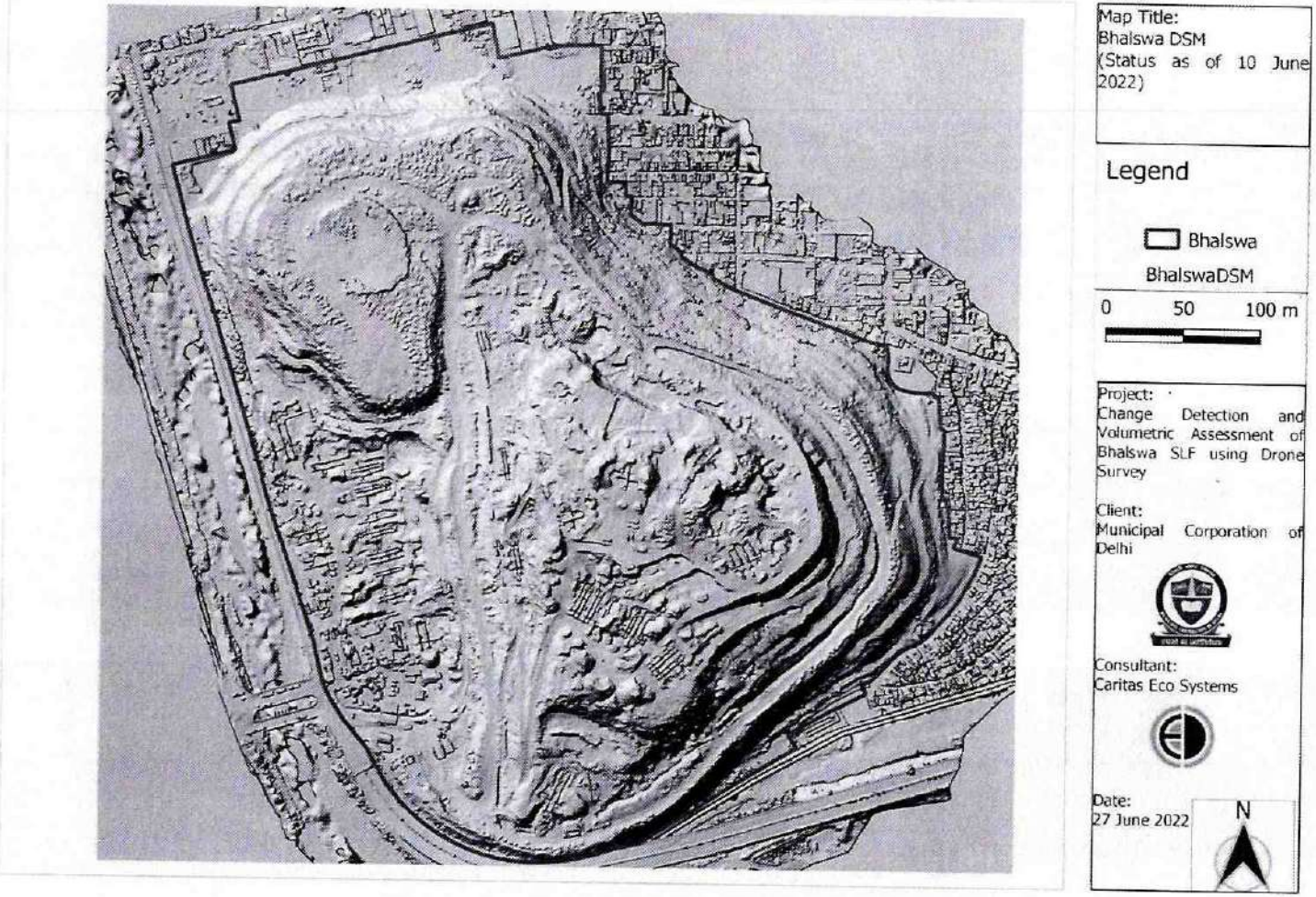


Figure 9: SLF as Viewed from Pushta road (West Side View)

Figure 10: SLF as Viewed from Bhalswa Lake(East Side View)

Figure 11: SLF as Viewed from ESI Hospital (South Side View)

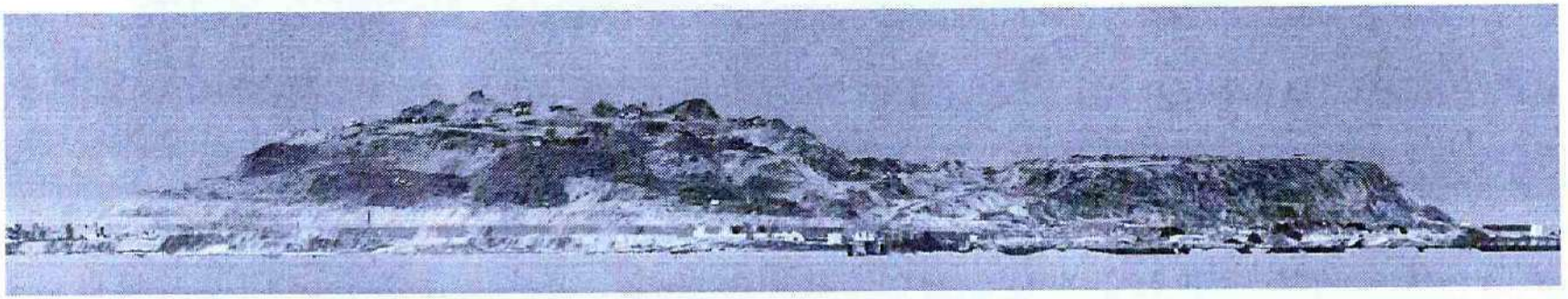


Figure 12: SLF as Viewed from North Side

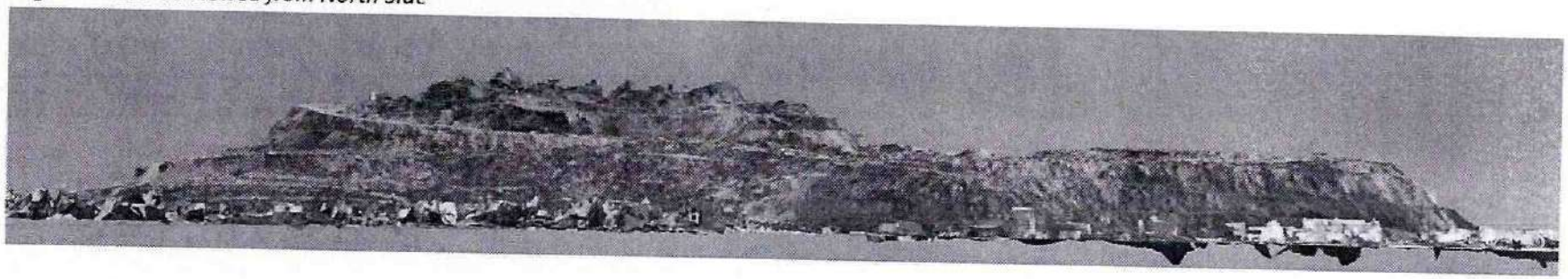


Figure 13: SLF Perspective View 1

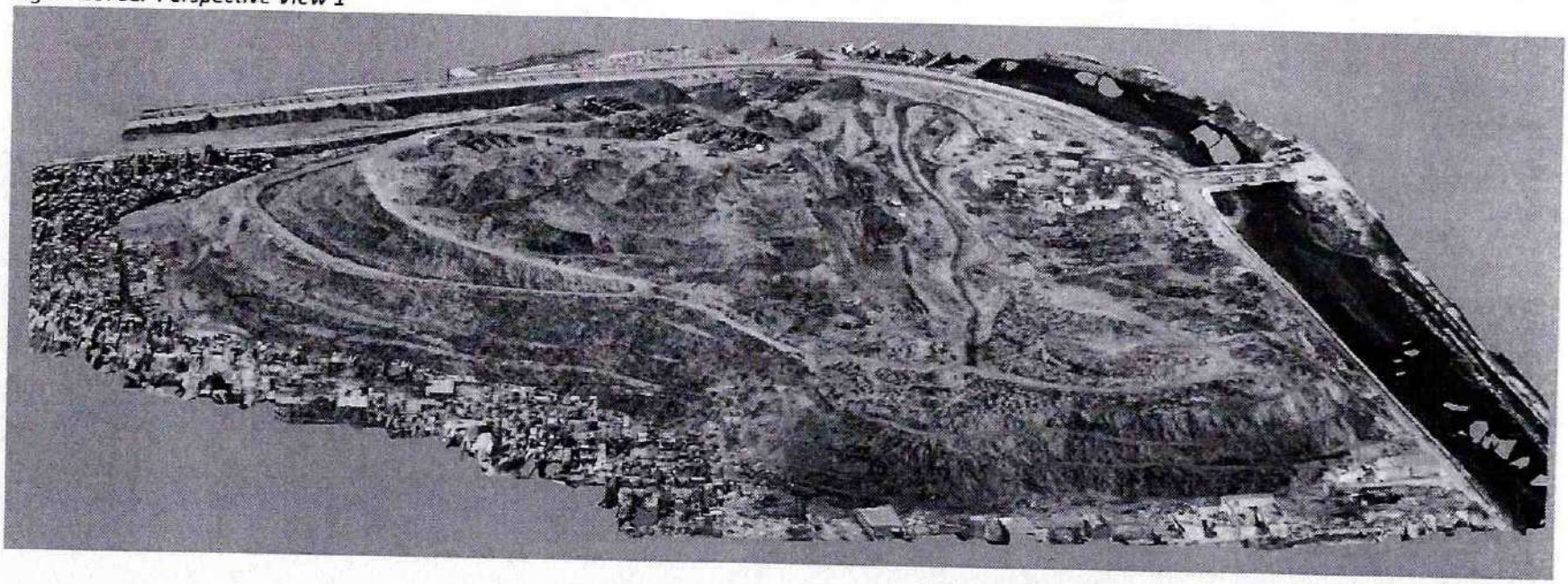
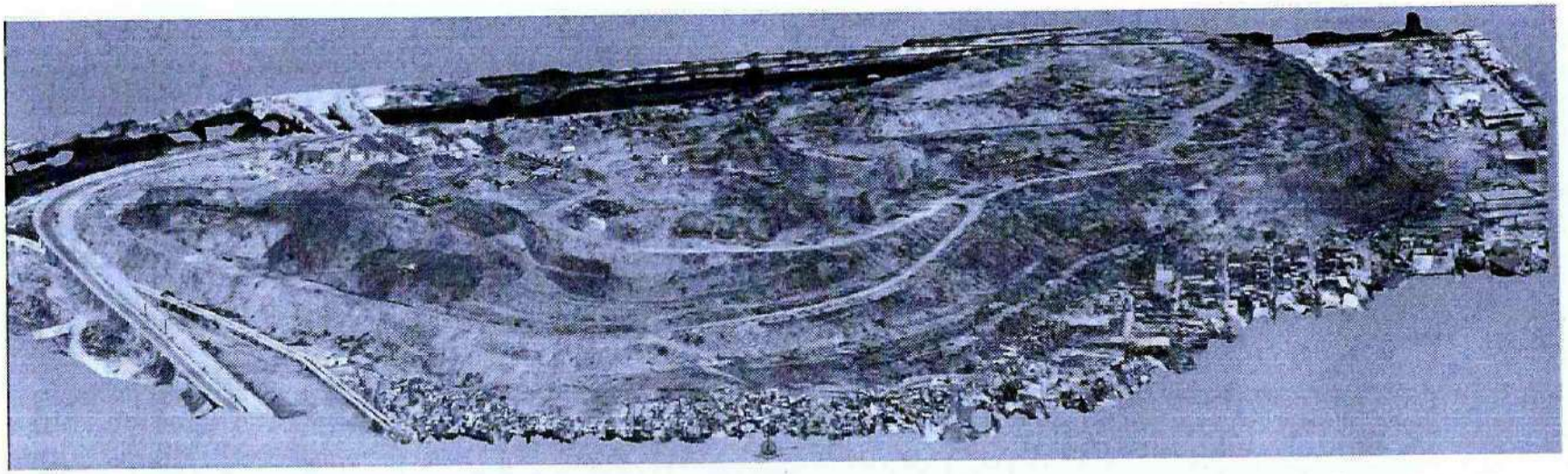


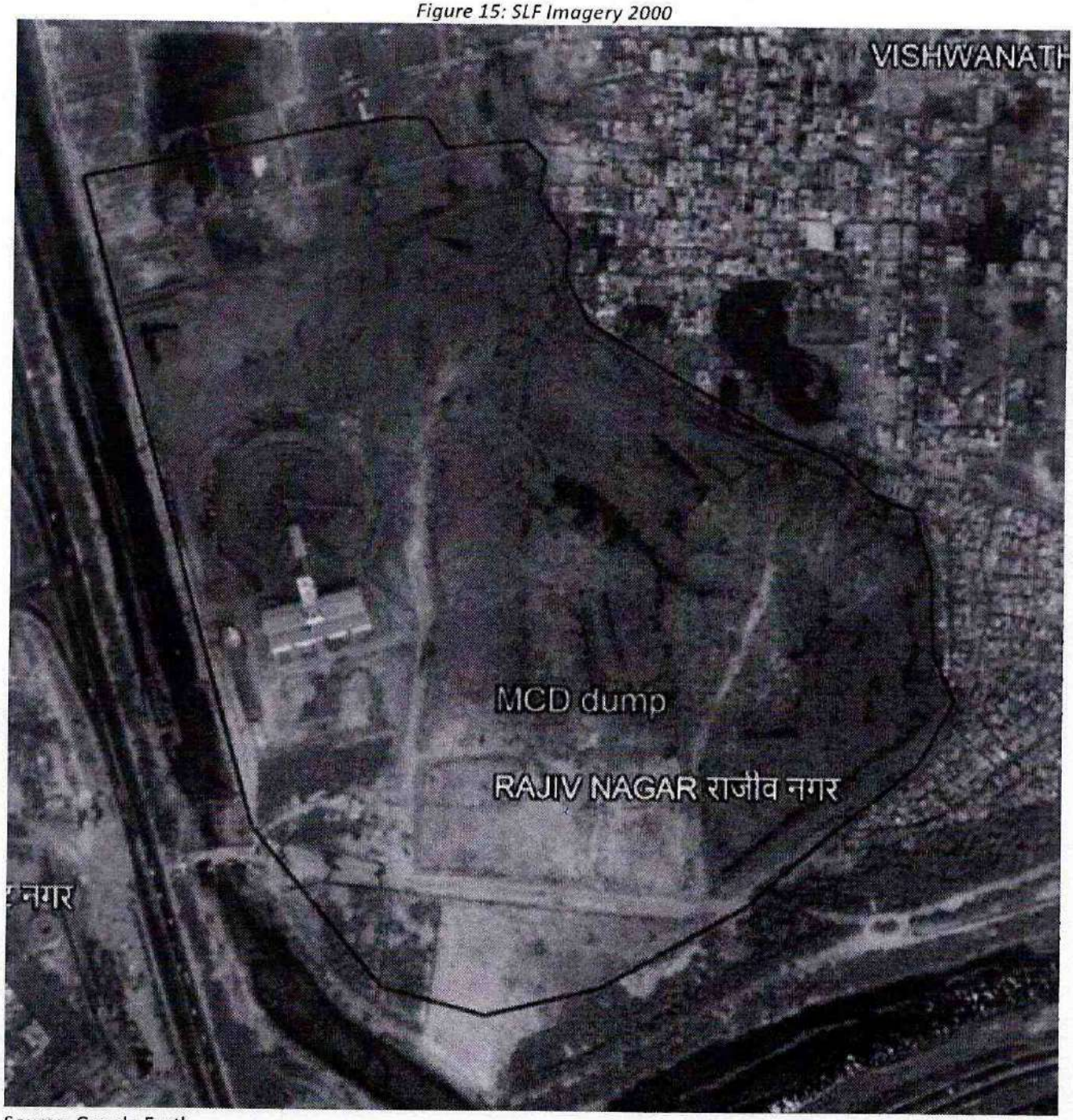
Figure 14: SLF Perspective View 2



3.3 Topographical Analysis

The open dumpsite has been in operation for many years and waste has spread all over an area of almost 78 acres well beyond the originally planned or officially recorded area of about 65 acres. It is noted that due to lack of original ground survey data (prior to dumping) and the subsequent waste dumping over the years, the original ground profile of the site is not known. The consultants collected historic images to trace the growth and development of the landfill through the years. It may be seen that the site appeared almost flat in the year 2000 with a number of buildings in the adjacent areas have been engulfed by the dumpsite as per the recent reports.

Figure 15: SLF Imagery 2000



Source: Google Earth

In the absence of any survey data, reference has been taken from the toposheet and the output generated by the Consultant has been used for this project. As per the toposheet, the contour along the road adjacent (the western boundary) was 210m and 210m along the east boundary of the site.

Based on the aerial survey data, a Digital Surface Model (DSM) was generated. Based on the DSM, contours were extracted and are presented in figure 19

Figure 16: Contours Map of the SLF Bhalswa

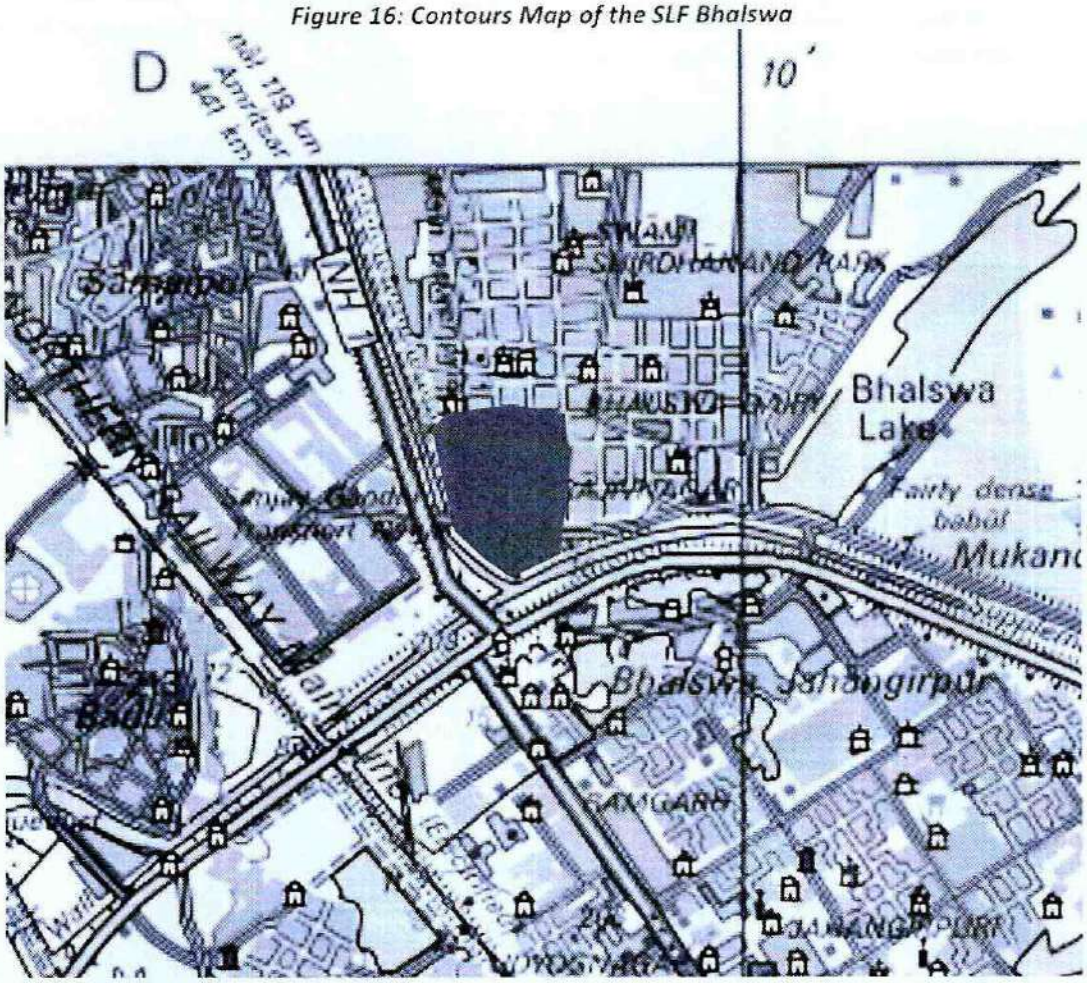
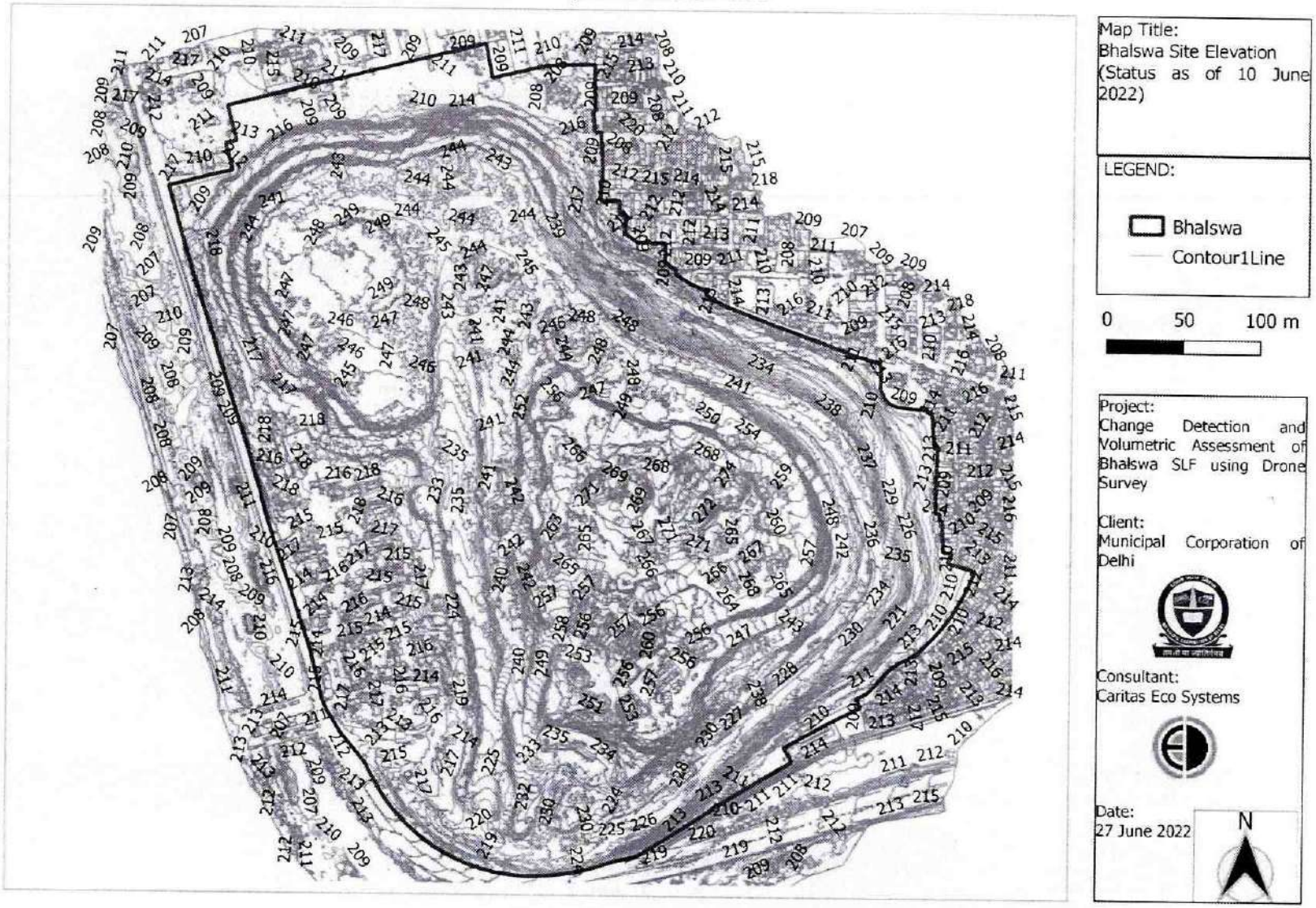
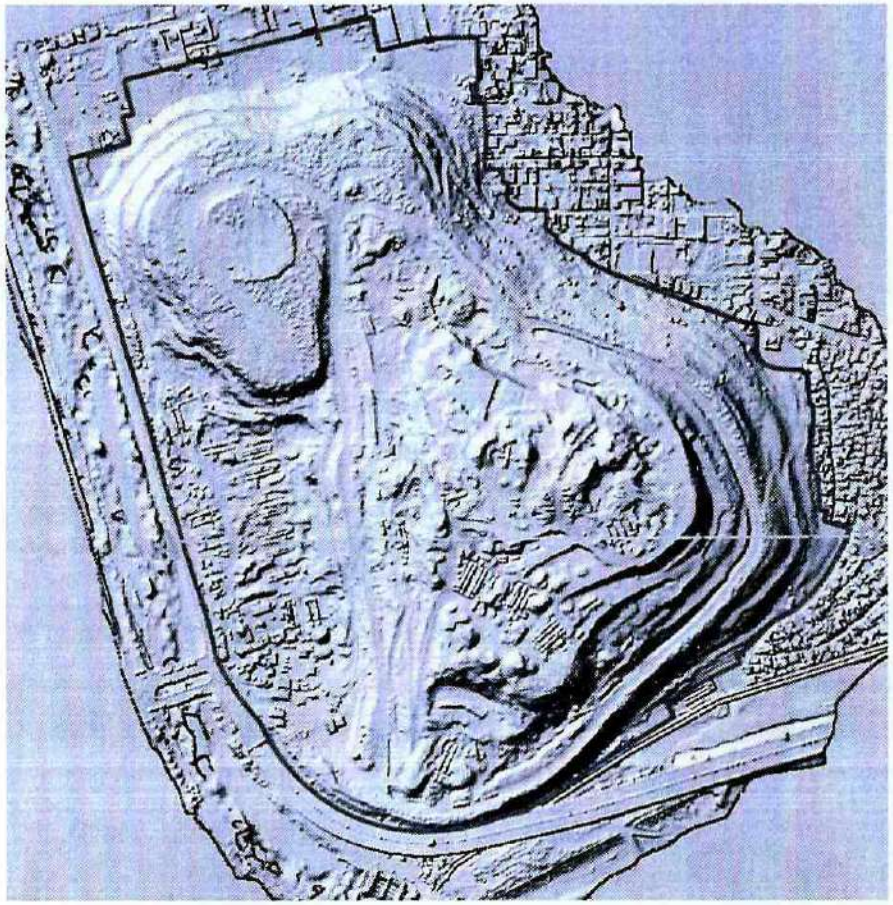


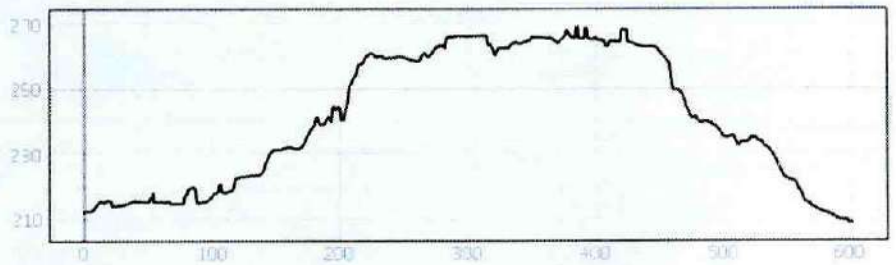
Figure 17 Contour Lines



Multiple cross sections of the site are generated to understand the site profile and Slope Variation. These are presented through to 18 Figure 18 to 18

Figure 18: Cross Section AB- height and slope variation in %





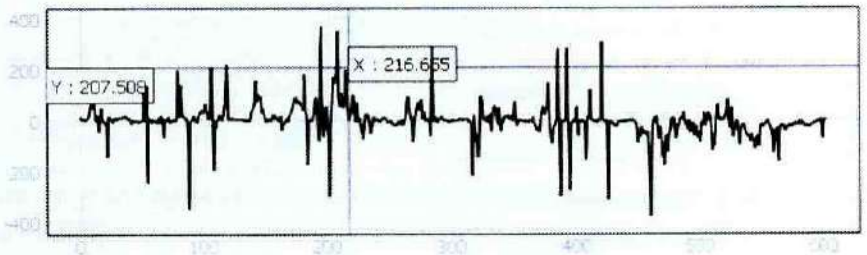


Figure 19: Cross section CD- Height and Slope variation in %

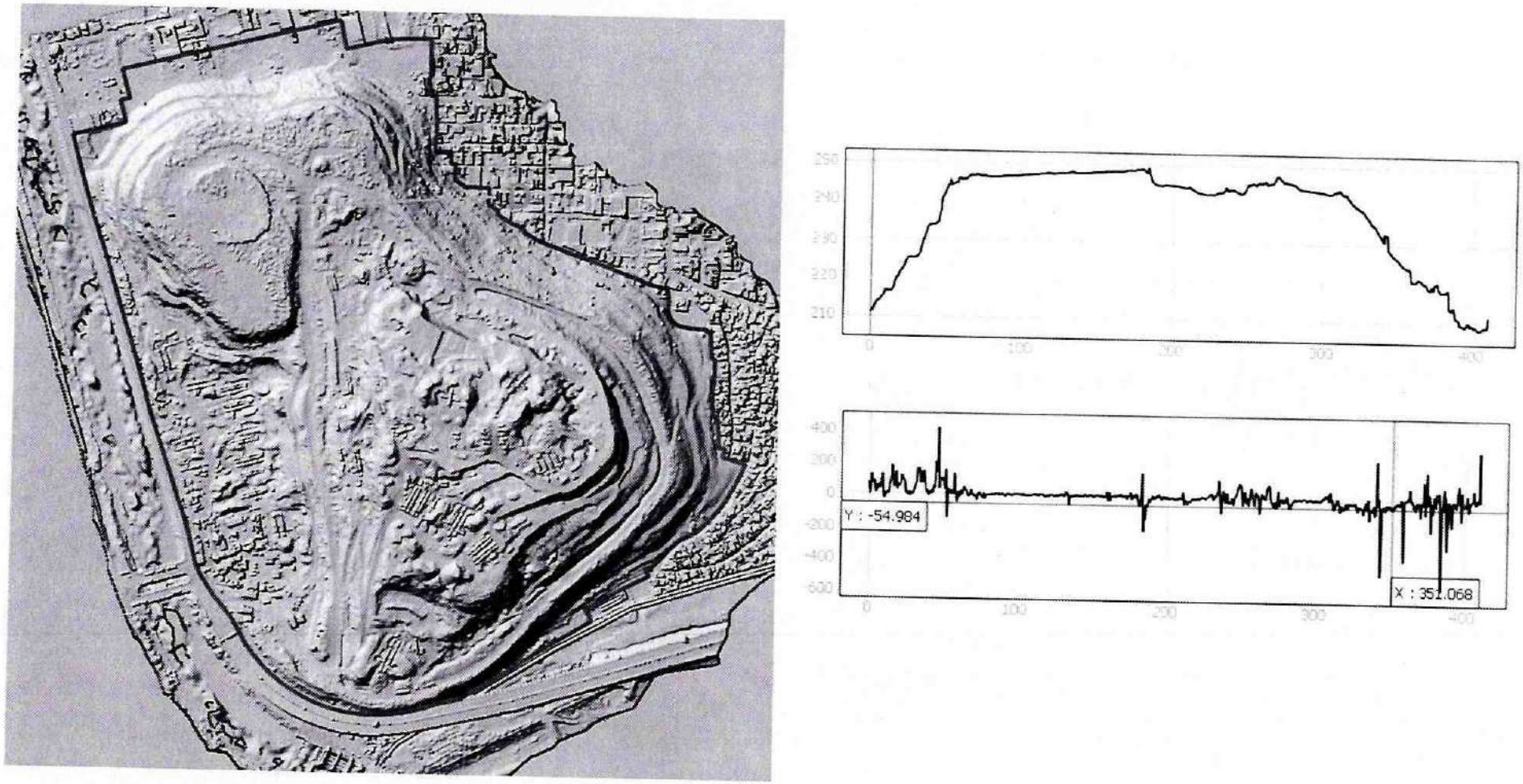
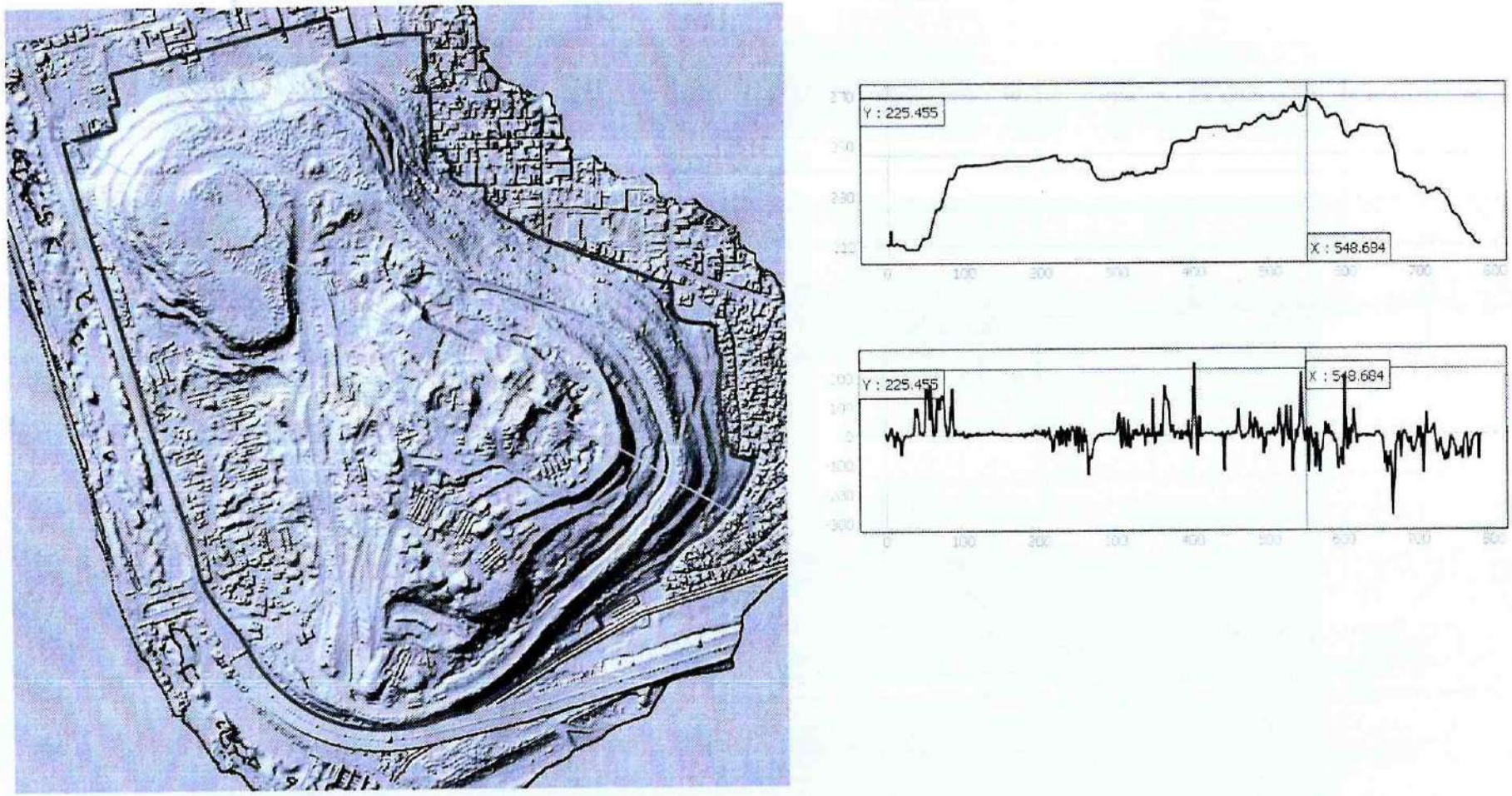


Figure 20: Cross section EF- Height and Slope variation in %



3.4 Volumetric Assessment

As an output of the drone survey the consultants generated a 3D surface model of the existing waste mound at the site using photogrammetric analysis. This generated surface has been used to for estimation of the enclosed volume. It is observed that the natural ground is sloping towards east. It can be seen from the contour survey that waste has reached a height of 62 m from the ground. The highest point being more than 274 m.

The Consultant has estimated the waste volume with the following assumptions.

1. Average original level of the site being 212 m based on the toposheet
2. A level of 212 m with reference to the existing road level Pushta Road assuming the site may be flattened to match the existing road level

Volume estimation is presented in Table 1.

Table 1: SLF Waste Volume Estimate

SLF site area	**78.47 Acre**	**31.76 Ha.**
SLF site area considered for volumetric assessment	**76.87 Acre**	**31.11 Ha.**
Waste volume @ 212 m baseline level	**73 Lakh Cubic Meter**	
Waste volume @ 215 m baseline level	**65 Lakh Cubic Meter**	

4 Way Forward

The Consultant has estimated the waste volume, presented in Table 1 above, as on 15 June 2022. As per discussion with MCD officials, the Consultant will conduct the aerial survey again in the month of October 2022. In the next submission, the Consultant would be able to undertake the change detection whereby highlighting the change in the waste volume, slope and general topography of the site. This would be helpful for MCD to monitor the progress and plan its activity accordingly.

GOVT OF NCT OF DELHI
SUB DIVISIONAL MAGISTRATE (MODEL TOWN)
NEAR NDPL OFFICE, AZADPUR FLYOVER, DELHI-110033

F. No. SDM/MT/2022/Bhalswa Mock Drill/ 3718-19 **Dated:-** 19/07/2022

To,

Sh. D.K. Singh
Sr. Env. Engineer & In-charge, WHC II, DPCC
Member Convener of Joint Committee
Delhi Pollution Control Committee
5th Floor, ISBT Building, Kashmere Gate, Delhi-110006

Delhi Pollution Control Committee
Dairy No. 119986
21 JUL 2022
Sign. of Receiving Officer

Sub:- regarding Fire Mock Drill and NGO Report of Bhalswa Land Fill Site;

Sir,

This is to bring to your kind attention that a surprise Fire Mock Drill was carried out at Bhalswa Land Fill Site on 08th March' 2022 by the District Disaster Management Authority (DDMA), North District to check the preparedness and response time of different Emergency Support Functionaries (ESF) and to identify the areas for further improvement. In this context, report of Fire Mock Drill carried out at Bhalswa Land Fill Site on 08th March' 2022 has been attached herewith.

Further, w.r.t. mainstreaming of reg-pickers, NGO Chintan was engaged earlier. The NGO has now submitted its survey report, copy of the same has also been attached for your kind information.

Encls:- as above

(RAHUL SAINI)
SDM (MODEL TOWN)

OFFICE OF THE SUB DIVISIONAL MAGISTRATE * MODEL TOWN *

Copy to:-
PA to DM(North), Alipur

22/07/2022

AEE (MS)
AF (MS Branch)

FIRE MOCK DRILL

AT

BHALSWA LANDFILL

ON

08TH June, 2022

GOVERNMENT OF NATIONAL CAPITAL TERRITORY OF DEI
OFFICE OF THE DISTRICT MAGISTRATE (NORTH)
DM COMPLEX G.T. KARNAL ROAD, ALIPUR DELHI-11003

Azadi Ka Amrit Mahotsav

F.No. DC/N/DDMA/ **Date:**

A Surprise Fire Mock Drill was organized by District Disaster Management Authority (DDMA) North to check the preparedness and response time of ESFs on **08.06.2022 at 11:57 A.M.** The Mock exercise was conducted at Bhalswa Landfill. The scenario was of Fire

OBJECTIVES OF THE. MOCK DRILL:

- To review the alertness and response time of different emergency support functionaries (ESF's) in the North Delhi district for any disaster and to identify areas for further improvement.
- To assess the vulnerability of the proposed area to proposed disaster/incidents and to formulate recovery /mitigation plans for the district.
- Capacity building of ESF's and practice of standard operating procedures.
- Networking knowledge on best practices and tools for effective risk management.
- Damage minimization.

SCENARIO OF THE DRILL AT, BHALSWA LANDFILL

The mock drill was planned on the scenario of fire at Bhalswa Landfill is vulnerable to fire.

- In the month of June, it's quite hot during the summer days, on April, 2022 sun is razing and the temperature has soared to 45°C. at Bhalswa landfill area the temperature remains 2-3° higher than rest of Delhi.
- There are the chances of formation of methane and other gases at the landfill site due to heat and various chemical reactions.
- This methane and other combustible gases formed in the landfill sites sometimes caused fire and which may grow big depending on the amount of gases formation.
- On June 8th due to excessive gas formation, huge fire was reported from Bhalswa landfill site, which was spreading rapidly in the landfill area.

STAGING AREA:

- In said Mock Exercise the Office at Bhalswa Dumping Site Parking area was selected as the staging area for mock drill. Staging Area is generally a place identified for gathering of different ESFs during the time of any emergency or disaster. In this mock drill, **CEO, DDMA** was the Staging Area Manager; he had looked after all the ESFs as well as the equipments required during the time of mock drill.

EMERGENCY SUPPORT FUNCTION PREPAREDNESS THROUGH SOP'S:

Each team leader was requested to interact with their team members to test the preparedness and the links with the District EOC. **SOP prepared for following departments.**

ESF-1 Communication

Nodal agency at District level: Mahanagar Telephone Nigam Ltd. (MTNL).

The communication ESF is primarily responsible for restoration of communication facilities. The ESF on Communication should ensure the smooth flow of information that can cater to the outreach in a time-sensitive manner at District level in response efforts.

ESF-2 Evacuation

Nodal agency at District level: OFFICE OF THE DISTRICT MAGISTRATE/DEPUTY COMMISSIONER,

The ESF on evacuation is primarily responsible for establishing evacuation plans, identification of fastest evacuation routes and alternate routes and coordinating evacuation logistics during field operations.

ESF-3 Search and Rescue

Nodal agency at District level: DELHI FIRE SERVICE

Search and Rescue operations are one of the primary activities taken up in a post disaster situation. The promptness in these operations can make a remarkable difference in the amount of loss of life and property.

ESF - 4 Law and Order

Nodal agency at District level: DCP, OUTER-NORTH DELHI POLICE SERVICE.

The ESF on Law and Order maintains the law and protects the property and valuable commodities. It is mainly responsible to control crowd and avoid riots situations.

ESE -5 Medical Responses and Trauma Counseling

Nodal agency at District level: CDMO OFFICE, DEPARTMENT OF HEALTH SERVICES

The ESF on Medical Response and Trauma Counseling will look after emergency treatment for the injured people immediate after the disaster take place.

ESF- 6 Water Supply

District Nodal agency: DELHI JAL BOARD

The ESF on drinking water and water supply will ensure provision of basic quantity of clean drinking water and water for other purposes in a manner that does not allow the spread of diseases through the contamination of water.

ESF - 7 Reliefs (Food and Shelter)

Nodal agency at District level: DEPARTMENT OF FOOD AND CIVIL SUPPLIES

In the event of a disaster there would be a need of disbursing relief materials due to massive destruction of life and property taken place. The ESF on Relief should ensure coordination of activities involving with the emergency provisions of temporary shelters, emergency mass feeding and bulk distribution of relief supplies to the disaster victims as also the disaster managers and relief workers.

ESF- 8 Equipment support, Debris and Road clearance

Nodal agency at District level: MUNICIPAL CORPORATION OF DELHI

The importance of this ESF emanates from the fact that most large scale hazards such as earthquakes, cyclones, floods primarily affect the building structures.

ESF-9 Electricity

Nodal agency at District level: BSES

The ESF on electricity will facilitate restoration of electricity distribution systems after a disaster. In the event of a disaster there would be major electricity failure and many power stations damaged. At some places in order to carry out search and rescue, even electricity is required to cut off, which can be easily managed with the help of this Agency.

ESF -10 Transport

Nodal agency at District level: TRANSPORT DEPARTMENT

The ESF on Transport should ensure smooth transportation links at state and district level. Within the disaster context, quick and safe movement of material and humans are a priority. It should coordinate the use of transportation resources to support the needs of emergency support forces requiring transport capacity to perform their emergency response, recovery and assistance missions.

MAJOR HOSPITAL IDENTIFIED

- **Babu Jag Jiwan Ram Hospital, Jahangirpuri, Delhi- 110033**
- **Maharishi Balmiki Hospital, Pooth Khurd, Bawana, Delhi-110039**
- **Raja Harish Chander Hospital, Narela Delhi-110040**

RELIEF CENTERS

A Relief Center was setup at Bhalswa Landfill Parking area in the District. All the affected persons were sent to Relief Centers, where the minor injured and other affected persons were sent for initial first aid and care. It is also pertinent to mention here that facility of Food, Drinking Water & Medical etc. was provided to all the persons reached at Relief Camp by Revenue Department. The local transportation was used for taking them to the relief centers from the incident sites.

BHALSWA LANDFILL (DUMPING YARD)

As per IMD forecast, the weather will remain likely to rise. In the month of June, it's quite hot during the summer days, on 8th June, 2022 sun is razing and the temperature has soared to 45°c., at Bhalswa landfill area the temperature remains 2-3° higher than rest of Delhi. There are the chances of formation of methane and other gases at the landfill site due to heat and various chemical reactions. This methane and other combustible gases formed in the landfill sites sometimes caused fire and which may grow big depending on the amount of gases formation. On June 8th due to excessive gas formation, huge fire was reported from Bhalswa landfill site, which was spreading rapidly in the landfill area.

TIME LOG OF EMERGENCY SUPPORT FUNCTIONARIES ESFs DETAILS

CALL TO ESFs	CALL TIME	RESPONSE TIME	REMARKS
Caller	11:57 AM		
DDMA NORTH QRT	11: 59 AM	12:10 PM	
Delhi Fire Services- 101	12:01 PM	12:22 PM	
CATS- 102	12:01 PM	12:21 PM, 12:27 PM 12:35 PM, 12:40 PM	
Delhi Police- 112	12:01 PM	12:20 PM	
DPO- NORTH	12:01 PM	12:15 PM	
PC-NORTH	12:01 PM	12:10 PM	
SR. CHIEF WARDEN	12:04 PM	12:15 PM	
ICD	12:04 PM	12:15 PM	
SDM-MODEL TOWN	PSO- 12:05 PM	12:20 PM	
NDRF	12:05 PM		
ACP, SHO	SHO-12:07 PM	ACP-12:32 PM	
DJB	12:08 PM	12:13 PM	
CDMO	12:10 PM	12:15 PM 12:25 PM	
P.S.-BHALSWA DAIRY	12;12 PM	12:20 PM	
ADM-NORTH	P.A. BRANCH- 12:10 PM AKHILESH PSO- 12:09,12:20, 12:21, 12:31 PM (NOT PICKED)	12:20 PM	
DM-NORTH	P.A. BRANCH- 12:06 PM DM (N) 12:17 PM	12:39 PM	
NDMC	11:27,11:28,11:30,11:32 PM (NOT RESPONDING)	12:15 PM 12:25 PM	
DUMPING YARD INCHARGE	12:11, 12:12, 12:14, 12:16, 12:20 PM (NOT RESPONDING)	12:25 PM	
I.O.	12:20 PM		
QRT UPDATES	12:24 PM		

BHALSWA LANDFILL MOCKDRILL

DETAILS OF ESF'S MANPOWER & EQUIPMENT

Department	Nodal Officer	Contact Number	Number of Manpower	Equipment Details	Response Time
DM NORTH	MS. R. MENEKA	9811226267	1+2		12:39 PM
ADM NORTH	SH. PADMAKAR RAM TRIPATHI	9953916491	1+2		12:20 PM
SDM MODEL TOWN	SH. RAHUL SAINI,	8860420086	1+2		12:20 PM
DPO- NORTH	Ms. RAVI JYOTI	8929659559	1+2		12:15 PM
PC-NORTH	SH. VINAY DAMARA	9953821125	1+2		12:10 PM
QRT NORTH	DDMA QRT(N) TEAM WITH PC (N)	8505971289	ALL DDMA STAFF		12:10 PM
ACP	SH. ASHOK KUMAR	7065036307	1+2		12:32 PM
DELHI JAL BOARD	**I.C-** SH. SANTOSH KUMAR	8860405075	1+2	WATER TANK-02	12:13 PM
DELHI FIRE SERVICES	**I.C/STO-** SH. RAMGOPAL MEENA	8076376263 DL1M-7817	1+7		12:22 PM
NDMC	**(CSI)** SH. SUDHIR CHAUHAN	8588845531	1+1		12:25 PM
	S.I.- SH. AZAD SINGH	8851378603	1+2		12:15 PM
SR. CHIEF WARDEN	SH. SURESH MITTAL SH. S.P. MITTAL	9910104000 9810029320	1+1		12:10 PM
TRAFFIC D.P.	-	-	-	-	-
PCR	DL1 CAC-1199 **H.C.-** SH. VRIJESH	9873912625	1+1		12:25 PM
	(29/A)- DL 1CP 7545 **ASI-** SH. SATISH KUMAR	9711228037	1+1		12:25 PM
	COMET (58/A)- DL1CAC1244 **ASI-** SH VINAY PAL	9868016405	1+1		12:22 PM

	DL1CAC 1229 **ASI-** MAHESH	8595949361	1+1		12:22 PM
	BHALSWA DAIRY ERV- DL1CX- 6525 **ASI-** RAMKARAN	9899136213	1+1		12:36 PM
D.P. EMERGANCY	112				
	I.O.- H.C.- SH. DEVENDER	7838297641	1+1		12:20 PM
CATS	CATS- MP07DA0830- LOVE KUSH	7017641253	1+1	AC LIFE SUPPORT	12:27 PM
	CATS- DL1A 2917 MANISH DAHIYA	8168599497	1+1	AC LIFE SUPPORT	12:21 PM
	CATS- DL 1A 2549 I.C- SH DEEPAK	8130221600	1+1	AC LIFE SUPPORT	12:35 PM
	CATS- DL1A 2416 SH YOGESH DAHIYA	9050001716	1+1	AC LIFE SUPPORT	12:40 PM
NDRF	UP 14 AG 1245 **IC-** AKHILESH	9816985988	2+8		12:25 PM
CID	SH SUNIL KUMAR	9968403112	1		12:36 PM
ICD	AMARNATH PAL	9213707755	1		12:18 PM
CIVIL DEFENCE VOLUNTEER	CW- 1 AD. CW- 1 DCW-3 IC-14		1(ICD)+92		10:30 PM

Lateral findings/ challenges of Bhalswa fire Mock drill (08.06.2022)

I. Role of Revenue Department:

As Revenue department is leading all Emergency Support functionaries in district, for better coordination and implementing the action plan in any scenario and by improvising the policy made for any kind of mishap according to the need of situation and making the results fruitful.

II. Training programmes in District:

Frequency of Training programmes in district regarding Fire Safety and using the equipments like Fire extinguishers to various department as well non government bodies shall be increased to enhance the preparedness and safety level which leads to least to minimum losses in term of life and livelihood. These training programmes should target the most vulnerable sections which are prone to more risk, i.e. Schools, RWA's TPDDL, NGOs, Industries, Malls etc.

III. Latest Technologies:

Talking in context of using latest technologies in Disaster Management some equipments needs to be in the check list of DDMA in case of any exigency for better coordination and monitoring.

A. Mobile Tetra Sets (Walky -Talky), for better communication and coordination among all the emergency support functionaries.

B. Drones for better monitoring in case of any mishap.

IV. Manpower.

Manpower is very essential tool in handling any kind of exigency whether it is any kind of disaster or implementing any policy in District or State.

A. 24 No's of CDVs has been appointed on the disposal of DDMA, these CDVs needs to be trained time to time to tackle any kind of emergency and number of training programs need to be increased.

Trained CDVs in DDMA and other CDVs deployed in all divisions of district act as buffer zone in case of any mishap and reduces the no. of losses by providing assistance to the victims until the ESFs arrives to tackle with mishap.

V. Type of Trainings:

Trainings provided to the CDVs and Delhi Fire Personnel need to be in uniformed pattern so that the probability of mis-coordination shall be reduced, as they are the first respondents of society.

VI. Home guards and NDRF:

As Home Guards are attached with Delhi police to assist in maintaining law and order in Districts, Home Guards shall also be trained time to time to act as additional force during any disaster.

As NDRF is a professional national agency in dealing with any kind of mishappening in country, it need to increase the number of Battalions so that losses in any kind of disaster may be taken to minimum level.

NDRF shall increase the frequency of training and awareness programmes in coordination with Disaster experts, Police, Civil Defense and Home guards to make the society more resilient as these personnel are the first respondents of society.

VII. Disaster Management Plans by MCD :

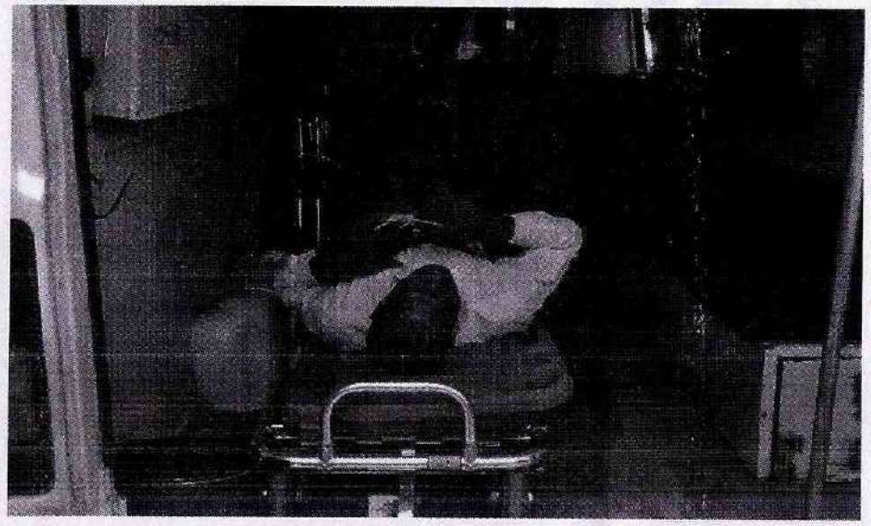
MCD shall share their On-site Disaster Management Plan for its integration with DDMA North Plans.

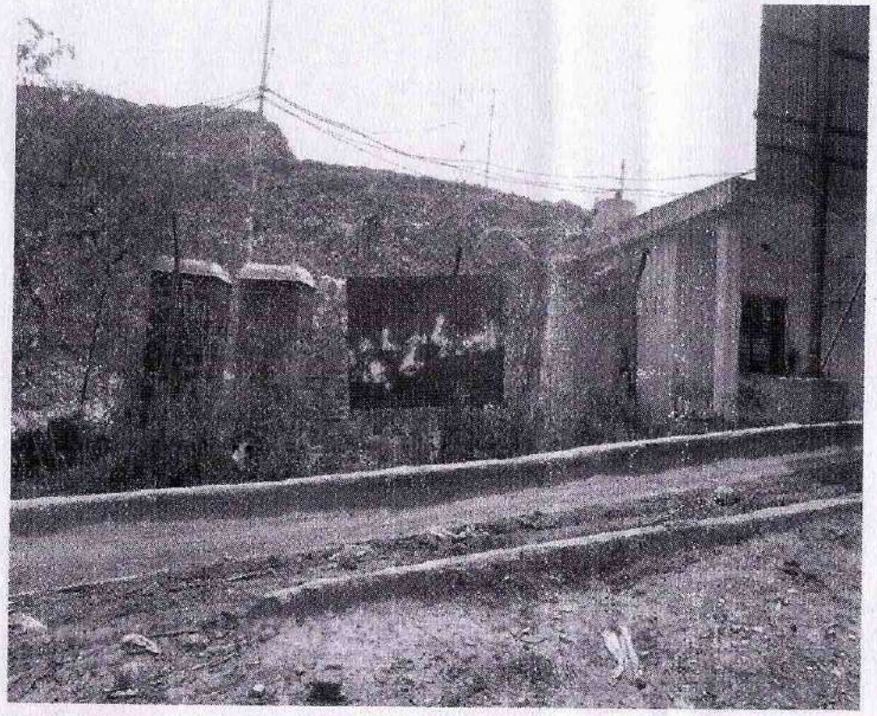
VIII. Preparedness of MCD on Fire Incident:

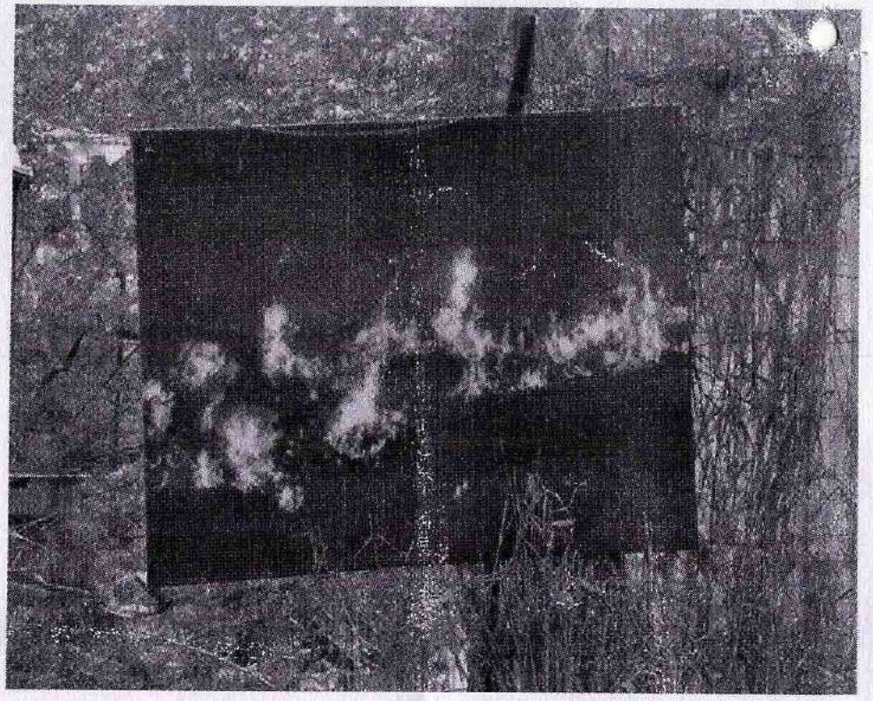
MCD (North) needs to enhance their preparedness & experiences w.r.t. such fire incidents.

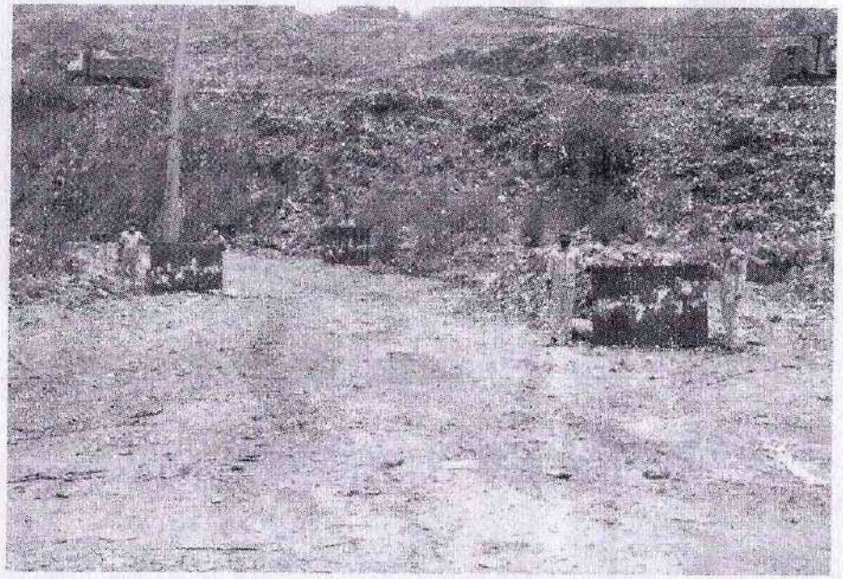

DISASTER MOCK DRILL
AT
BHALASWA LAND FILL
जिलाधीश कार्यालय (उत्तरी जिला)

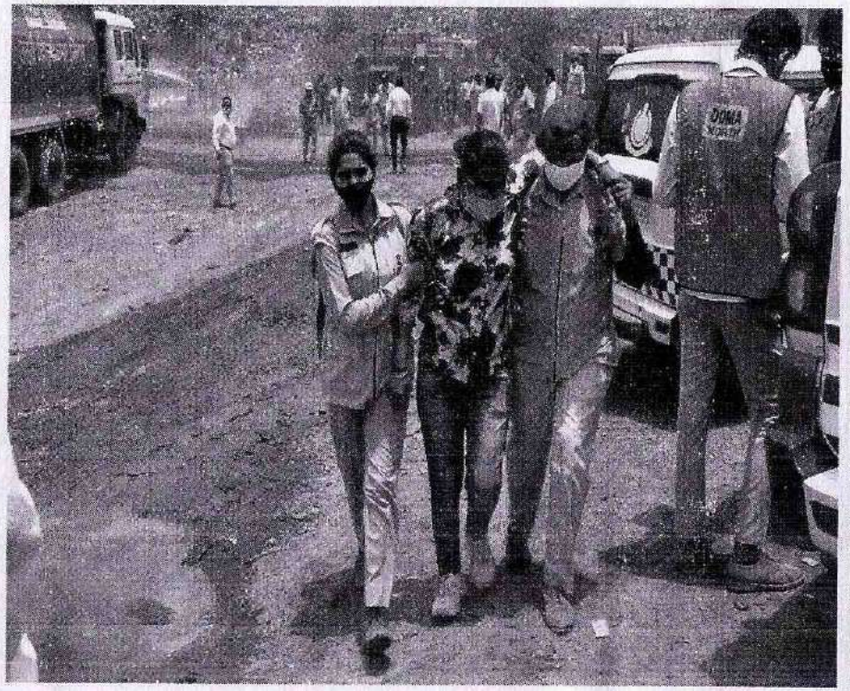

RELIEF POST / FIRST AID

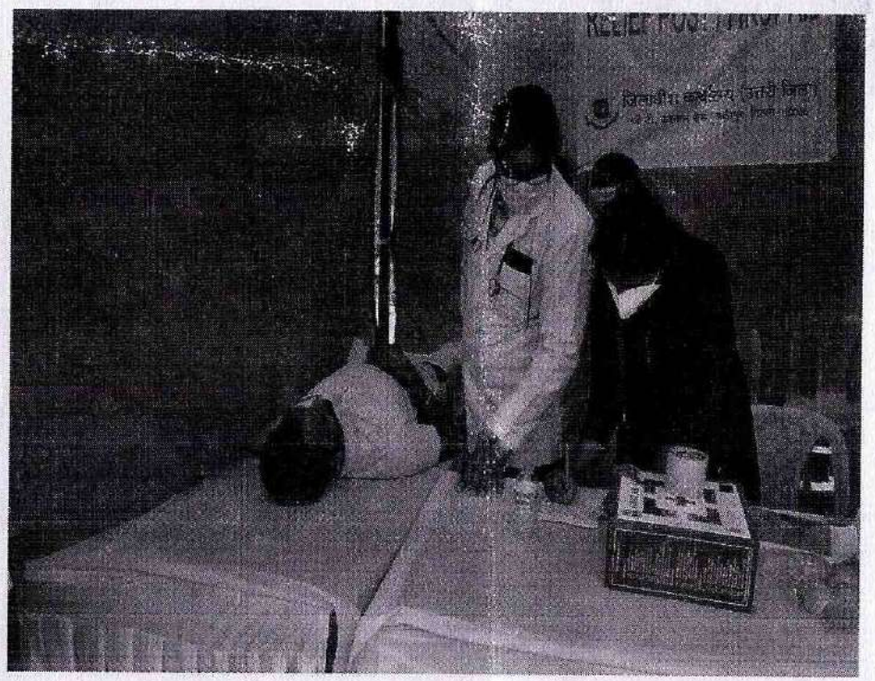












Upgrading the Work of Waste-pickers at Bhalswa landfill

Results from a Participatory Research

chintan
environmental research and action group

Chintan Environmental Research and Action Group

June 2022

Contents

Acknowledgement

We would like to extend our gratitude to all those who have helped in completing this research successfully. We are grateful to the members of Safai Sena Welfare Foundation who mobilized the waste-pickers for the survey. We are grateful to everyone in Chintan who contributed to the successful completion of this research report.

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About Chintan Environmental Research and Action Group
Chintan reduces waste and consumption, manages solid and electronic waste and advocates around materials, waste and consumption. It uses waste as a tool to fight poverty, child labor, gender-based violence, exclusion and climate change, while creating green livelihoods. Chintan pushes back and combats unsustainable consumption. Its work directly supports the UN's Sustainable Development Goals 1, 2, 3, 4, 5, 6, 11, 12, 13, 14, 17.

1. Background

The waste management value chain in India, has currently been unable to formally integrate informal waste-pickers. The country generates about 62 million tonnes of waste annually of which only 68% is collected, of which only 28% is treated by municipalities and only 19% of the total waste is scientifically treated. It means that 80% of the waste generated ends up on dumpsites.[1] Considering these statistics, waste-pickers working on landfills perform the herculean task of recycling the waste that the formal waste management system is currently unable to manage. Waste-pickers working on the landfills are performing the herculean task of recycling the waste that is cast off by those legally liable for its management.

A waste-picker is defined in the Solid Waste Management Rules,2016 as "a person of groups of persons informally engaged in collection and recovery of reusable and recyclable solid waste from the source of waste generation for sale to recyclers directly or through intermediaries to earn their livelihood." The Rules also task Urban Local Bodies (ULBs) to engage waste-pickers and provide infrastructure and operations for waste management, among other tasks.

Integrating waste-pickers- which includes providing them with identity cards, spaces to work with waste, social security, protective gear etc.-can ensure that the waste in our cities is managed successfully. Building capacities for government bodies to successfully run decentralized waste management models also includes integrating the human resource for it- waste-pickers- such that goals are aligned and achieved together.

In this regard, Chintan Environmental Research and Action Group has worked closely with government bodies to integrate waste-pickers into formal waste management process. The survey discussed in this report is a first step to provide an overview to the North Delhi district administration of the status of informal waste-pickers in Bhalswa. This includes:

1. Demographic Profile of the Waste-pickers
2. Nature of Work on the Landfill
3. Working Conditions and Challenges Faced While Working on the Landfills
4. Solutions to improve working conditions as suggested by Waste-pickers
   The survey is meant to be a document to guide the district administration and local bodies to recognize the key issues and aspects highlighted by informal waste-pickers working on the landfill as the process to integrate them into the formal waste management system is initiated.

[1] file:///C:/Users/admin/Downloads/http___cdn.cseindia.org_attachments_0.41932700_1626066244_integration-of-informal-sector-in-solid-waste-management-report.pdf

2. Methodology

A mixed methodology was identified and adopted for the study to assess the status of informal waste-pickers working on the Bhalswa landfill. A survey was created to be conducted with waste-pickers working on the Bhalswa landfill and covered their demographic details, status of access to social security, nature of work and challenges faced and suggestions for the district administration to improve their working conditions.

Prior to the survey, the objective and purpose of the survey was communicated to waste-pickers, and maximum participation was encouraged. A total of 308 informal waste-pickers working on the landfill were surveyed and purposive sampling was undertaken to ensure that only one adult participant from each household was interviewed. This was done to ensure maximum representation.

Gender	Number of Respondents
Female	170
Male	136
Prefer not to say	2
Total	308

The location of the survey was in Bhalswa. Three locations at and around the landfill were identified: Bhalswa Dairy, Murgi Farm and Kabaddi Gali.

The survey was paper-based and conducted by trained field personnel from Chintan, and data entry was done simultaneously.

Apart from this, a community consultation of 65 waste-pickers was conducted to triangulate data and understand the attitudes, perceptions and conditions of work and living of waste-pickers with regard to their occupation and daily work at the landfill.

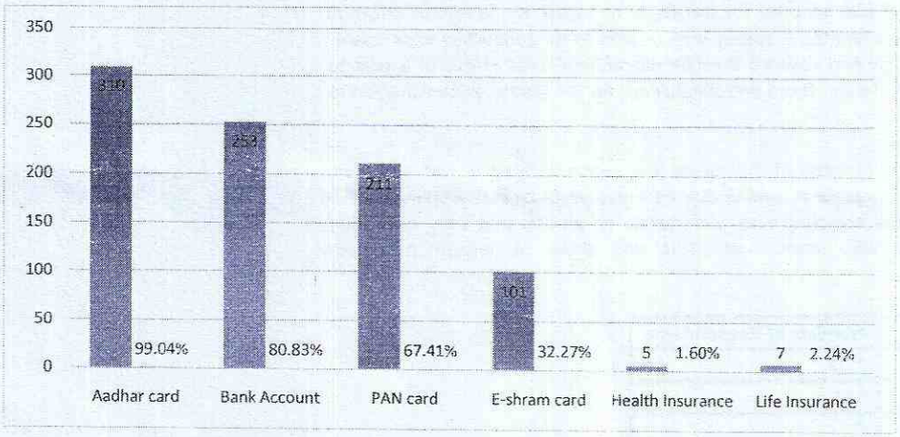
3. Report Findings

3.1.Profile of the waste-pickers working at the Bhalswa Landfill

Delhi has the second highest population of inter-state migration in India. The survey suggests that most of the waste-pickers working in the Bhalswa landfill are migrants with their home states being Bihar, Haryana, Rajasthan, Uttar Pradesh, Uttarakhand, and West Bengal. The survey conducted suggests that about 73 percent of the respondents have been residents of Delhi for about 11-40 years, 25 percent below 11 years and 2 percent above 40 years. This indicates that most waste-pickers surveyed are familiar with Delhi and its waste landscape and are and can continue to be key in reducing waste in the city.

About 99 percent waste-pickers had Aadhar cards, 80.8 percent had bank account, 67 percent had PAN card, 32 percent had e-Shram, 2 percent had life insurance and 1.6 percent had health insurance (Figure 1). As almost all waste-pickers surveyed have Aadhar Cards, it won't be a time-consuming process for the administration to formally verify and integrate them into the formal system of waste management.

Figure 1 Percentage of waste-pickers having government issued documents and social security



The survey revealed that 68% of the waste-pickers working at the landfill are between the age group of 18 to 39 and 27% between the age 40-60 (Table 2). Waste-pickers working below the age of 18 and above 60 were 2 percent each. It was found that even minors accompany their parents for working in the landfill and get involved in the picking waste. Two important takeaways from these data points are that the majority of waste-pickers on the landfill are from a very productive age group- who look for secure jobs with steady incomes. Integrating them into the formal waste management system will act as an incentive to earn an income and not engage in counter-productive activities. Further, it will also increase the ratio of employed youth in India. Another important aspect that comes out is that there needs to be a mix of supervision and supportive policy to ensure children are not illegally involved in the labour of waste picking and can go to schools. This becomes even more essential given the low rates of literacy within the waste picking community. Of the waste-pickers surveyed, 75% were not literate. (Table 1).

Comment [SS1]: For Bharati: I want to say this because the repeated concern is drugs and violence in the community which was raised by the district administration. I want to basically say that integration can help divert them from this to working and earning steady incomes. Is there a better way to say it?

Table 1 Educational qualification of wastepickers working at the landfill

Education Level	No. of waste-pickers
Not literate	231
Primary school	45
Secondary school	26
High school	6

Table 2 Age of the waste-pickers working at the Landfill

Age (in years)	No. of waste-pickers
15 to 17	5
18 to 24	53
25 to 39	158
40 to 60	85
60 +	7

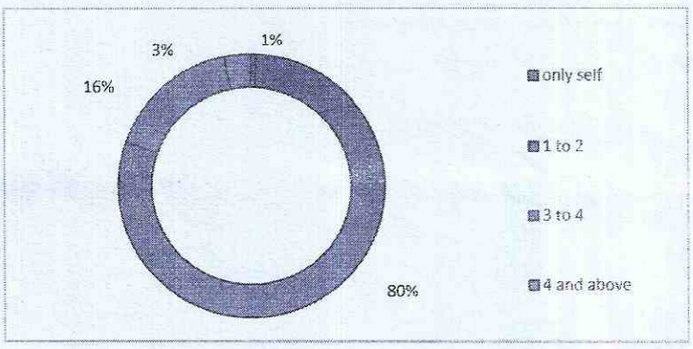
Figure 2 graphically depicts that 53.25% of the respondents have been working in the Bhalswa landfill for over 10 years. This implies that integrating these waste-pickers would be only add to efficient waste management in the landfill as they have several years of experience doing waste work on the landfill.

Figure 2 Years of picking waste in Bhalswa Landfill

As the sampling was purposive, only one waste-picker per household was interviewed, Figure 3suggeststhat 246out of the 308 respondents (80%) had one or two family members picking waste from landfill, 50 waste-pickers had 3 to 4 family members working at the landfill and 10 respondents had 5 or more family members picking waste.

Further, analysis of earning members in the family suggests that 76 percent of the waste-pickers have only 1 or 2 earning members in the family. Respondents were asked if they engage in any other activity for income generation. The data highlighted that 96 percent of respondents depend on waste picking as their sole occupation and income generation for their livelihood. This only adds to the need to integrate them into the system at the earliest, to provide them financial security and a steady income.

Figure 3 Number of members from the family working at the landfill



3.2. Nature of Work

Waste-pickers are considered informal workers, i.e., their work is not 'registered, regulated or protected by the existing legal framework.[2]The informality of labor in the urban waste management economy fails to account the contribution of waste-pickers in the circular economy.
During the community consultation, a female waste-picker said, "We pick up waste which can be recycled. If we do not work, all the garbage would get accumulated... There would be infections and new viruses and it can cause problems for everyone."

3.2.1 Materials recovered from the landfill

The respondents said that on an average work day of up to 12 hours, they pick about 20-25kgs of waste materials per day. Figure 4 showcases that 99.8 percent of waste-pickers collect plastics, 96 percent collect metals, 87.6 percent collect glass, 76 percent respondents collect paper waste followed by e-waste, cardboard, food waste and 12.6 percent pick cloth from the landfill.

On an average a waste-picker picks 5-6 kgs of food waste everyday i.e., roti and bread which is used to feed cows at Bhalswa dairy.

The type of plastic picked from the landfill are mentioned in figure 5 which include PET, tetra pack, farra plastic, MLP and HM.
Figure 4 Percentage of waste-pickers by the type of waste they pick up

[2]https://www.ilo.org/global/topics/wages/minimum-wages/beneficiaries/WCMS_436492/lang--en/index.htm

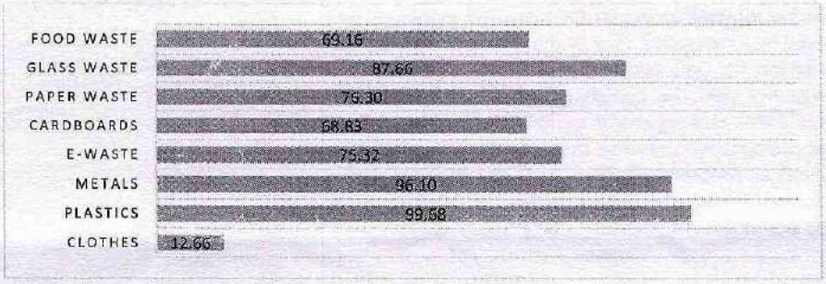
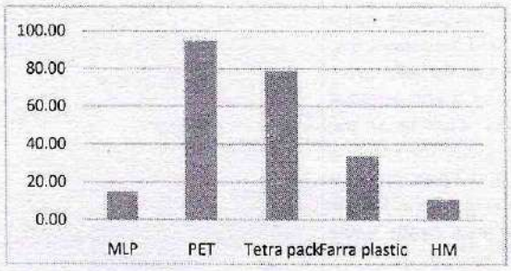


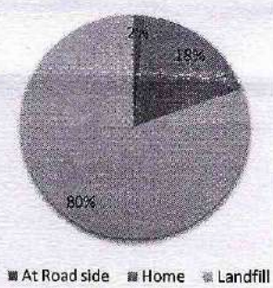
Figure 5 Percentage of waste-pickers by the Type of Plastics they pick up



3.2.2 Landfill as a space for segregation and storage

Not only do the respondents pick waste in the landfill but are also segregate materials at the landfill. This means that the landfill is also used as a space for segregation of waste before bringing it down from the landfill or selling it.43 percent respondents complained of having no space of storage for collected waste materials.

Figure 6 Space used for segregation of waste



The Space for Waste survey conducted by Chintan in 2021 revealed that wastepickers working in the Bhalswa landfill work in an area ranging from 2sq ft to 12 sq ft. In the current survey, about 80 percent of the respondents said that they use the landfill as a space to segregate the materials (Figure 6). The respondents said they bring it down to segregate at home or sort out waste at the roadside. The landfill and home are also used as a space for storage of waste. What this indicates is the lack of space or infrastructure provided by the government administration for bulk of waste-pickers to carry out work that reduces the city's waste. Safe and sheltered space for work is crucial for efficient (and humane) waste management.

3.2.3 Employment Status

The survey revealed that 99% of the wastepicker working at the landfill were self employed and working for themselves. Only 1% were employed by a contractor. Four of the wastepickers who had contractual work had no contract or employment ID. Only one respondent said that he was a salaried employee but reported that he was not paid the complete amount due to him as intermediaries withheld money. On being asked if they also engaged in other waste work apart from picking waste at the landfill, 97 percent of the respondents confirmed that they solely depended on working on the landfill. This indicates that almost all wastepickers do not have any alternate places where they engage in waste related work , work informally and without any private or government contracters and are not a part of the organized workforce.

3.2.4 Working hours

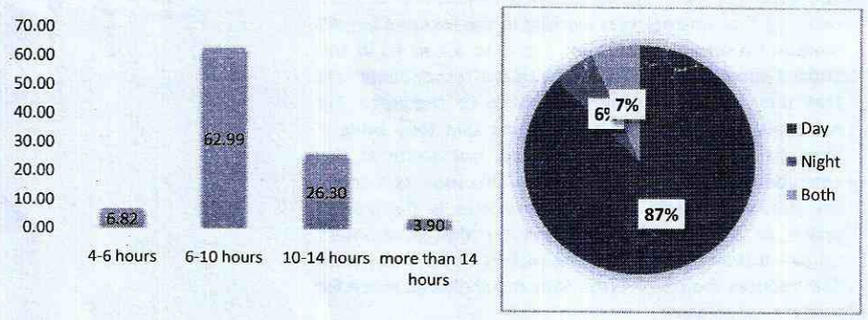
Table 3 Work timing of the respondents

Time	Start time	End time
00:00-2:00	0	3
2:00-4:00	1	10
4:00-6:00	45	67
6:00-8:00	130	14
8:00-12:00	3	0
12:00-14:00	1	0
14:00- 16:00	2	22
16:00-18:00	2	110
18:00- 20:00	1	62
20:00-22:00	117	3
22:00-23:59	1	12
Didn't disclose	5	5

On being asked about the hours spent in picking waste at the landfill (figure 7), 63 percent said they spent 6 to 10 hours at the landfill, 26 percent said to have spent 10 to 14 hours, 7 percent spent 4 to 6 and about 4 percent spent more than 14 hours working at the landfill. Further, 87 percent wastepickers work during the day, 6 percent during the night and 7 percent work day and night both. The ones working at the landfill during the night tied a torch on their heads while working with the waste.

Table 3 shows the work timings of the respondents. The work time for 130 respondents begins between 6:00am to 8:00amand for 117 respondants begings between 8:00pm to 10:00pm. The working hours for110 respondents ends at 4:00pm to 6:00pm and for 67 respondents it ends between4:00-6:00am in the morning.

Figure 7 Hours spent in picking waste at the landfill

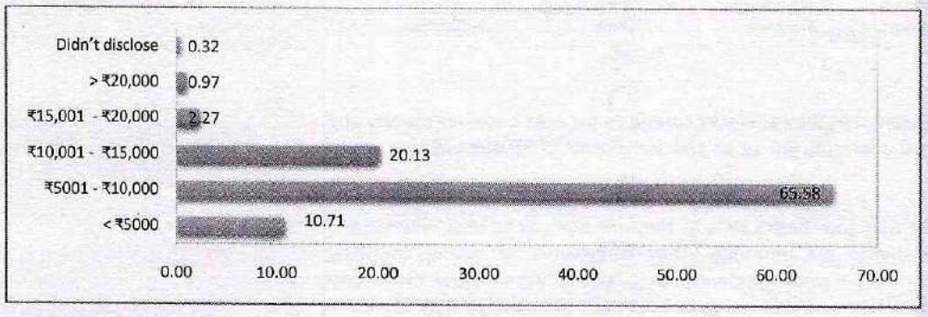


3.2.5. Income

63 percent waste-pickers said that they sell waste daily after collecting and segregating at the landfill, 3 percent sell waste weekly, 10 percent sell twice or thrice a month and 21 percent sell waste monthly. Respondent were asked their minimum and maximum income earned in a day in the previous month which ranged from INR 50-600 and INR 70-5000 respectively.

Respondents earning less than INR 5000 monthly are 11 percent, 66 percent earned between INR 5000-10000. As shown in figure 8, 20 percent respondents earn INR 10,000 to 15,000 and about 3 percent earned more than INR 15000.The respondents said that they had in sufficient income and are often in debt.

Figure 8 Monthly income via waste



3.3 Working Conditions of waste-pickers in Bhalswa

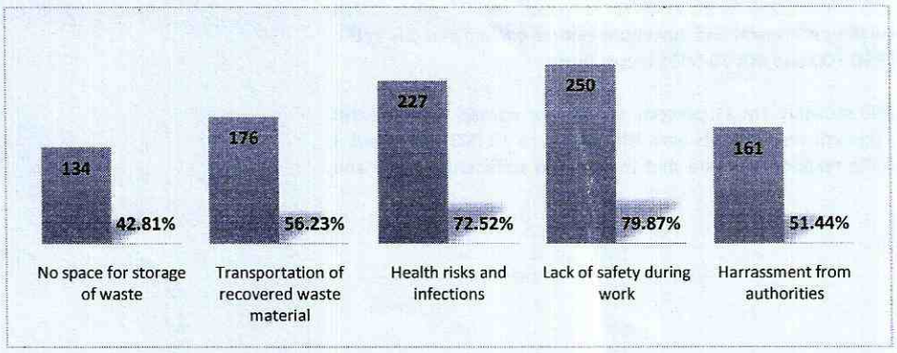
3.3.1 Health and Safety of waste-pickers

80 percent waste-pickers said they faced occupational injuries while working at the landfill (figure 9). During the community consultation and, it was found that risks occur at every stage in the process in working on the landfill. Though the waste-pickers use *Sangdi*, a shovel like tool for waste, they often have cuts on their hand, finger, thumb, and foot due to broken glasses and needles found in waste. Many complained of having eye problems caused due to the dust from the vehicles running at the landfill or smoke from toxic gas or landfill fires.

There are accidents caused by the vehicles bringing waste to the landfill, as many times when the garbage truck comes people surround it to collect more amounts of waste. They said, "We think we can earn more, so we put our lives at risk. The truck also gets stuck while disposing waste, so it has to use speed to move forward. Sometimes people don't realize and come under the wheels or get run over."

The accumulation of waste causes odour, air and water pollution, explosions, and fires especially during summer. The waste-pickers complained of extreme heat and lack of any form of shelter forcing workers to work under the sun. They often fall sick, and their lunch gets spoiled. They put a makeshift tent for shade when taking breaks for working. Currently, there's no provision for shelter or rest or safekeeping of waste collected or segregated.

Figure 9 Challenges while working with waste in the landfill



During monsoon, the respondents said that they are more careful as the area becomes marshy and slippery. Many people slip down the landfill, get stuck and are victims of landfill collapse which causes moderate to severe injury.

73 percent waste-pickers said that they face health risks as they are exposed to toxic, allergic and infectious substances especially during the monsoon. They complained of having breathing difficulties due to excess smoke during the landfill fire and feeling faint during excessive heat. Most of the respondents said they or their family members do not have sound health as they work in a toxic atmosphere on the landfill. The respondents also had the fear of getting bitten by stray animals such as dogs, pigs, etc and recommended availability of first aid at the landfill.

A consistent danger that waste-pickers face when working with waste, and especially on landfills is to their health. This may be in form of injuries from external factors like animal bites or landfill collapses, or in terms of diseases and long-term health impacts when working with toxins. One solution comes from providing safe and hygienic spaces to work, and the other is to ensure that they are provided with protective gear (masks, gloves etc.), when working on the landfill.

3.3.2Harassmentfrom Authorities

51 percent respondents said that they were harassed by the MCD workers or official representatives while working at the landfill (figure 9). The respondents hired as laborers to segregate metals from trommel machines said were paying bribes to the contractor out of their income. As mentioned above in 3.2.3 they also complained of middlemen cutting their salaries and paying them as a daily wage laborer.

The respondents said that they had restricted authorization for entry at the landfill and are denied entry many times. The respondents in the focused group discussion said that often the MCD workers or drivers come with waste disposal truck and take away all the recovery materials, selling it for their own profit and harass the waste-pickers.

Any intervention would then require that intermediaries and private players are eliminated as far as possible. Further as waste-pickers are integrated, their roles and jurisdiction must be delineated viz. a. viz the role of MCD workers to ensure security of lucrative wastes which provide income to waste-pickers and to avoid overlaps.

A respondent said, "the people who come with garbage trucks take out the good waste and sell it for their own profit leaving barely anything for us." The respondents said that they have never faced abuse or misbehavior from MCD workers at the landfill.

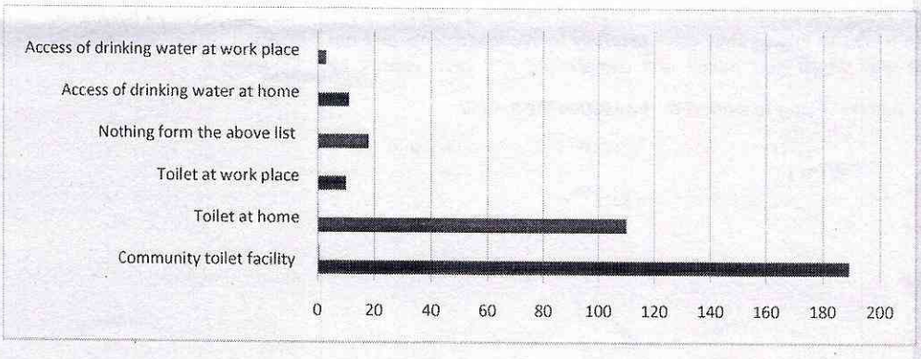
3.3.3. Transportation of recovered waste material and storage

56 percent respondents said that they have difficulty transporting collected materials from the land fill. During the focused group discussion, respondents stated that either they pay the drivers to bring down the waste, carry it on their back or throw bundled waste down the land fill. As mentioned in 3.2.2, the safekeeping of collected or segregated waste materials was a challenge.
This indicates lack of transportation facility for waste-pickers to carry recovered waste down the landfill. An efficient system of waste management also incorporates easy transportation of waste. Intervention in this aspect becomes even more important as landfills are elevated and hazardous sites to work at.

3.3.4Access to water and Sanitation

The survey brought out that 60 percent of respondents use community toilets and 35 percent had toilet facility at home (figure 10). Only 3 percent of the respondents said to have access to clean drinking water at home and 6 percent had no access to water and sanitation facility at home or work. During the community consultation, the respondents said that the water coming from the pipeline is extremely dirty and brownish in colour that it is impossible to use it for drinking purposes. They said that they buy drinking water every day. As homes are also spaces of work for many of the respondents, drinking water facilities at home and at the landfill was brought out as the major challenge during work. Respondents said that they carry 15litres of bottled water on their back each day and it becomes very difficult for them to climb the landfill and it's a half an hour walk. The solution that they put forth was availability of drinking water at the landfill. They said there are pipes to sprinkle water at the landfill for extreme dust, but it doesn't function all the time.

Figure 10 Availability of water and sanitation facilities



3.3.5Stigma attached to work and lack of social security

As mentioned in 3.1, figure 1about 99 percent waste-pickers have Aadhar cards, 80.8 percent had bank account, 67 percent had pan card and 32 percent have e-shram. Only 2% had life and 1.6% had health insurance. About 4 percent of the respondents said to have pension scheme in their family. There is lack of access to government schemes, pension or insurance and no job security.

The respondents said to have no affordable health care system or facilities for their health treatment. They said that the government hospitals in Bhalswa never treat them well, so they prefer going to private hospitals. Respondents in the focused group discussion said, "We are discriminated because of our work, our poor back grounds, and the language we speak. When they ask us our address and we say we are from Kabadi gali, they call us Bihari or Bengali and don't let us in."

3.4 Solutions from the waste-picker community at Bhalswa

The respondents were asked to provide suggestions that could be implemented to improve their working conditions. The following responses were revealed:

1. Provision of occupational identification: Provision of occupational ID cards with documentation of waste-pickers for them to be authorized to work in the land fill and to have a job security.99 percent waste-pickers showed interest of working in the landfill with the municipality (figure 11).
2. Protection from harassment: Creation of policies for protection from harassment of waste-pickers.
3. Provision of health safety: Availability of first aid and treatment at the landfill. Safety gears such as gloves and shoes must be provided. Additionally, provisions to safeguard waste-pickers from animals at the landfill.
4. Provision of water and sanitation: Creating facilities for water and toilets in places of work, possibly even on or very close to landfills. Construction of new water pipeline for supply of water for the community and maintenance of old pipelines which are broken and allows for seepage of dirty water.
5. Provision of sheltered space for work: Creating storage spaces for waste and providing sheltered spaces for protection from extreme weather conditions.
6. Provisions to prevent landfill fires: Undertaking measures to avoid landfill fire such as planting trees and making water pipes available on the landfill.
7. Availability of electricity in the landfill for waste-pickers working during the night.
8. Provision of safe transport: Providing vehicles for the transportation of segregated waste. Training of drivers of waste trucks to ensure they drive carefully to avoid accidents and not flatten the wastes on the way which gets mixed and compressed and then cannot be recovered.

Figure 11 Percentage of waste-pickers willing to work with the MCD in the landfill

4. C onclusion and Recommendations

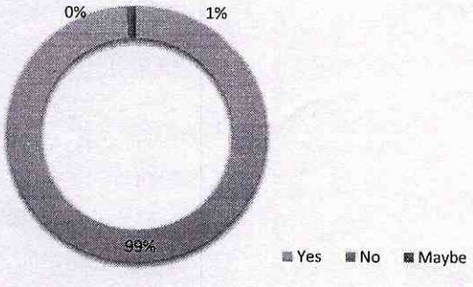
The key conclusions drawn from the findings are:

1. Waste picking at Bhalswa landfill is the sole source of income for most respondent waste-pickers with members of their family also involved in waste picking as a livelihood (3.2.5).75 percent have been residents of Delhi for more than 11 years and 77.6% have been picking waste for more than 5 years. Integrating them into the formal waste management will only lead to more efficiency in waste management in the landfill as they are experienced workers. 68 percent of the waste-pickers are from a very productive age group i.e.,18-39 years.

   Integrating waste-pickers and building capacity
   Solid Waste ManagementRules,2016 suggests waste-pickers should be integrated in the formal waste management and key to that is providing occupational identity cards.99 percent respondents mentioned that they had Aadhar cards. This can expedite and ease the process of providing occupational IDs to waste-pickers. Camps can be held to provide these cards post police verification and documentation. Capacities of the integrated waste-pickers can be built further by conducting workshops and training on waste.

2. The survey revealed that currently there is a lack of safe and sheltered space to work, or store recovered materials from the landfill. Waste-pickers not only pick waste from the landfill but use the space for segregation and storage of waste. As mentioned in 3.2.3, waste-pickers having no space for storage of waste is 43 percent. Providing facilities where they can work safely and be protected from extreme weather conditions, animals etc will upgrade their working conditions. Their working condition is such that they have no adequate water and sanitation facilities.

   Facility for work and storage of waste
   Providing a sheltered space at the bottom of the land fill with water and toilet facility will ensure waste pickers have space to wash their hands and feet post waste work. In the Space for waste survey, waste-pickers expressed that they require a space of 225 sq ft to 450 sq ft for their work. Cleaning of hands and feet with soap can prevent waste-pickers from infections and diseases borne out of waste. Drinking water and toilet facility can be functional from 6:30 a.m. to 6:30 pm on all days.



3. Informal waste-pickers lack protective equipment to keep safe from injury and diseases. Further protective gears like masks and gloves as well as uniforms will ensure protection from health impacts from toxins and diseases. The data reflects the hazardous conditions waste-pickers work in, apart from dealing with waste itself which is hazardous. Apart from providing first aid kits to waste-pickers and in spaces of work, it is also recommended that sensitization workshops are conducted with hospitals near the landfills for them to be aware of the health challenges and risks faced by waste-pickers and to address them effectively.

   Protective gear and equipments
   The survey showcases that more than 600 waste-pickers are working at the landfill, which includes the respondents and their family members. Once the waste-pickers are integrated through occupational id cards, safety gears such as first aid box, gloves, masks and shoes can be provided for safety and hygiene at work.

4. Waste-pickers face difficulties in transporting wastes from the landfills. Facilities of transit including permissions and identifications of vehicles to carry recovered material can be ensured.

5. Waste-pickers are often disproportionate victims of disasters like landfill fires and collapses. In recognizing their vulnerability, it is important to train them in disaster risk reduction and management to ensure minimal damage to life, property and incomes.

100 TPD Solid Waste Management Facility at Saligao (2016-2021)
PROCESS WRITE-UP

The Municipal Solid Waste (MSW) Processing Facility was divided into **Six (6)** Sections as described below:

1.0 Material Segregation & Recovery Facility (MSRF)

Municipal Solid Waste (MSW) was delivered, segregated, recovered, processed and stored for later use in Material Segregation & Recovery Facility (MSRF). The main function of the MSRF was recovery of recyclables and efficient segregation/processing of mixed waste into a feedstock for biological conversion or into a fuel source for the production of energy.

Mixed Municipal Solid Waste (MSW) collected in open trucks/compactors and delivered at the facility was taken to the Tipping Floor, housed in an enclosed Shed. The Shed was covered and had adequate height with proper arrangement for lighting and ventilation. The Tipping Floor area shall be provided with an Odor Control System comprising Centrifugal Fans, Air Ducting and Bio-filter to ensure that odorous gases are effectively sucked and adsorbed in the Bio-filter.

The main function of the MSRF was to segregate and recover maximum possible recyclables from the mixed waste such that they can be directly reused. Recyclable and sorted materials were baled and wrapped for reuse as per the Buyers'/Vendor's requirements. A part of the remaining waste left after sorting and recovering recyclables was shredded and/or compacted as Refuse Derived Fuel (RDF) and residual material which cannot be converted into RDF was taken to the Sanitary Landfill Cells.

Electronic waste (e-Waste) e.g. Phones, Printer Cartridges, Compact Discs etc.coming into the facility from households was sorted at the Tipping Floor/ Manual Sorting Station and taken to the e-Waste Storage Bin / Container from where it was disposed of suitably as per applicable statutory norms.

Hazardous waste e.g. Batteries, Bulbs/ Tube Lights etc. and Bio-medical waste, if received from households was stored and disposed as per applicable statutory norms. Main Units in this Section are as follows:

1. Tipping Floor

The waste, after weighing and visual inspection at Weighbridge Station, was unloaded on a Tipping Floor where waste was visually inspected and bulking and disturbing materials (big stones, metal scrap, wood, cadaver etc.) was sorted out manually or by Wheel Loader

2. **Infeed Hopper cum Chain Belt Conveyor and Bag Opening Shredder**

Mixed Municipal Solid Waste (MSW) from the Tipping Floor was loaded into the Infeed Hopper cum Chain Belt Conveyor with Wheel Loader / Skid Stir Loader. The purpose of the Infeed Hopper was to provide an adequate storage volume and automatically transfer the waste to the downstream Units. The Chain Belt Conveyor transferred the waste into the feed hopper of a Bag Opening Shredder which ensured 100% of the bags are opened. The contents from the opened bags dropped onto the downstream Conveyor leading to the Roller Screen.

3. **Roller Screen**

The Roller Screen provided the first level of screening to screen out several types of material that were difficult to screen effectively. It had a screen deck of 80 mm opening. The underflow fraction having size <80 mm was conveyed to the Organic Extrusion Press while the overflow fraction having size >80 mm was conveyed to the Manual Sorting Station. A separate Infeed Hopper with Trough Conveyor provided after the Roller Screen to directly feed pre-sorted material, if any, to the Manual Sorting Conveyor for further sorting.

4. **Manual Sorting Station**

The Manual Sorting Station was in form of elevated structure with Handpicking Stations located at both sides of the Sorting Conveyor to remove valuable items like Glass, Metals, Wood, Paper, Plastic, Rubber and Textile etc. by handpicking. Glass and Metals were handpicked and stored into Bins / Containers placed besides the dedicated Handpicking Stations whereas all other recyclables were handpicked and thrown through the Chutes into the Compartments located beneath the Chutes by the sorting personnel. Materials which cannot be baled were collected / stored into Bins / Containers whereas all other recyclables that could be baled were pushed by Wheel Loader / Skid Steer Loader onto the under-floor Chain Belt Conveyor, on which they were transported to the Baler.

5. **Baler with Wrapping Unit**

Sorted recyclables that could be baled were pushed by Wheel Loader / Skid Steer Loader onto the under-floor Chain Belt Conveyor, on which they were transported to the Baler and baled. The bales were wrapped, if required, in a Wrapping Unit and then stored in Containers for further transportation to the recycling Vendors / Buyers.

6. Shredder

A Shredder was provided to shred the overflow from Roller Screen as well as sorted recyclables so as to meet the requirement of prospective recycling Vendors /Buyers.

7. Organic Extrusion Press

The underflow from Roller Screen was conveyed to the Organic Extrusion Press. The hydraulically operated Organic Extrusion Press separated the waste into two fractions – an organic wet fraction and an inorganic dry fraction. It squeezed out the waste through an extrusion matrix at a very high pressure. The mainly wet organic substances thereby, squeezed out to form the waste fraction and transferred to the Wet Fraction Processing Line for production of Biogas as well Compost whereas the residue referred to as the dry fraction was conveyed to the Dry Fraction Processing Line for recovery of RDF.

2.0 Dry Fraction Processing Line

The dry fraction from the Organic Extrusion Press was conveyed onto a Wave Screen. The fraction which is < 15 mm shall be collected and disposed to the Sanitary Landfill Cells. The 10 – 300 mm fraction was passed to a Windsifter, where it was separated into heavy and light fractions. The combustible materials that can be used as RDF was blown upward as the light weight fraction and materials which cannot be used remain in the heavy fraction. The light weight fraction was transported to the Baler whereas heavy fraction was collected and sent to the Sanitary Landfill Cells.

3.0 Wet Fraction Processing Line

The wet fraction from the Organic Extrusion Presses was taken to the Bio-methanation System wherein organic substance were digested inside Fermenters and biogas as well as digestate was produced. The biogas was fed to the Biogas based Power Plant to generate electricity and waste heat. The electricity was utilized to run the Plant whereas waste heat is utilized to maintain thermophilic environment inside the Fermenters. The digestate was fed to the Sludge Dewatering Units for solid-liquid separation. The solids (dewatered sludge) was sent to In-vessel Composting Drums whereas liquid (centrate) was sent to the Effluent Treatment Plant for further treatment. Main Units in this Section are as follows:

1. Bio-methanation System

The wet fraction from the Organic Extrusion Presses was taken to the Bio-methanation Fermenters having Mixing System, Grit Removal System, Heating System and Biogas Extraction system. A thermophilic temperature range (i.e. 55 degree Celsius) was maintained inside Fermenters. During methanization process, the biogas was produced which was extracted and stored into Biogas Holders. After a residence time of 14 days, the digestate substrate was conveyed to the Sludge Dewatering System.

2. Sludge Dewatering System

The digested substrate was separated into solids (dewatered sludge) and liquid (centrate) phases in Sludge Dewatering System. The dewatered sludge was then transported to the In-Vessel Composting Drums whereas the centrate was sent to the Effluent Treatment Plant for further treatment before disposal.

4.0 Composting Line

The dewatered sludge from Sludge Dewatering System was transferred to the In-vessel Composting Drums. The bulking materials e.g. saw dust, wood chips etc. were added to improve moisture content, C:N ratio and bulk density of the feedstock and therefore to improve composting efficiency. The Drums were rotating continuously and the decomposition would take place in an accelerated manner within 4 – 6 days' residence time.

After In-vessel Composting Drums, the compost was further stored for a period of minimum 14 days in a Shed. Afterwards, the compost was screened to separate bulking materials using Star Screen of 10 – 30 mm screening capacity. The large sized fraction (>30 mm), basically the bulking material was separated here and recycled to be added with the dewatered sludge to prepare feedstock for the In-vessel Composting Drums whereas the finer fraction (<10 mm) was bagged in a Bagging Machine and stored for further sale as per requirement.

5.0 Biogas Genset based Power Plant

The fermentation of organic residues in an anaerobic atmosphere in the Bio-methanation Fermenters generated biogas, 50% – 70% of which was methane. The biogas was stored in double membrane type Biogas Holders. This biogas was cleaned for removal of H_2S and moisture to suit the operation of Biogas Gensets /Micro Turbines for generation of electricity. Electricity generated was utilized to run the entire processing facility including various auxiliaries of Biogas Gensets. A part of thermal energy (waste heat) generated was used for heating the contents of the Fermenters and excess heat was exhausted.

6.0 Sanitary Landfill

The dry fraction (< 15 mm) screened out from Wave Screen, heavy fraction separated out from Windsifter, the residue from Manual Sorting Station which cannot be converted into RFD and other inert residue which is generated during the processing of the waste was collected, transported in Wheel Loaders / Tipper Trucks to the designated Landfill Cells and landfilled. ***The landfilling of the organic waste is not be permitted and no organic fraction is to be disposed in the Landfill***.

The Landfill Cells were constructed as per **The Municipal Solid Wastes (Management and Handling) Rules, 2000 by Ministry of Environment and**

Forests. Adequate access and approach was provided along the Landfill Cells for easy transport and landfilling operation.

Landfilled material was weighed daily on the Weighbridge prior to disposal into Landfill Cells and date was logged.

PROCESS DESCRIPTION OF THE 250 TPD EXPANSION OF SOLID WASTE MANAGEMENT FACILITY (Dec 2021 onwards)

1.1 Quantity of Input Waste:

Table 1: Enhanced Plant Capacity Design Basis

Sr. No.	Design Basis	Plant Capacity (TPD)	Maximum Variation (%)	Maximum Waste handling capacity * (TPD)	Type of waste
1	Present Condition *(as per NIT)*	100	+25%	125	Initially – Mixed Present- Segregated
2	Enhanced Design Condition	250	+20%	300	Segregated
a	Dry Waste	100	+20%	120	less than 10% Bio-degradable fraction
b	Wet Waste	150	+20%	180	less than 10% Non- biodegradable fraction

Note:

1. The *maximum waste handling capacity (300 TPD) indicates waste which can be handled in the plant on a temporary basis and not as a regular practice, as the duration in

which this extra capacity can be handled in the plant is for maintenance and cleaning of the equipment.

2. Based on the present experience of last 5 years, the quantity of recyclables is less, and the quality is poor, as most of the recyclables are recovered during primary collection of the waste, hence the type of recyclable fractions which is sorted may vary based on actual condition of the incoming waste received at the plant.
3. Overall enhanced capacity of the plant is 250 TPD. Further other fraction like "mulched / tree waste "is part of wet waste as this stream quantum coming separately to the plant is less than 1%.
4. Based on the past few years of operational experience, wet waste contains large quantum of beach sand, which creates wear & tear of the processing equipment's. Preferably, the waste receipt at plant shall have minimum contamination of sand and in case the contamination is high, such waste shall be rejected at the plant.
5. Hazardous waste, Slaughter waste, construction debris or bio-medical waste shall not be mixed with the municipal solid waste or received at SWM Facility.
6. All Waste shall be brought in authorized closed trucks only, with wet waste carrying trucks to have leachate collection system. The transportation of waste from the source to the plant is not in the scope of the concessionaire and in case any unauthorized trucks are received at the plant the same shall be rejected and shall be informed to GWMC. List of trucks who are violating such requirement, shall be provided to GWMC.
7. In case the above conditions are exceeded, HWTPL will highlight the discrepancy to GWMC. Variation in the performance criteria, over the designed basis is expected in case the design condition is not met.

Table 3: Design Capacity of the Enhanced Treatment plant

Sr. No.	Description	Unit	Value
1	**Dry waste**		
a	Maximum Quantity of Dry Waste processed in a day	TPD	100
b	No. of Operating shifts per day	No.	2
c	No. of Operating Hours per shift	No.	6
d	No. of Operating hours per day= (B) x (C)	Hr./day	12
e	Design capacity of Dry line required = (A) ÷ (D)	TPH	100/12 = 8.5

f	Capacity of Dry line provided	TPH	9.0
2	**Wet waste**		
a	Maximum Quantity of Wet Waste processed in a day	TPD	150
b	No. of Operating shifts per day	No.	2
c	No. of Operating Hours per shift	No.	6
d	No. of Operating hours per day= (B) x (C)	Hr./day	12
e	Design capacity of Wet line required = (A) ÷ (D)	TPH	150/12 = 12.5
f	Capacity of Wet line provided	TPH	13.0

Note:

1. The treatment capacity of each of the above lines (dry and wet) is based on total enhanced capacity. Size and selection of the additional equipment shall be provided keeping in mind capacity of existing similar functionality equipment.
2. The incoming waste quantity from the costal belt region, to certain extended is likely to be mixed waste, however even for mixed waste the existing secondary organic waste feed bunker followed Organic Extrusion Press and its subsequent treatment units are used.

1. CHAPTER – Integrated Treatment Philosophy

Integrated Treatment Philosophy

i. Segregated lines for treatment for wet and dry waste

The MSW treatment plant is mainly receiving two types of waste streams,

1._ Segregated Dry waste

2._ Segregated Wet waste

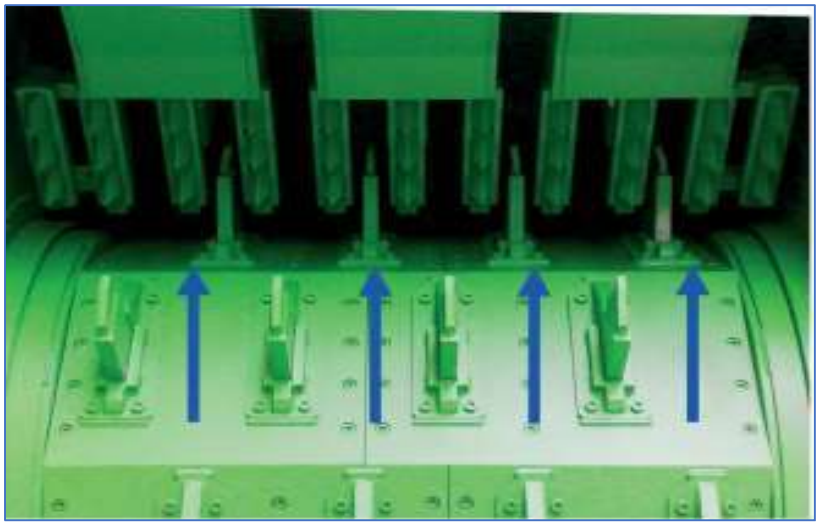
Small quantum of mixed waste and tree waste is also received. The tree waste is shredded and mixed with compost. Hence complete separate treatment lines have been implemented for dry and wet waste.

1. Segregated Dry line treatment line

The Material Recovery Shed (MRS) is used only for treating dry segregated waste and a new shed with tipping bunker arrangement is provided for treatment of the wet waste. The sorting line is augmented with a new infeed bunker, bag opener, wind sifter, conveyors to handle the dry excess waste capacity.

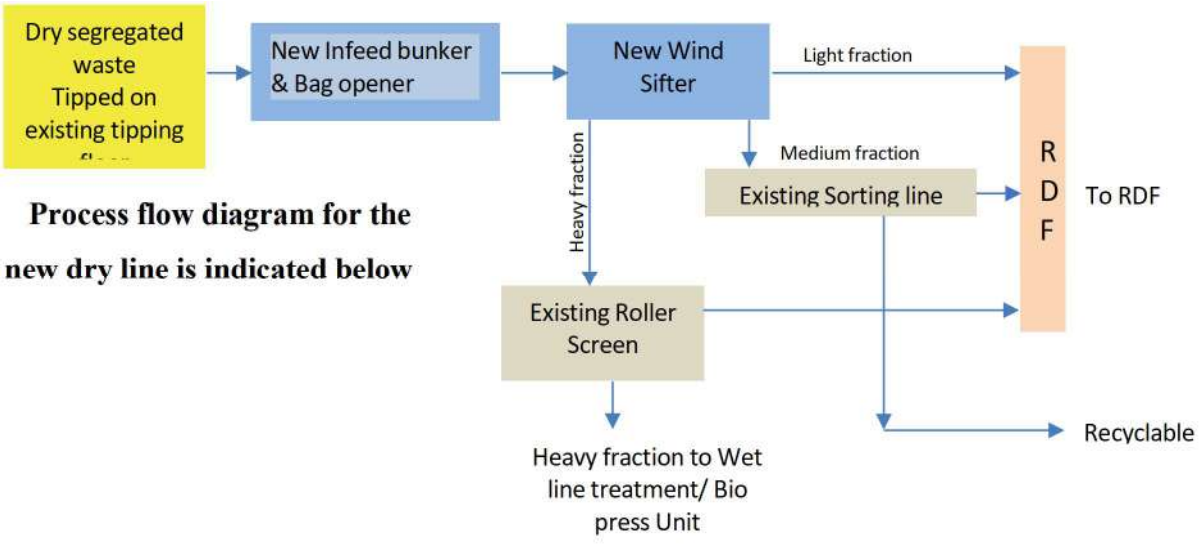
- **New Infeed bunker and bag opener with oversized film remover**

A front-end loader is used to load the input dry waste into the Infeed Bunker cum Bag Opener followed by Oversize Remover for removal of oversized plastics, fishing nets, etc. the bag opener opens the bags, and make the waste available for further wind sifting, sorting, and recovery of recyclables. The waste is then, taken to the wind sifter.



Picture 1: Infeed Bunker and Bag opener

Process flow diagram for the new dry line is indicated below



- **Wind sifter**

  Wind Sifter separates the super light, medium and heavy fractions with the use of air stream. The separation is based on the difference in density and size of the materials. The air stream is created by fans and air nozzles whereas the splitter drum provides the separation between light and heavy fractions. The light material is blown over the splitter drum and the heavy materials fall through the air flow or hot the drum and fall.

  Wind Sifter separates into three fractions – heavy, medium, and light.

  The heavy fraction is primarily organic fraction or wet waste and contaminated dry fraction such as food waste packets, leather articles, and glass bottles etc. These fractions are conveyed to the existing roller screen for further screening and the over fraction of screen is conveyed to manual sorting station and under fraction of the screen is sent to bio-press extraction unit.

  The medium fraction comprising mainly recylables are conveyed to the existing manual sorting station for sorting of recyclables.

  The light fraction comprising low film plastics, Styrofoam, thermo-coal multi-layer plastic bags etc. is taken to the RDF Storage Area.

Picture 2: Wind sifter

Picture 3: Existing roller Screen

Picture 4: Existing Sorting Station

2. **<u>Separate Wet line treatment shed with infeed bunkers</u>**

   A separate wet waste treatment shed is provided to receive the incoming wet waste. This shed is enclosed and has its own ventilation and lighting system. The wet waste received at the plant is unloaded in 2 nos. of in-feed bunkers with multiple screw conveyors, so that no leachate falls on the ground and keeps the shed neat and clean. The multiple screws inside the bunker shall open the bags, homogenize the content, and feed the same into a bio-press.

- **Organic Extruder System based on low pressure organic extruder :**

  The wet waste along with under fraction of the fraction from the existing roller screen is conveyed to the bio-press based extraction unit for extraction of the organic pulp. This unit has a screw mechanism with a screen and uses recycled water for dilution and extraction of the organic pulp. As the pulp is screened out of a fine screen, plastics, rags, cloth are eliminated from the wet pulp going to the fermenters. By diluting the pulp to 10-12% concentration, a hydro cyclone is effective in removing grit prior to feed into the

fermenters. By using this unit along with hydro-cyclones both the above issues are resolved.

This unit extracts the organic fraction in form of pulp for feed to the fermenter/digester and a reject fraction comprising cellulosic fibrous material along with 10-20% plastic, cloth, bags etc. disturbing material. Recycled water is used here to dilute the pulp to 10-12% solids concentration. The inorganic reject fraction is taken into a wind sifter for blowing out the lighter plastic fraction to get a cleaner cellulosic fibrous material can be converted into clean compost. The reject plastic, paper, cloth etc. be taken to the RDF storage area. The wet pulp (liquid substrate) is pumped to the hydro cyclone for removal of sand/grit, prior to feeding the same to the anaerobic digesters. Dilution to 10-12% shall ensure removal of heavy sand/grit in the hydro-cyclones

- **Reject Fraction from the Organic Extruder (SMICON)**

  The reject fraction from the Bio-press is taken into existing in-vessel composting drums wherein it is dried and converted into a compost post trommel screening.

- **Solar drying facility:**

  This extracted organic fraction in form of pulp is fed into 2 Nos. of new as well as existing digester/fermenter units for fermentation and generates biogas which is cleaned, scrubbed of H2S, and fed into Bio-Gas engines of 1200 KW capacity. The digested sludge is dewatered in a sludge dewatering unit, namely belt press and the dewatered solids are taken into solar compositing sheds for drying and composting of the dewatered sludge. 3.0 numbers of solar drying shed are provided

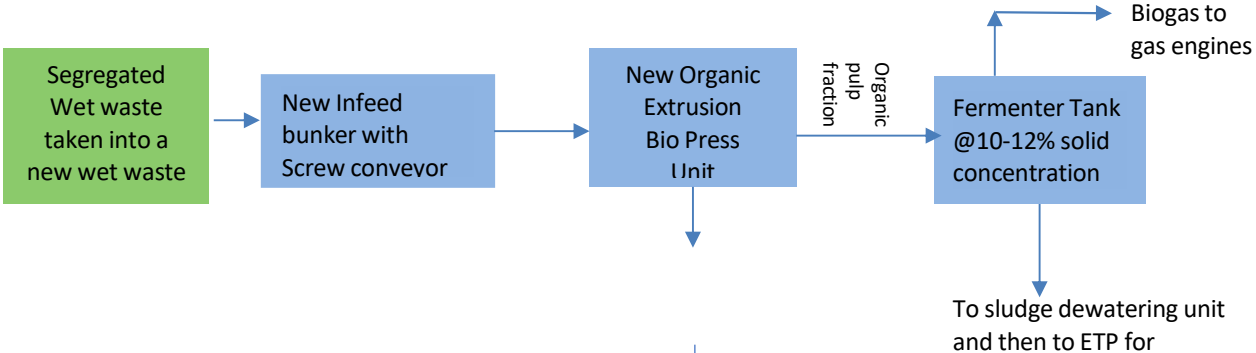
  In solar drying Shed, the solar radiation warms the sludge's surface. The rise in the temperature forces the water molecules out into the surrounding air. The moist air transports the water and is evacuated. However, while the surface dries the lower parts remain moist, and have to be turned. This is achieved by a turning and conveying machine running on the side walls, yielding finally a dry granulate of 10 to 20 mm as an average size.

As the radial velocity is higher than the advancing speed, each time the drum passes, the sludge is automatically moved from one end of the drying bed to the other.

View of the Drying Hall

The drying bed is fed and emptied with appropriate equipment such as conveyor belts or shovel loader but the transport through the bed is entirely automatic.

Process flow diagram for the Wet line is indicated below,



Compost drum/ Solar Drying Halls

- **Buffer Tank**

  Buffer tank is provided before the new fermenters, to take fluctuations of the operating shift. Pulp from the organic extrusion units is pumped directly to hydro cyclones and then feed into the buffer tank. Once sand/grit is removed and stored in buffer tank the wet fraction is fed into the exiting as well as a new digester at a uniform rate. The buffer tank acts as buffer storage to have uniform feeding to subsequent treatment unit

- **Existing & New Fermenter units**

  The volume of the existing digester is 1500 cum and the volume of the additional digester is approx. 4712 cum.

  The additional digester tank size is 2 Nos x 20.0 m x 8.5 m liquid depth. The combined volume is more than 6000 cum considering factors such as accumulation of grit / inert and other inorganic matter. All the digester i.e., the existing as well as additional digester is operated together to handle the complete organic waste. New digesters shall also operate in thermophilic range of 50 – 55 degree Celsius. The fermentation of organics in an anaerobic atmosphere generates biogas, which contains 50-60% methane.

- **Reject digestate from the fermenter**

  The digestate is taken into a Centrifuge type sludge dewatering unit, from where the centrate is recovered and sent to the effluent treatment plant for further treatment. The dewatered sludge is dried in the solar drying sheds to remove moisture. This fraction after drying is sent out directly as fine quality compost. The centrifuges provided in this expansion for dewatering of sludge is a high-speed centrifuge with much higher efficiency of solids capture as compared to existing centrifuge, so that the carryover over of solid is very minimal in the centrate going to ETP.

- **Biogas Genset based Power Plant consisting of Gas Holder, H2S Scrubbing System, Gas Engine, Gas Flare & its associated Components:**

  The additional gas generated due to upgradation is stored in new gas holders. The expected additional gas generation is about 500 to 600 cum/hr. A minimum 5.0 hr. hours of storage period is considered for the gas holder volume. The biogas is stored in an integrated Double Membrane Type Gas Holder Dome, similar in line with the existing one and is anchored on the top of the fermenter units. This biogas is cleaned for removal of H2S and moisture to suit the operation of Biogas Genset for generation of electricity. The existing H2S system is augmented to cater to the addition gas flow rate.

  The existing facility has a gas production is about 300 cum/hr. Presently the gas engine is consuming only 200 cum/hr. (max) based on its capacity, and the balance 100 cum/hr. is flared in the atmosphere. With the upgradation, the expected gas generation after complete upgradation is about 500 to 600 cum/hr. Biogas Engines to cater to total gas generation (cum/hr.) are provided to generate more electricity. The generated electricity is utilized to run the entire processing facility and the balance is exported to Goa State Electricity Grid. The thermal energy (waste heat) generated during this process is used for heating the contents of the fermenters. Two number of additional 600 KW gas engines are provided. After completion of the digestion process, the digested substrate is pumped to the Sludge Dewatering System comprising belt press type of dewatering unit.

- **Effluent Treatment Plant**

  The effluent treatment plant shall comprise equalization tank followed by biological treatment unit using a SBR system. The reject from the plant is disposed to the nearest STP. Initially for the 100 TPD waste, the reject quantity from the ETP was 40 cum/day. A solar evaporation pond was proposed in the initial design for evaporation of this reject, however the Expert committee recommended to dispose the reject to nearest STP through tankers instead of the solar evaporation pond.

  However, in the expansion due to addition of water for reducing the solid concentration to 10% for enhancing the removal of grit/sand inerts, the total quantum of digestate increase drastically and eventually after dewatering the digestate is treated in the ETP. The ETP is designed for 600 cum/day of effluent. The ETP designed in order to higher solid concentration in the centrate and also to treat other issues like stripping of ammonia etc from the digestate.

The effluent from Solid waste Management facility (Centrate and Floor wash waste) is treated in the ETP. Preliminary Treatment includes removal of floating, inorganic, large sized materials that have the potential to clog downstream units. For this purpose, Screening units are provided. The effluent is then equalized in Equalization Tank to dampen the flow variations and thereafter pumped at a constant flow rate for primary treatment.

After preliminary treatment, the effluent is treated biologically in the Sequential Batch Reactor which further reduce the pollutant load in the effluent. In this process, the soluble and colloidal organic material is metabolized by a diverse group of microorganisms to carbon dioxide and water. At the same time, a sizeable fraction of incoming organic matter is converted to cellular mass that can be separated from the effluent by settling. The settled biomass & inert solids constitute the biological sludge which is dewatered and sent to Solar drying facility and final product is used as a land fertilizer.

Treated effluent from SBR is further treated in Multi Grade Filter (MGF) followed by Activated Carbon Filter (ACF) and is disinfected using chlorine. This treated water is stored in treated water storage tank and Fire Water storage tank for further use.

TREATMENT PHILOSOPHY

The Effluent Treatment Plant comprises of the following Unit Processes,

a. Receiving Pit
b. Fine Screen channel
c. Equalization Tank and Equalization Transfer Pumps (SBR Feed Pumps)
d. Biological Treatment in SBR
e. Multi Grade Filter (MGF) & Activated Carbon Filter (ACF)
f. Chlorine Disinfection
g. Treated Water Tank
h. Biological Sludge Sump and Pumping Station
i. Dewatering (centrifuge) Facility for Biological Sludge

GOA WASTE MANAGEMENT CORPORATION
Government of Goa Undertaking

Ref: GWMC/Admin/37/Part-1/2022-23/792 Date: 07.09.2022
08

Most Urgent

To,
Senior Environmental Engineer
WMC-II, Delhi Pollution Control Committee
Department of Environment, Govt of NCT of Delhi
5th Floor, ISBT Building, Kashmere Gate
Delhi- 110006

Sub: Information/ Report regarding successful Bio-mining of the Legacy Waste and Solid Waste Management/ Processing Facilities in Goa

Ref: Your Letter No. DPCC/WMC-II/Ghazipur Dumpsite/OA 288/2022/262-263 dated 25.08.2022

Sir,

The Goa Waste Management Corporation is in receipt of above referred letter. With respect to the same, please find enclosed Remediation Process and additional sites taken up for remediation at Goa enclosed as Annexure I and Annexure II respectively. Further, also find enclosed the process description of Solid Waste Management Facility at Saligao, Goa which is in operation since Aug 2016 as Annexure III for your reference.

For any further details, you may contact Mr. Digvijay Desai- Assistant Manager (8208338741 / digvijay.desai@zerowastegoa.com).

Yours faithfully,

Dr. Levinson J. Martins
Managing Director

A: Saligao Plateau, Saligao, Bardez, Goa - 403511 | T: 0832-6712396 | W: www.zerowastegoa.com | E: contact@zerowastegoa.com

Annexure - 1

Detailed Process Description

For

Remediation of Existing Legacy Dumps in Goa

1. General:

The state of Goa admeasures 3,702 square Km of which more that one third of the land is afforested area. Goa has a coastline of about 110 Km. The availability of land for the use of waste management is scarce and acquisition of land for this specific purpose is very difficult.

The State Government, understanding the various problems faced in identifying lands for setting up of waste management facilities took a conscious decision of utilizing legacy dump areas to set up its waste management's facilities.

In the first phase two main sites were identified for setting up state of art integrated solid waste management facilities. The first site identified was in Saligao/North Goa and the second site was at Cacora in South Goa.

2. Description of the legacy waste Dumps

SN	Description	North Goa	South Goa
1.	Location of Dump Site	Saligao/Calangute	Cacora
2.	Area Details	Survey No.: 47/1 (Part)	Survey No.: 167/168
3.	Area of Dump site	29,000 m2	11,961 m2
4.	Estimated Volume of waste.	80,437 m3	~ 30,000 m3

Photographs of Dump sites

Img. 1: Saligao/Calangute dump site

Img. 2: Cacora Dump Site

3. Detailed Process:

The State Government constituted an Expert Committee to assist in the construction of the integrated solid waste management facilities (SWMF) under the Chairmanship of Padmashree Dr. Sharad Kale. The constitution of the committee is as under:

1.	**Dr. Sharad Kale**	Head, Technology Transfer & Collaboration Division, Bhabha Atomic Research Centre, Mumbai	Chairman
2.	**Dr. Munish K. Chandel**	Associate Professor, Centre For Environment Science & Engineering, IIT, Mumbai	Member
3.	**Dr. Shrikant Mutnuri**	Associate Professor, BITS Goa Campus	Member
4.	**Dr. A. N. Vaidhya**	Senior Principal Scientist, Solid & Hazardous Waste Management Division, CSIR-NEERI, Nagpur	Member
5.	**Dr. Mahendra Patil**	Principal Scientist, Solid & Hazardous Waste Management Division, CSIR-NEERI, Nagpur	Member

OFFICIAL MEMBERS

7.	**Shri. Sandip K. Prabhu Chodnekar**	General Manager (Engineering-II), Goa State Infrastructure Development Corporation	Member Secretary

8.	**Shri. Sanjeev Joglekar**	Environmental Engineer, Goa State Pollution Control Board	Member
9.	**Shri. Dominic Fernandes**	Officer on Special Duty Solid Waste Management Department of Science & Technology	Member

Img. 3: Expert Committee conducting tests at Saligao/Calangute dump site

The proposed remediation process was vetted by the Committee and its suggestions were incorporated. Preliminary trial runs for remediation were conducted at site, by using a mobile Multi Deck Vibratory Screen and Conveyor Mechanism, wherein the waste was screened using 120 mm, 40 mm and 15 mm Screens. Various tests were conducted at NABL / MoEF&CC accredited labs to test the composition of the compost and finalise the method of final disposal of the compost. The over fractions primarily comprised plastic, clothes and inorganic

Refuse Derived Fuel (RDF) fractions and the under fractions were earth material.

The conclusions of the Expert Committee Meeting were as under:

1. The existing dumped waste primarily comprises of plastics and earth material. This waste was screened at the dump location only.
2. A mobile multi deck vibratory screen was used to separate the various fractions, which was tested and analysed.
3. The separated fractions can be stored at one location at the site. The compost can be either provided to the social forestry or can be put to suitable use based on the characteristics of the compost as decided by the Dept. of Science, Technology & Environment/Goa State Pollution Control Board.
4. Regarding the monsoon cover, the expert committee approved both, geo-membrane bentonite liner or Polyethylene as optional methods to cover the dump prior to the monsoon period. As per DST&E's approval, a Bentonite Liner has been considered.

Remediation Methodology of existing Municipal Solid Waste:

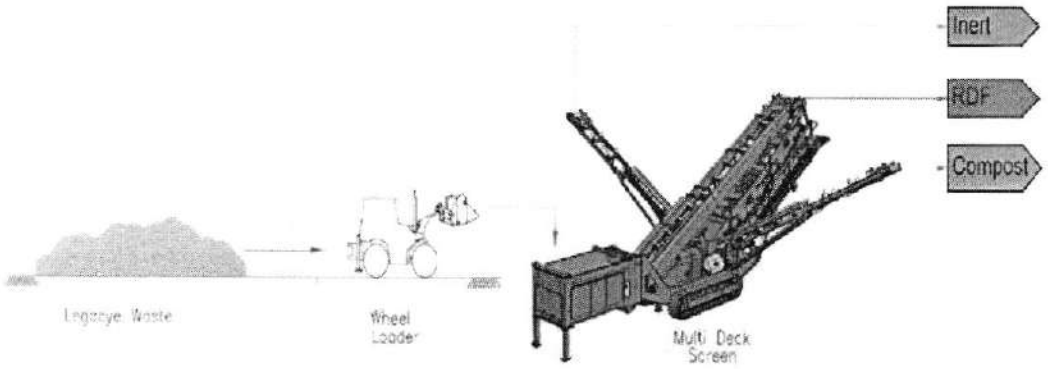
Img-4: Mobile Screen screening the existing Dump at Site

The existing Solid Waste was remediated by mobile "Multi Deck Vibratory Screen and Conveyor Mechanism". It has multiple Screen Decks having Opening as 120 mm, 40 mm and 15 mm. The existing waste was loaded into the Machine by a Wheel Loader / Crawler Dozer. The waste was then screened and separated into the four fractions as described below:

1.	Over fraction of 120 mm Screen	mainly comprising rags, textile and clothes etc
2.	Under fraction of 120 / 40 mm Screen	mainly non-recyclable plastic
3.	Over fraction of 40/15 mm Screen	mainly stones & gravel
4.	Under fraction of 15 mm Screen	mainly inert earth material and soil conditioner / compost

The screen was operated during the non-monsoon period. It was ensured that fresh waste was not dumped in the areas where waste was being remediated.

Both Items 1 & 2 are primarily Refuse Derived Fuel (RDF) and was sent to the Cement Companies for co-processing and Items 3 & 4 was used as a Soil Conditioner / Compost for non-food agricultural trees / social forestry usage. The sample of compost was analysed and test reports are annexed.



Img 5: Process Flow Diagram for remediation of legacy waste

COMPOST: 25% to 30%	RDF: 50% to 60%	Inerts 10% to 15%
Compost utilized within the MSW facility	High calorific material (plastic, paper, cloth etc.) Alternative fuel (to be sent to cement factories for co-incineration etc.)	Inert heavy material, sand, stones, grit etc used to reclaim the low lying area within the plant site.

4. Pre- monsoon Cover of the existing Dumped Waste:

The balance waste was pushed and shaped at one side of the site. It was compacted and covered by a Geo-membrane Bentonite Liner (Specifications enclosed as **Annexure-3**), which prevented any water ingress in to the same. All along the dumped waste, temporary roads were created for proper access and garland drains were made to allow the rain water to be diverted to the main storm water drain.

Vimta
Driven by Quality Inspired by Science

Test Report

ISSUED TO
Hindustan Waste Treatment Pvt Ltd
Phoenix Estate, 2nd Floor, S-18,
Eastern Bypass Road, Gogal
Margaon-403601
Goa INDIA
Ph:
KIND ATTN. :.

Report Number : 29170/15/VLL/000/02
Issue Date : 2016-03-16
Your Ref : WO NO:INT/VLL/120TPD MSW PROJECT NORTH GOA/16
and Date : 2016-02-15

Sample Particulars: COMPOST

Sample Received date : 2016-02-24 Sample Registration Date : 2016-02-26
Analysis Starting date : 2016-02-27 Analysis Completion date : 2016-03-11
Quantity:1No Packet in Polyethylene Cover.
Sample ID:COMPOST,15 MM SCREEN OVER FRACTION.
Test Required:As,Cd,Cr,Cu,Pb,Hg,Ni,Zn,C/N ratio,PH,Moisture,Bulk density,Total organic Carbon,Total nitrogen,Total Potassium as K2O,Total Phosphorous as P2O5,Colour,Odour,Conductivity and Sieve(4mm) Analysis
SAMPLE TESTED AS RECEIVED BASIS LAB REF NO:SFINAG/6230130

TEST RESULTS

Sl. No	Test Parameters	Unit of Measurement	Result
1	Odour	-	No foul odour
2	Colour	-	Brown
3	Moisture	%	5.80
4	Bulk Density	gm/cc	0.9930
5	Total organic Carbon	%	21.88
6	Total Nitrogen as N	%	0.41
7	Chromium as Cr	mg/Kg	275.79
8	Nickel as Ni	mg/Kg	15.34
9	Lead as Pb	mg/Kg	60.04
10	Cadmium as Cd	mg/Kg	2.60
11	Mercury as Hg	mg/Kg	<1.0
12	Total phosphorous as P2O5	%	0.57
13	Potassium as K2O	%	0.47
14	PH(5% Solution)	-	8.37
15	C/N ratio	-	53.63
16	Passing through 4.0 MM	%	3.45
17	Copper as Cu	mg/Kg	47.73
18	Arsenic as As	mg/Kg	51.31
19	Zinc as Zn	mg/Kg	89.80
20	Conductivity(5% Solution)	dsm-1	3.23

Method of Testing : As per ADAC 17th Edition and Fertilizer(control)order 1985 and ASTM E928
Instrument Used :ICP-AES.

Remarks : This is a revised report, supersedes previous test report bearing no. 29170/15/VLL/000/02, dated 2016-02-15 with copy numbers 426530, 870027, 870028. This revised report is issued as per customer request for address correction

Srinivasa Rao Ghanta
Sr Manager Analytical

Vimta
Driven by Quality, Inspired by Science

Test Report

ISSUED TO:
Hindustan Waste Treatment Pvt Ltd
Phoenix Estate, 2nd Floor, S-18,
Eastern Bypass Road, Gogal
Margaon-403601
Goa INDIA
Ph:
KIND ATTN :

Report Number : 29170/15/VLL/000/01
Issue Date : 2016-03-16
Your Ref : WO NO:INT/VLL/300TPD MSW PROJECT NORTH GOA/15
and Date : 2016-02-15

Sample Particulars: COMPOST

Sample Received date : 2016-02-24 Sample Registration Date : 2016-02-26
Analysis Starting date : 2016-02-27 Analysis Completion date : 2016-03-11
Quantity 1No Packed in Polyethylene Cover
Sample ID:COMPOST,15 MM SCREEN UNDER FRACTION
Test Required As,Cd,Cr,Cu,Pb,Hg,Ni,Zn,C/N ratio,PH,Moisture,Bulk density,Total organic Carbon,Total nitrogen,Total Potassium as K2O,Total Phosphorous as P2O5,Colour,Odour,Conductivity and Sieve(4mm) Analysis.
SAMPLE TESTED AS RECEIVED BASIS LAB REF NO:SF/NAG/8226126

TEST RESULTS

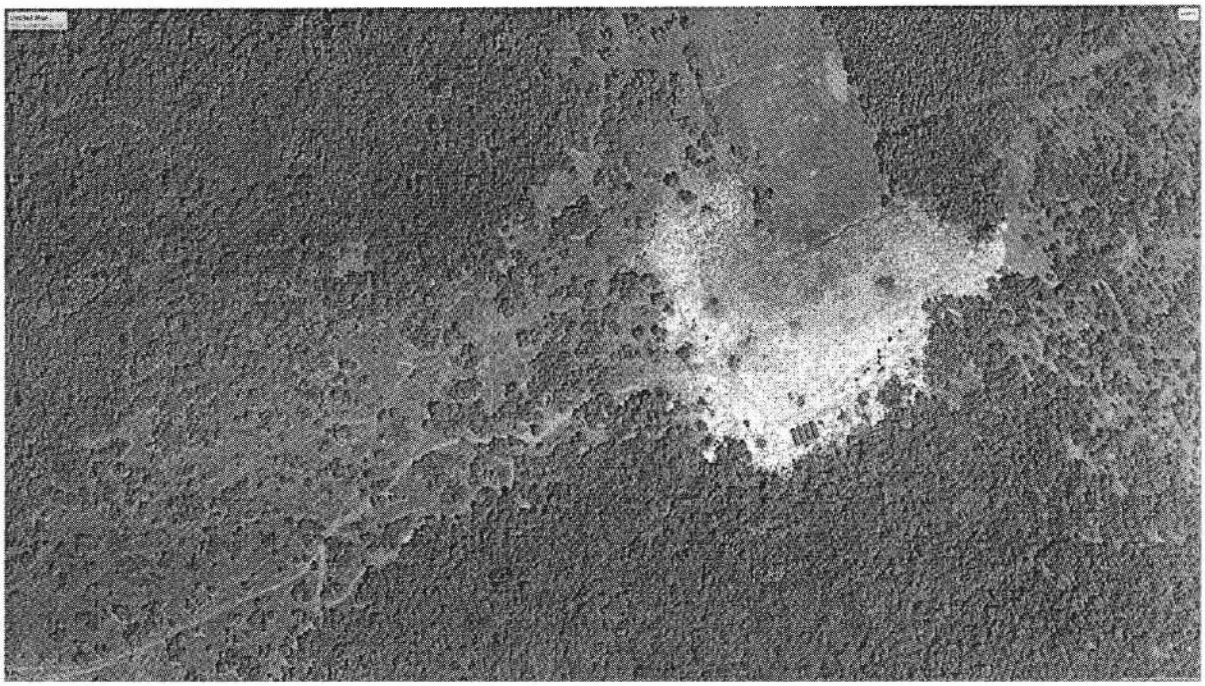
Sl. No	Test Parameters	Unit of Measurement	Result
1	Odour	-	No foul odour
2	Colour	-	Blackish brown
3	Moisture	%	11.16
4	Bulk Density	gm/cc	0.8625
5	Total organic Carbon	%	9.24
6	Total Nitrogen as N	%	0.37
7	Chromium as Cr	mg/Kg	274.05
8	Nickel as Ni	mg/Kg	19.58
9	Lead as Pb	mg/Kg	25.64
10	Cadmium as Cd	mg/Kg	2.24
11	Mercury as Hg	mg/Kg	<1.0
12	Total phosphorous as P2O5	%	0.44
13	Potassium as K2O	%	0.64
14	PH(5% Solution)	-	8.33
15	C/N ratio	-	24.97
16	Passing through 4.0 MM	%	65.70
17	Copper as Cu	mg/Kg	87.16
18	Arsenic as As	mg/Kg	36.29
19	Zinc as Zn	mg/Kg	149.37
20	Conductivity(5% Solution)	dsm-1	1.34

Method of Testing : As per AOAC 17th Edition and Fertiliser(control)order 1985 and ASTM E828
Instrument Used:ICP-AES

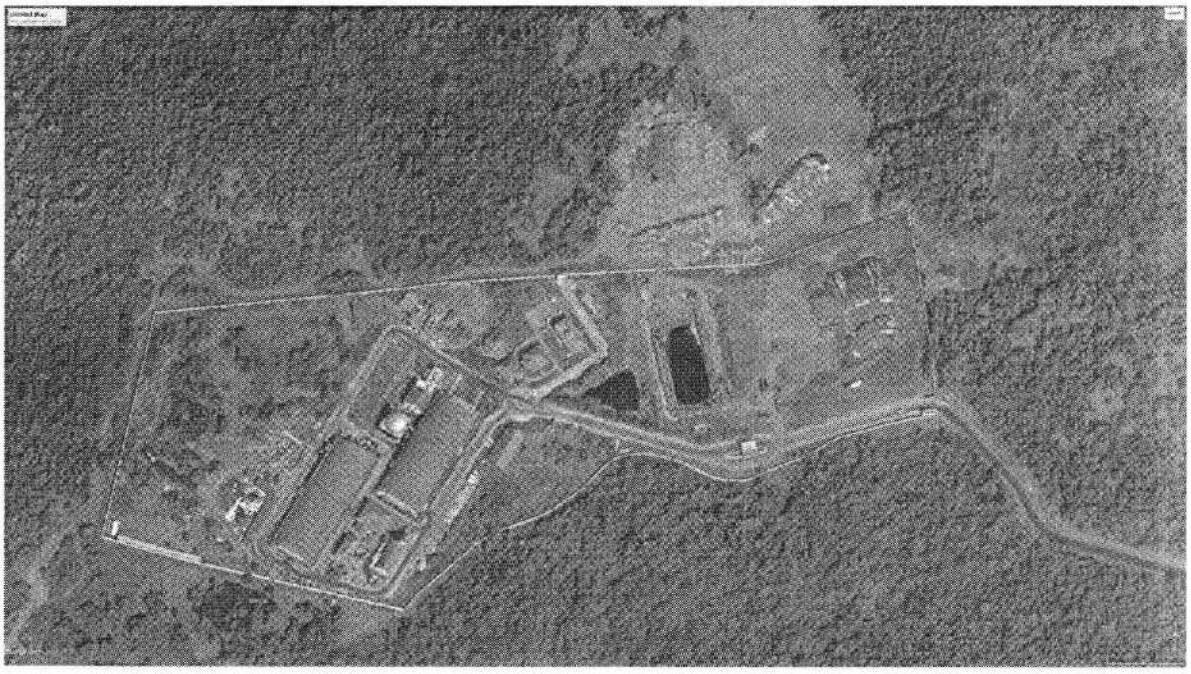
Remarks : This is a revised report, supersedes previous test report bearing no. 29170/15/VLL/000/01, dated 2016-02-15 with copy numbers 476529, 476525, 476526. This revised report is issued as per customer request for address correction

Srinivasa Rao Ghanta
Sr.Manager Analytical

Photos of Legacy Waste Site in Calangute/ Saligao, North Goa



Img. 6: Old legacy Waste at Calangute/ Saligao



***Img. 7*: Remediated site and SWTF at Calangute/ Saligao**

Photo of Legacy waste site at Cacora, South Goa.

Img. 8: Legacy waste site at Cacora

Annexure- II

"Remediation of various dumpsites in the State of Goa"

Goa Government has taken decision to "Remediate the existing dumpsites at various locations in Goa". Accordingly, the Goa Waste Management Corporation (GWMC) shall take steps for quantification and remediation of the legacy waste. In order to confirm the quantity of the legacy waste to be remediated GWMC conducted drone survey and details are as follows:

Volume of dumps as per drone survey

Sr. No.	Name of the Local Body	Location of dump	Area of dump (m^2)	Volume of dump (m^3)
1	Corporation of the City of Panaji (CCP)	Curca- Attachment Point No. 289	9497.97	7454.94
2	CCP	Campal- Attachment Point No. 290	3476.24	7555.25
3	CCP	Behind SBI, EDC, Patto-attachment Point No. 287	1537.8	2524.2
4	CCP	Near Divja Circle, Panaji- Attachment Point No. 288	850.89	1018.38
5	Margao Municipal Council	Municipal jurisdiction on eastern side of the Curtorim Road	12581.67	231239.76
6	Mormugao Municipal Council	Opp. to MPT Hospital, Headland Sada	14313.73	83661.41
7	Mapusa Municipal Council	Lat. 15.60846 Long. 73.79639	24742.48	127684.8
8	Bicholim Municipal Council	Adjacent to the garbage Treatment Plant, Lakherem in Sy. No.109/0.	2561.66	3165.25
9	Pernem Municipal Council	At garbage Treatment Plant of Pernem Municipal Council	498.98	210
10	Canacona Municipal Council	Garbage Treatment Plant at Dumane Shristhal	929.39	493.21
11	Cuncolim Municipal Council	15.179271 (lat), 74.025	6309.04	3616.95

** The total quantity of waste to be remediated is approximately **4.7 Lakh m3**.*

GWMC has floated the tender on 16/08/2019 on **"Remediation of various dumpsites in the State of Goa"** and salient features of the tender are as follows:

DISPOSAL OF THE SEPARATED FRACTIONS

- The Local bodies /DMA or DOP shall identify land for disposal of compost/inert and storage of RDF wherever necessary prior to issue work order.
- The inert and compost recovered shall be temporarily stacked within the premises and it will be the responsibility of concerned area successful bidders to dispose it as per the Directions of GWMC within State of Goa.
- Bidders need to analyse compost and inert through the MoEF accredited lab once in every month.
- The separated non-recyclable RDF fraction from remediation should be disposed in cement companies for co-process.
- The disposal work shall be carried even during Monsoon period as well, with prior consent from the employer.

MONSOON COVER

- Each dumpsite shall be provided with a Monsoon cover (geo synthetic clay liner). Both the dumped fraction and the recovered RDF fraction if not disposed during the monsoon period in that respective year are to be covered.
- Before providing monsoon cover to the garbage dump or RDF fraction, needs to be properly shaped and compacted using hydraulically operated excavator and dozer etc.

TIME FRAME FOR THE REMEDIATION AND DISPOSAL ACTIVITY:

Remediation: Initial period is 24 months (Excluding monsoon-The Monsoon period shall be 15th May to 15th October)

Disposal & monsoon cover: Initial period is 36 months – from the date of remediation work released/allotted (Excluding monsoon).

The remediation work shall be carried out only during non-monsoon period starting from 15th October in the first year up to 15th May of the subsequent year. No remediation work will be carried out during monsoon (15th May to 15th October).

Time frame for the providing monsoon cover: Before monsoon period

The monsoon cover shall be provided before 15th May (beginning of the monsoon period) in any given year during the project period.

Annexure - III

100 TPD Solid Waste Management Facility at Saligao (2016-2021)
PROCESS WRITE-UP

The Municipal Solid Waste (MSW) Processing Facility was divided into **Six (6)** Sections as described below:

1.0 Material Segregation & Recovery Facility (MSRF)

Municipal Solid Waste (MSW) was delivered, segregated, recovered, processed and stored for later use in Material Segregation & Recovery Facility (MSRF). The main function of the MSRF was recovery of recyclables and efficient segregation/processing of mixed waste into a feedstock for biological conversion or into a fuel source for the production of energy.

Mixed Municipal Solid Waste (MSW) collected in open trucks/compactors and delivered at the facility was taken to the Tipping Floor, housed in an enclosed Shed. The Shed was covered and had adequate height with proper arrangement for lighting and ventilation. The Tipping Floor area shall be provided with an Odor Control System comprising Centrifugal Fans, Air Ducting and Bio-filter to ensure that odorous gases are effectively sucked and adsorbed in the Bio-filter.

The main function of the MSRF was to segregate and recover maximum possible recyclables from the mixed waste such that they can be directly reused. Recyclable and sorted materials were baled and wrapped for reuse as per the Buyers'/Vendor's requirements. A part of the remaining waste left after sorting and recovering recyclables was shredded and/or compacted as Refuse Derived Fuel (RDF) and residual material which cannot be converted into RDF was taken to the Sanitary Landfill Cells.

Electronic waste (e-Waste) e.g. Phones, Printer Cartridges, Compact Discs etc.coming into the facility from households was sorted at the Tipping Floor/ Manual Sorting Station and taken to the e-Waste Storage Bin / Container from where it was disposed of suitably as per applicable statutory norms.

Hazardous waste e.g. Batteries, Bulbs/ Tube Lights etc. and Bio-medical waste, if received from households was stored and disposed as per applicable statutory norms. Main Units in this Section are as follows:

1. Tipping Floor

The waste, after weighing and visual inspection at Weighbridge Station, was unloaded on a Tipping Floor where waste was visually inspected and bulking and disturbing materials (big stones, metal scrap, wood, cadaver etc.) was sorted out manually or by Wheel Loader

2. **Infeed Hopper cum Chain Belt Conveyor and Bag Opening Shredder**

Mixed Municipal Solid Waste (MSW) from the Tipping Floor was loaded into the Infeed Hopper cum Chain Belt Conveyor with Wheel Loader / Skid Stir Loader. The purpose of the Infeed Hopper was to provide an adequate storage volume and automatically transfer the waste to the downstream Units. The Chain Belt Conveyor transferred the waste into the feed hopper of a Bag Opening Shredder which ensured 100% of the bags are opened. The contents from the opened bags dropped onto the downstream Conveyor leading to the Roller Screen.

3. **Roller Screen**

The Roller Screen provided the first level of screening to screen out several types of material that were difficult to screen effectively. It had a screen deck of 80 mm opening. The underflow fraction having size <80 mm was conveyed to the Organic Extrusion Press while the overflow fraction having size >80 mm was conveyed to the Manual Sorting Station. A separate Infeed Hopper with Trough Conveyor provided after the Roller Screen to directly feed pre-sorted material, if any, to the Manual Sorting Conveyor for further sorting.

4. **Manual Sorting Station**

The Manual Sorting Station was in form of elevated structure with Handpicking Stations located at both sides of the Sorting Conveyor to remove valuable items like Glass, Metals, Wood, Paper, Plastic, Rubber and Textile etc. by handpicking. Glass and Metals were handpicked and stored into Bins / Containers placed besides the dedicated Handpicking Stations whereas all other recyclables were handpicked and thrown through the Chutes into the Compartments located beneath the Chutes by the sorting personnel. Materials which cannot be baled were collected / stored into Bins / Containers whereas all other recyclables that could be baled were pushed by Wheel Loader / Skid Steer Loader onto the under-floor Chain Belt Conveyor, on which they were transported to the Baler.

5. **Baler with Wrapping Unit**

Sorted recyclables that could be baled were pushed by Wheel Loader / Skid Steer Loader onto the under-floor Chain Belt Conveyor, on which they were transported to the Baler and baled. The bales were wrapped, if required, in a Wrapping Unit and then stored in Containers for further transportation to the recycling Vendors / Buyers.

6. **Shredder**

A Shredder was provided to shred the overflow from Roller Screen as well as sorted recyclables so as to meet the requirement of prospective recycling Vendors /Buyers.

7. **Organic Extrusion Press**

The underflow from Roller Screen was conveyed to the Organic Extrusion Press. The hydraulically operated Organic Extrusion Press separated the waste into two fractions – an organic wet fraction and an inorganic dry fraction. It squeezed out the waste through an extrusion matrix at a very high pressure. The mainly wet organic substances thereby, squeezed out to form the waste fraction and transferred to the Wet Fraction Processing Line for production of Biogas as well Compost whereas the residue referred to as the dry fraction was conveyed to the Dry Fraction Processing Line for recovery of RDF.

2.0 Dry Fraction Processing Line

The dry fraction from the Organic Extrusion Press was conveyed onto a Wave Screen. The fraction which is < 15 mm shall be collected and disposed to the Sanitary Landfill Cells. The 10 – 300 mm fraction was passed to a Windsifter, where it was separated into heavy and light fractions. The combustible materials that can be used as RDF was blown upward as the light weight fraction and materials which cannot be used remain in the heavy fraction. The light weight fraction was transported to the Baler whereas heavy fraction was collected and sent to the Sanitary Landfill Cells.

3.0 Wet Fraction Processing Line

The wet fraction from the Organic Extrusion Presses was taken to the Bio-methanation System wherein organic substance were digested inside Fermenters and biogas as well as digestate was produced. The biogas was fed to the Biogas based Power Plant to generate electricity and waste heat. The electricity was utilized to run the Plant whereas waste heat is utilized to maintain thermophilic environment inside the Fermenters. The digestate was fed to the Sludge Dewatering Units for solid-liquid separation. The solids (dewatered sludge) was sent to In-vessel Composting Drums whereas liquid (centrate) was sent to the Effluent Treatment Plant for further treatment. Main Units in this Section are as follows:

1. **Bio-methanation System**

The wet fraction from the Organic Extrusion Presses was taken to the Bio-methanation Fermenters having Mixing System, Grit Removal System, Heating System and Biogas Extraction system. A thermophilic temperature range (i.e. 55 degree Celsius) was maintained inside Fermenters. During methanization process, the biogas was produced which was extracted and stored into Biogas Holders. After a residence time of 14 days, the digestate substrate was conveyed to the Sludge Dewatering System.

2. **Sludge Dewatering System**

The digested substrate was separated into solids (dewatered sludge) and liquid (centrate) phases in Sludge Dewatering System. The dewatered sludge was then transported to the In-Vessel Composting Drums whereas the centrate was sent to the Effluent Treatment Plant for further treatment before disposal.

4.0 Composting Line

The dewatered sludge from Sludge Dewatering System was transferred to the In-vessel Composting Drums. The bulking materials e.g. saw dust, wood chips etc. were added to improve moisture content, C:N ratio and bulk density of the feedstock and therefore to improve composting efficiency. The Drums were rotating continuously and the decomposition would take place in an accelerated manner within 4 – 6 days' residence time.

After In-vessel Composting Drums, the compost was further stored for a period of minimum 14 days in a Shed. Afterwards, the compost was screened to separate bulking materials using Star Screen of 10 – 30 mm screening capacity. The large sized fraction (>30 mm), basically the bulking material was separated here and recycled to be added with the dewatered sludge to prepare feedstock for the In-vessel Composting Drums whereas the finer fraction (<10 mm) was bagged in a Bagging Machine and stored for further sale as per requirement.

5.0 Biogas Genset based Power Plant

The fermentation of organic residues in an anaerobic atmosphere in the Bio-methanation Fermenters generated biogas, 50% – 70% of which was methane. The biogas was stored in double membrane type Biogas Holders. This biogas was cleaned for removal of H_2S and moisture to suit the operation of Biogas Gensets /Micro Turbines for generation of electricity. Electricity generated was utilized to run the entire processing facility including various auxiliaries of Biogas Gensets. A part of thermal energy (waste heat) generated was used for heating the contents of the Fermenters and excess heat was exhausted.

6.0 Sanitary Landfill

The dry fraction (< 15 mm) screened out from Wave Screen, heavy fraction separated out from Windsifter, the residue from Manual Sorting Station which cannot be converted into RFD and other inert residue which is generated during the processing of the waste was collected, transported in Wheel Loaders / Tipper Trucks to the designated Landfill Cells and landfilled. ***The landfilling of the organic waste is not be permitted and no organic fraction is to be disposed in the Landfill.***

The Landfill Cells were constructed as per **The Municipal Solid Wastes (Management and Handling) Rules, 2000 by Ministry of Environment and**

Forests. Adequate access and approach was provided along the Landfill Cells for easy transport and landfilling operation.

Landfilled material was weighed daily on the Weighbridge prior to disposal into Landfill Cells and date was logged.

PROCESS DESCRIPTION OF THE 250 TPD EXPANSION OF SOLID WASTE MANAGEMENT FACILITY (Dec 2021 onwards)

1.1 Quantity of Input Waste:

Table 1: Enhanced Plant Capacity Design Basis

Sr. No.	Design Basis	Plant Capacity (TPD)	Maximum Variation (%)	Maximum Waste handling capacity * (TPD)	Type of waste
1	Present Condition *(as per NIT)*	100	+25%	125	Initially – Mixed Present- Segregated
2	Enhanced Design Condition	250	+20%	300	Segregated
a	Dry Waste	100	+20%	120	less than 10% Bio-degradable fraction
b	Wet Waste	150	+20%	180	less than 10% Non- biodegradable fraction

Note:

1. The *maximum waste handling capacity (300 TPD) indicates waste which can be handled in the plant on a temporary basis and not as a regular practice, as the duration in which this extra capacity can be handled in the plant is for maintenance and cleaning of the equipment.

2. Based on the present experience of last 5 years, the quantity of recyclables is less, and the quality is poor, as most of the recyclables are recovered during primary collection of the waste, hence the type of recyclable fractions which is sorted may vary based on actual condition of the incoming waste received at the plant.
3. Overall enhanced capacity of the plant is 250 TPD. Further other fraction like "mulched / tree waste "is part of wet waste as this stream quantum coming separately to the plant is less than 1%.
4. Based on the past few years of operational experience, wet waste contains large quantum of beach sand, which creates wear & tear of the processing equipment's. Preferably, the waste receipt at plant shall have minimum contamination of sand and in case the contamination is high, such waste shall be rejected at the plant.
5. Hazardous waste, Slaughter waste, construction debris or bio-medical waste shall not be mixed with the municipal solid waste or received at SWM Facility.
6. All Waste shall be brought in authorized closed trucks only, with wet waste carrying trucks to have leachate collection system. The transportation of waste from the source to the plant is not in the scope of the concessionaire and in case any unauthorized trucks are received at the plant the same shall be rejected and shall be informed to GWMC. List of trucks who are violating such requirement, shall be provided to GWMC.
7. In case the above conditions are exceeded, HWTPL will highlight the discrepancy to GWMC. Variation in the performance criteria, over the designed basis is expected in case the design condition is not met.

Table 3: Design Capacity of the Enhanced Treatment plant

Sr. No.	Description	Unit	Value
1	**Dry waste**		
a	Maximum Quantity of Dry Waste processed in a day	TPD	100
b	No. of Operating shifts per day	No.	2
c	No. of Operating Hours per shift	No.	6
d	No. of Operating hours per day= (B) x (C)	Hr./day	12
e	Design capacity of Dry line required = (A) ÷ (D)	TPH	100/12 = 8.5
f	Capacity of Dry line provided	TPH	9.0
2	**Wet waste**		

a	Maximum Quantity of Wet Waste processed in a day	TPD	150
b	No. of Operating shifts per day	No.	2
c	No. of Operating Hours per shift	No.	6
d	No. of Operating hours per day= (B) x (C)	Hr./day	12
e	Design capacity of Wet line required = (A) ÷ (D)	TPH	150/12 = 12.5
f	Capacity of Wet line provided	TPH	13.0

Note:

1. The treatment capacity of each of the above lines (dry and wet) is based on total enhanced capacity. Size and selection of the additional equipment shall be provided keeping in mind capacity of existing similar functionality equipment.
2. The incoming waste quantity from the costal belt region, to certain extended is likely to be mixed waste, however even for mixed waste the existing secondary organic waste feed bunker followed Organic Extrusion Press and its subsequent treatment units are used.

1. CHAPTER – Integrated Treatment Philosophy

Integrated Treatment Philosophy

i. Segregated lines for treatment for wet and dry waste

The MSW treatment plant is mainly receiving two types of waste streams,

1._ Segregated Dry waste

2._ Segregated Wet waste

Small quantum of mixed waste and tree waste is also received. The tree waste is shredded and mixed with compost. Hence complete separate treatment lines have been implemented for dry and wet waste.

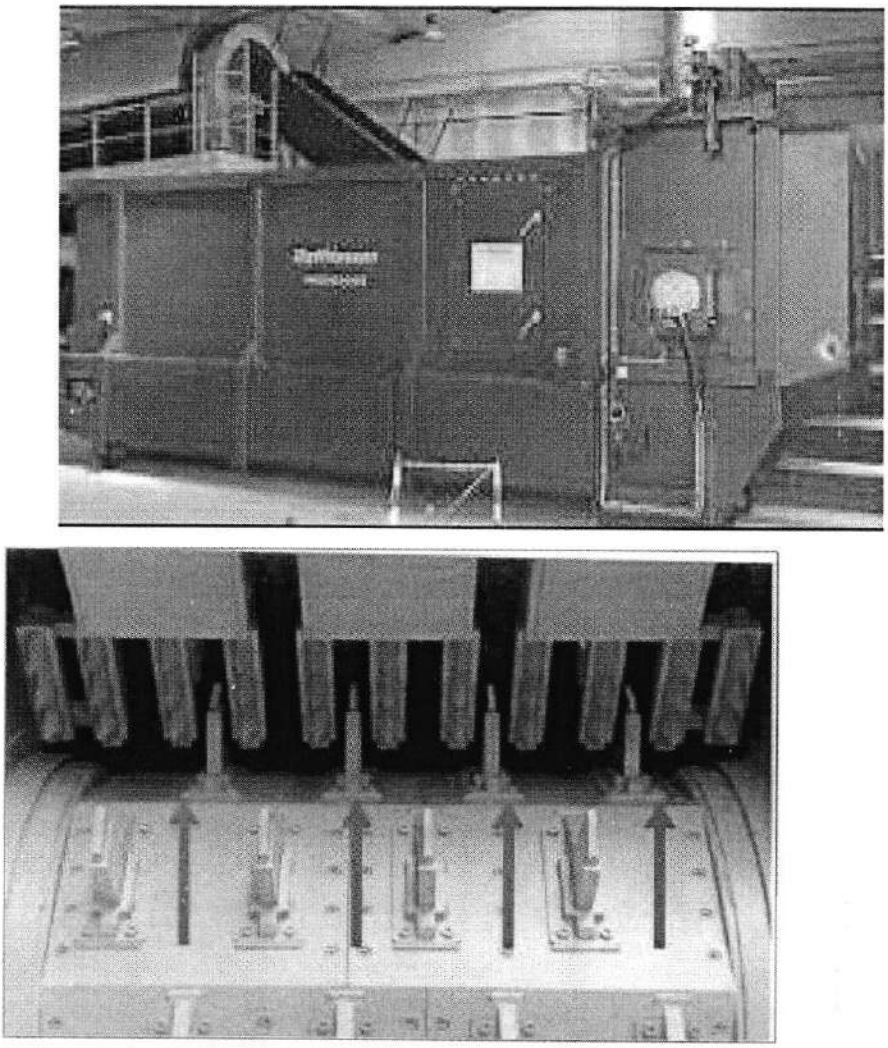
1. <u>Segregated Dry line treatment line</u>

The Material Recovery Shed (MRS) is used only for treating dry segregated waste and a new shed with tipping bunker arrangement is provided for treatment of the wet waste. The sorting line is augmented with a new infeed bunker, bag opener, wind sifter, conveyors to handle the dry excess waste capacity.

- **New Infeed bunker and bag opener with oversized film remover**

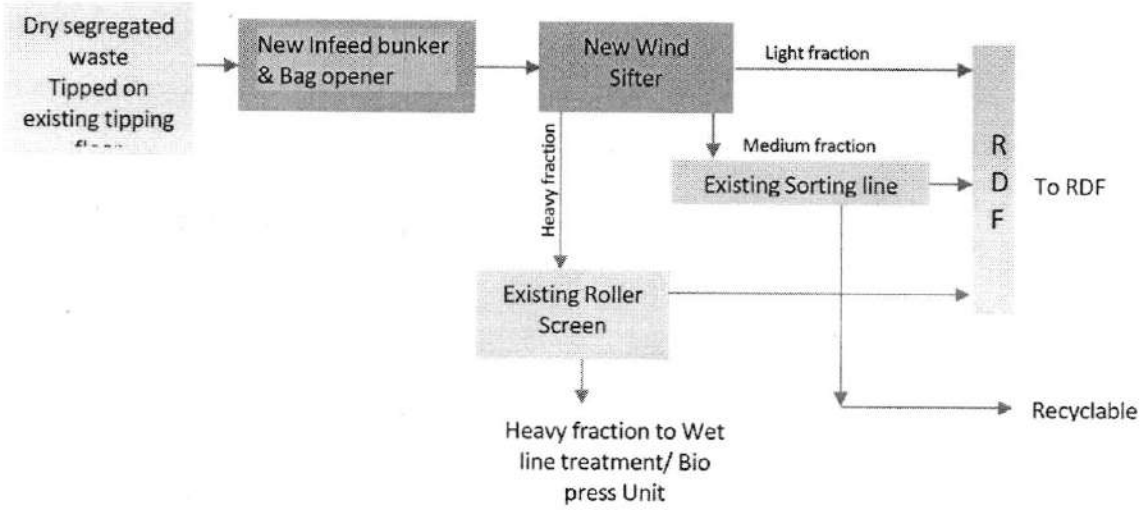
A front-end loader is used to load the input dry waste into the Infeed Bunker cum Bag Opener followed by Oversize Remover for removal of oversized plastics, fishing nets, etc. the bag opener opens the bags, and make the waste available for further wind

sifting, sorting, and recovery of recyclables. The waste is then, taken to the wind sifter.



Picture 1: Infeed Bunker and Bag opener

Process flow diagram for the new dry line is indicated below



- **Wind sifter**

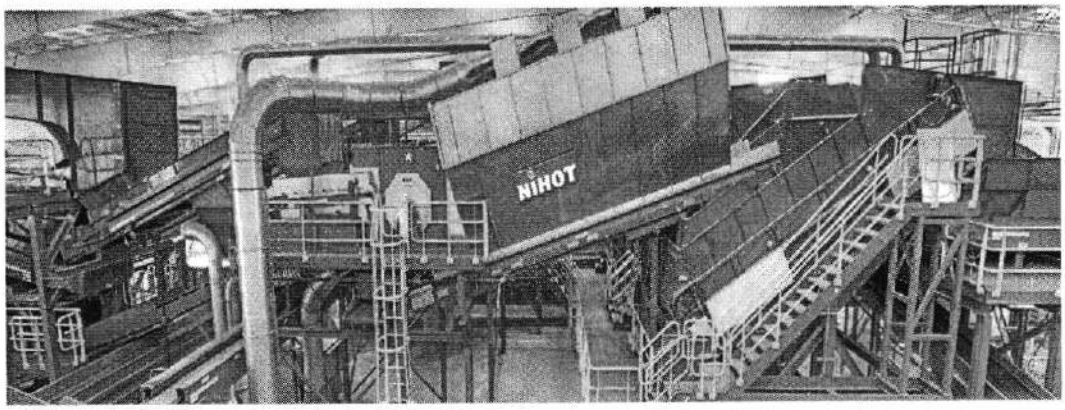
Wind Sifter separates the super light, medium and heavy fractions with the use of air stream. The separation is based on the difference in density and size of the materials. The air stream is created by fans and air nozzles whereas the splitter drum provides the separation between light and heavy fractions. The light material is blown over the splitter drum and the heavy materials fall through the air flow or hot the drum and fall.

Wind Sifter separates into three fractions – heavy, medium, and light.

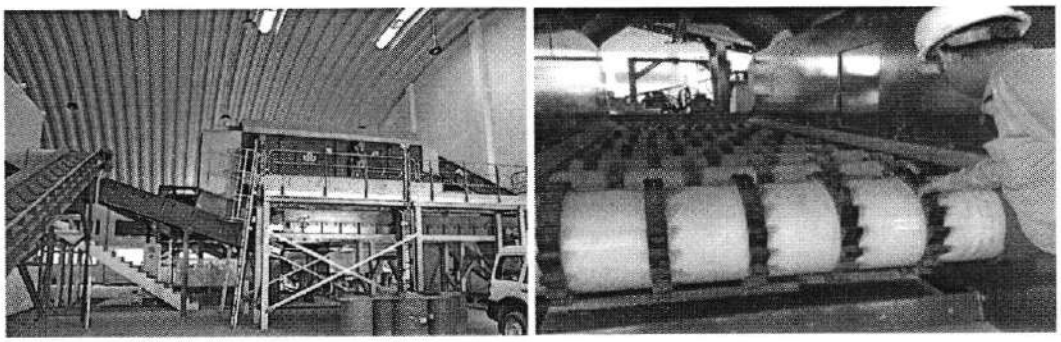
The heavy fraction is primarily organic fraction or wet waste and contaminated dry fraction such as food waste packets, leather articles, and glass bottles etc. These fractions are conveyed to the existing roller screen for further screening and the over fraction of screen is conveyed to manual sorting station and under fraction of the screen is sent to bio-press extraction unit.

The medium fraction comprising mainly recylables are conveyed to the existing manual sorting station for sorting of recyclables.

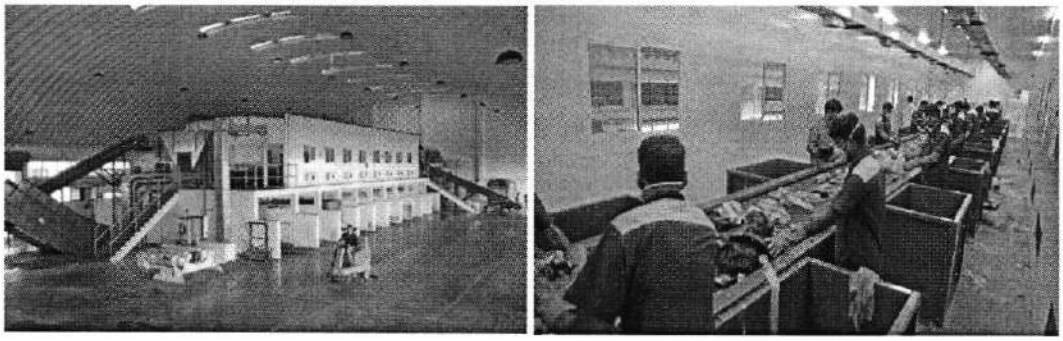
The light fraction comprising low film plastics, Styrofoam, thermo-coal multi-layer plastic bags etc. is taken to the RDF Storage Area.



Picture 2: Wind sifter



Picture 3: Existing roller Screen



Picture 4: Existing Sorting Station

2. **Separate Wet line treatment shed with infeed bunkers**

A separate wet waste treatment shed is provided to receive the incoming wet waste. This shed is enclosed and has its own ventilation and lighting system. The wet waste received at the plant is unloaded in 2 nos. of in-feed bunkers with multiple screw conveyors, so that no leachate falls on the ground and keeps the shed neat and clean. The multiple screws inside the bunker shall open the bags, homogenize the content, and feed the same into a bio-press.

- **Organic Extruder System based on low pressure organic extruder :**

The wet waste along with under fraction of the fraction from the existing roller screen is conveyed to the bio-press based extraction unit for extraction of the organic pulp. This unit has a screw mechanism with a screen and uses recycled water for dilution and extraction of the organic pulp. As the pulp is screened out of a fine screen, plastics, rags, cloth are eliminated from the wet pulp going to the fermenters. By diluting the pulp to 10-12% concentration, a hydro cyclone is effective in removing grit prior to feed into the fermenters. By using this unit along with hydro-cyclones both the above issues are resolved.

This unit extracts the organic fraction in form of pulp for feed to the fermenter/digester and a reject fraction comprising cellulosic fibrous material along with 10-20% plastic, cloth, bags etc. disturbing material. Recycled water is used here to dilute the pulp to 10-12% solids concentration. The inorganic reject fraction is taken into a wind sifter for blowing out the lighter plastic fraction to get a cleaner cellulosic fibrous material can be

converted into clean compost. The reject plastic, paper, cloth etc. be taken to the RDF storage area. The wet pulp (liquid substrate) is pumped to the hydro cyclone for removal of sand/grit, prior to feeding the same to the anaerobic digesters. Dilution to 10-12% shall ensure removal of heavy sand/grit in the hydro-cyclones

- **Reject Fraction from the Organic Extruder (SMICON)**

  The reject fraction from the Bio-press is taken into existing in-vessel composting drums wherein it is dried and converted into a compost post trommel screening.

- **Solar drying facility:**

  This extracted organic fraction in form of pulp is fed into 2 Nos. of new as well as existing digester/fermenter units for fermentation and generates biogas which is cleaned, scrubbed of H2S, and fed into Bio-Gas engines of 1200 KW capacity. The digested sludge is dewatered in a sludge dewatering unit, namely belt press and the dewatered solids are taken into solar compositing sheds for drying and composting of the dewatered sludge. 3.0 numbers of solar drying shed are provided

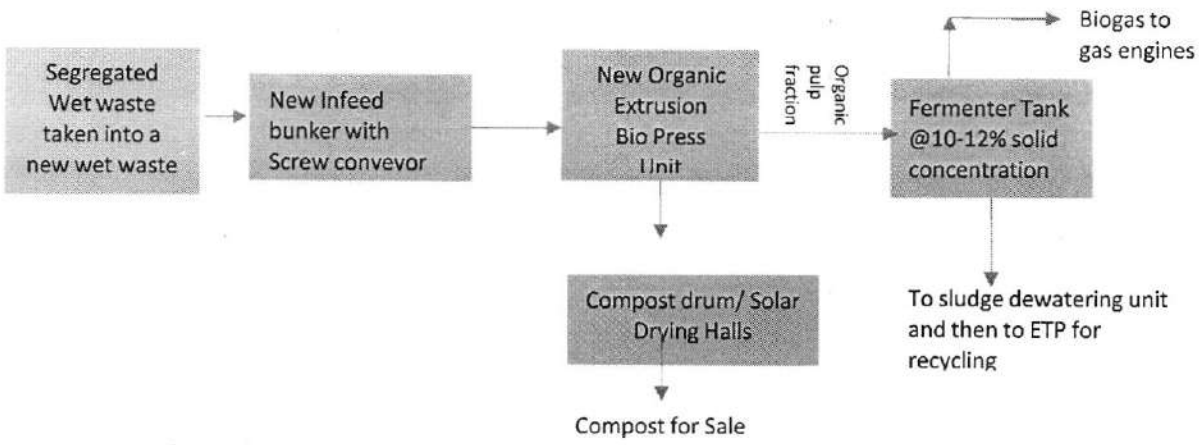
  In solar drying Shed, the solar radiation warms the sludge's surface. The rise in the temperature forces the water molecules out into the surrounding air. The moist air transports the water and is evacuated. However, while the surface dries the lower parts remain moist, and have to be turned. This is achieved by a turning and conveying machine running on the side walls, yielding finally a dry granulate of 10 to 20 mm as an average size.

  As the radial velocity is higher than the advancing speed, each time the drum passes, the sludge is automatically moved from one end of the drying bed to the other.

View of the Drying Hall

The drying bed is fed and emptied with appropriate equipment such as conveyor belts or shovel loader but the transport through the bed is entirely automatic.

Process flow diagram for the Wet line is indicated below,



- **Buffer Tank**

  Buffer tank is provided before the new fermenters, to take fluctuations of the operating shift. Pulp from the organic extrusion units is pumped directly to hydro cyclones and then feed into the buffer tank. Once sand/grit is removed and stored in buffer tank the wet fraction is fed into the exiting as well as a new digester at a uniform rate. The buffer tank acts as buffer storage to have uniform feeding to subsequent treatment unit

- **Existing & New Fermenter units**

  The volume of the existing digester is 1500 cum and the volume of the additional digester is approx. 4712 cum.

  The additional digester tank size is 2 Nos x 20.0 m x 8.5 m liquid depth. The combined volume is more than 6000 cum considering factors such as accumulation of grit / inert and other inorganic matter. All the digester i.e., the existing as well as additional digester is operated together to handle the complete organic waste. New digesters shall also operate in thermophilic range of 50 – 55 degree Celsius. The fermentation of organics in an anaerobic atmosphere generates biogas, which contains 50-60% methane.

- **Reject digestate from the fermenter**

  The digestate is taken into a Centrifuge type sludge dewatering unit, from where the centrate is recovered and sent to the effluent treatment plant for further treatment. The dewatered sludge is dried in the solar drying sheds to remove moisture. This fraction after drying is sent out directly as fine quality compost. The centrifuges provided in this expansion for dewatering of sludge is a high-speed centrifuge with much higher efficiency of solids capture as compared to existing centrifuge, so that the carryover over of solid is very minimal in the centrate going to ETP.

- **Biogas Genset based Power Plant consisting of Gas Holder, H2S Scrubbing System, Gas Engine, Gas Flare & its associated Components:**

  The additional gas generated due to upgradation is stored in new gas holders. The expected additional gas generation is about 500 to 600 cum/hr. A minimum 5.0 hr. hours of storage period is considered for the gas holder volume. The biogas is stored in an integrated Double Membrane Type Gas Holder Dome, similar in line with the existing

one and is anchored on the top of the fermenter units. This biogas is cleaned for removal of H2S and moisture to suit the operation of Biogas Genset for generation of electricity. The existing H2S system is augmented to cater to the addition gas flow rate.

The existing facility has a gas production is about 300 cum/hr. Presently the gas engine is consuming only 200 cum/hr. (max) based on its capacity, and the balance 100 cum/hr. is flared in the atmosphere. With the upgradation, the expected gas generation after complete upgradation is about 500 to 600 cum/hr. Biogas Engines to cater to total gas generation (cum/hr.) are provided to generate more electricity. The generated electricity is utilized to run the entire processing facility and the balance is exported to Goa State Electricity Grid. The thermal energy (waste heat) generated during this process is used for heating the contents of the fermenters. Two number of additional 600 KW gas engines are provided. After completion of the digestion process, the digested substrate is pumped to the Sludge Dewatering System comprising belt press type of dewatering unit.

- **Effluent Treatment Plant**

The effluent treatment plant shall comprise equalization tank followed by biological treatment unit using a SBR system. The reject from the plant is disposed to the nearest STP. Initially for the 100 TPD waste, the reject quantity from the ETP was 40 cum/day. A solar evaporation pond was proposed in the initial design for evaporation of this reject, however the Expert committee recommended to dispose the reject to nearest STP through tankers instead of the solar evaporation pond.

However, in the expansion due to addition of water for reducing the solid concentration to 10% for enhancing the removal of grit/sand inerts, the total quantum of digestate increase drastically and eventually after dewatering the digestate is treated in the ETP. The ETP is designed for 600 cum/day of effluent. The ETP designed in order to higher solid concentration in the centrate and also to treat other issues like stripping of ammonia etc from the digestate.

The effluent from Solid waste Management facility (Centrate and Floor wash waste) is treated in the ETP. Preliminary Treatment includes removal of floating, inorganic, large sized materials that have the potential to clog downstream units. For this purpose, Screening units are provided. The effluent is then equalized in Equalization Tank to dampen the flow variations and thereafter pumped at a constant flow rate for primary treatment.

After preliminary treatment, the effluent is treated biologically in the Sequential Batch Reactor which further reduce the pollutant load in the effluent. In this process, the soluble and colloidal organic material is metabolized by a diverse group of microorganisms to carbon dioxide and water. At the same time, a sizeable fraction of incoming organic matter is converted to cellular mass that can be separated from the effluent by settling. The settled biomass & inert solids constitute the biological sludge which is dewatered and sent to Solar drying facility and final product is used as a land fertilizer.

Treated effluent from SBR is further treated in Multi Grade Filter (MGF) followed by Activated Carbon Filter (ACF) and is disinfected using chlorine. This treated water is stored in treated water storage tank and Fire Water storage tank for further use.

TREATMENT PHILOSOPHY

The Effluent Treatment Plant comprises of the following Unit Processes,

a. Receiving Pit
b. Fine Screen channel
c. Equalization Tank and Equalization Transfer Pumps (SBR Feed Pumps)
d. Biological Treatment in SBR
e. Multi Grade Filter (MGF) & Activated Carbon Filter (ACF)
f. Chlorine Disinfection
g. Treated Water Tank
h. Biological Sludge Sump and Pumping Station
i. Dewatering (centrifuge) Facility for Biological Sludge

GWMC
GOA WASTE MANAGEMENT CORPORATION

Goa Waste Management Corporation <contact@zerowastegoa.com>

Information/ Report regarding Successful Bio-mining of the Legacy Waste and Solid Waste Management/ Processing Facilities in Goa.

1 message

WMC-II DPCC <dpcc.wmc2.delhi@gmail.com> Thu, Aug 25, 2022 at 5:04 PM
To: gwmc.goa@gov.in, "contact@zerowastegoa.com" <contact@zerowastegoa.com>
Cc: spgarg.ddc@nic.in, spgargdhc@gmail.com, jspg.mc.ngt@gmail.com, MS DPCC <msdpcc2022@gmail.com>, Member Secretary <msdpcc@nic.in>, Deepak Kumar Singh <dksinghdpcc@gmail.com>

Sir/ Madam,

Please find attached herewith letter dated 25.08.2022 regarding above mentioned subject. You are requested to provide Information/ Report regarding successful Biomining
of the Legacy Waste and Solid Waste Management/ Processing Facilities in Goa at the earliest.

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Thanks & Regards
D.K. Singh
SEE & Incharge, WMC-II
Delhi Pollution Control Committee

Letter Dt. 25.08.2022 (GWMC).pdf
476K

Goa Waste Management Corporation
Saligao
Inward No. 1644
Date: 25/08/22

GWMC may provide details of remediation & sump saligao & cameta details.
26/08/22

MD 26/8/22
Digvijay AM

Most Urgent
NGT MATTER
By Speed Post/Email

DELHI POLLUTION CONTROL COMMITTEE
DEPARTMENT OF ENVIRONMENT, GOVT. OF NCT OF DELHI
5th FLOOR, ISBT BUILDING, KASHMERE GATE, DELHI-110006
visit us at : http://dpcc.delhigovt.nic.in

F. No. DPCC/WMC-II/Ghazipur Dumpsite/OA 288/2022/262-263 **Dated: 25.08.2022**

To,

The Managing Director,
Goa Waste Management Corporation C/o Hindustan Waste Treatment Pvt. Ltd.
Opp. Saligao Seminary, Near Goa State Pollution Control Board Saligao Plateau,
Saligao, Bardez, Goa - 403511

Subject : Information/ Report regarding Successful Bio-mining of the Legacy Waste and Solid Waste Management/ Processing Facilities in Goa.

Sir/ Madam,

You are kindly informed that two Joint Committees headed by Hon'ble Justice (Retd.) Sh. S. P. Garg have been constituted by Hon'ble National Green Tribunal (in OA No. 288/2022 & OA No. 300/2022) regarding fire incidents at the Ghazipur and Bhalaswa Dumpsites in Delhi respectively.

It is learnt that Bio-mining of the legacy waste has been done successfully at the Campal Dumpsite in Panjim, Goa and there are Solid Waste Management/ Processing Facilities successfully operating in Goa.

In view of the above, you are requested to provide Information/ Report regarding successful Bio-mining of the Legacy Waste and Solid Waste Management/ Processing Facilities in Goa at the earliest.

Yours Sincerely,

(D. K. Singh)
SEE, WMC-II

Copy to :

1. Hon'ble Justice (R) Sh. S.P. Garg, Former Judge, Delhi High Court, Office of Delhi Jal Board, Room No. 101, DJB Office Complex, Andrews Ganj, Near Moolchand Chowk & Defense Colony Police Station, Delhi-110049.

(D. K. Singh)
SEE, WMC-II