Joint Report on Status of Compliance of Solid Waste Management Rules, 2016 by Surat Municipal Corporation (SMC) with reference to Hon'ble NGT

Matter

Original Application No. 81/2014(WZ)

Kantha Vibhag Yuva Koli Samaj Parivartan Trust & Ors.

Vs. State of Gujarat & Ors.

BEFORE THE NATIONAL GREEN TRIBUNAL

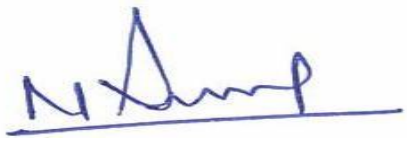
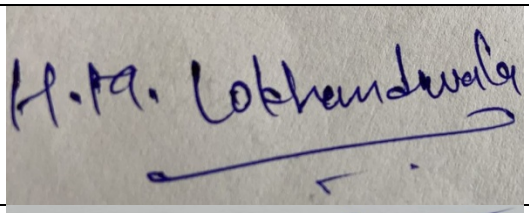
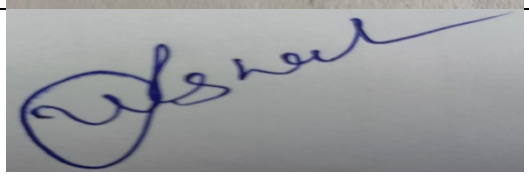
SPECIAL BENCH

Jointly prepared by

Central Pollution Control Board

Gujarat Pollution Control Board

Joint Report on Status of Compliance of Solid Waste Management Rules, 2016 by Surat Municipal Corporation (SMC) with reference to Hon'ble NGT Matter Original Application No. 81/2014(WZ) Kantha Vibhag Yuva Koli Samaj Parivartan Trust & Ors. vs State of Gujarat & Ors.

Name	Organization	Signature
Dr. N. Semwal Scientist C	Central Pollution Control Board, Regional Directorate, Vadodara	
H. M. Lokhandwala Assistant Environment Engineer	Gujarat Pollution Control Board, Regional Office, Surat	
U. R. Shah Assistant Environment Engineer	Gujarat Pollution Control Board, Regional Office, Surat	

Joint Report on Status of Compliance of Solid Waste Management Rules, 2016 by Surat Municipal Corporation (SMC) with reference to Hon'ble NGT Matter Original Application No. 81/2014(WZ)

Background:

In context to the matter that has been put up in pursuance of order of the Hon'ble Supreme Court dated 21.01.2022 in Civil Appeal No. 1046/2019, Kantha Vibhag Yuva Koli Samaj Parivartan Trust & Ors. vs State of Gujarat &Ors which is related to the grievance of the applicant against failure of the Surat Municipal Corporation (SMC) to comply with the Solid Waste Management Rules, 2016 which has resulted in contamination / pollution of environment. Hon'ble NGT (Special Bench) heard the matter on 12.09.2022 and directed Gujarat Pollution Control Board (GPCB) & Central Pollution Control Board (CPCB) to jointly verify the factual status on ground and submit the report. GPCB was appointed nodal agency for coordination and compliance. Hon'ble National Green Tribunal issued following direction vide order dated 12.09.2022,

Para -10

"We have heard learned Counsel for the parties. However, in view of factual dispute about compliance status, factual verification on the ground is necessary, particularly when the GPCB has not furnished its independent report on the subject. Let it be done now jointly by CPCB and GPCB. GPCB will be nodal agency for coordination and compliance. It may file report with factual statistics on each aspect of the waste management - municipal solid waste, plastics, C&D, E-waste and the waste from textile industries. The report may also provide details of quantity of waste generation and processed under each category. It may also mention the capacity of processing plants designed with their actual utilization status. Report may give quantified legacy waste in existence and arrangements with authorized end-users to use components arising out of bio-mining/processing plants. Observation may also be given on maintaining integrity of capped landfill site giving reasons for capping in place of bio-mining. Finally, PCB may mention compliance status and if there are violations, action taken/proposed, including liability for compensation on polluter pays principle, if violations exist."

In compliance of above stated order, following officers of CPCB, Regional Directorate Vadodara & GPCB, Regional Office – Surat carried out the survey cum inspection in Surat on 16.09.2022. The visit was accompanied by SMC officials to provide the necessary information.

- Dr. N. Semwal, Scientist 'C', CPCB, Regional Directorate, Vadodara
- Mr. H. M. Lokahndawala, Assistant Environment Engineer, Regional Office, GPCB Surat
- Mr. U. R. Shah, Assistant Environment Engineer, Regional Office, GPCB Surat
- Mr. Jwalant Naik, Environment Engineer, Surat Municipal Corporation

Point wise compliance status with respect to different category of solid waste management as observed by the joint team are as follows:

1. Status of Landfill Site

The joint team visited 02 sites of solid waste management in Surat along with SMC officials, one at Bhatar and another at Khajod. At Bhatar site, the joint team observed that some segregated solid waste (reject / plastic waste and good soil or compost material) is stored inside the boundary wall. 03 no. Rotary Screen or Trommel were also observed at this site. The quantity of waste was relatively small, SMC officials informed that total waste quantity is about 10,000 MT and presently no fresh waste is received / dumped at this site. It was further informed that the reject / plastic waste will be shifted to Khajod site for preparation of RDF and the organic stabilized waste (good soil) will be utilized as manure for development of Biodiversity Park and Children Park proposed to be developed at this site very soon by SMC under the Surat Smart City Mission. Work Order has already been issued in this regard. (Copy of work order provided by SMC is enclosed as **Annexure – 1**)

Bhatar Landfill Site

The joint team thereafter visited the Khajod site. Solid waste management at Khajod site can be broadly observed under following 02 parts.

Part A: Legacy Waste Management

i. Observation about the closed and capped site

The joint team visited the legacy waste disposal site at Khajod and observed that the entire site is covered with green grass cover with provision of 8 Nos. of Leachate Collection Wells and 40 Nos. of gas venting pipes. SMC official informed that leachate from the collection well is treated in SMC STP at Khajod.

About 25, 00,000 MT of legacy waste of Surat City was dumped at this site which is spread in about 61.2 Hectare area. Surat Municipal Corporation carried out investigation and analysis of the legacy waste at open dumpsite and physical characteristics of the legacy waste was analyzed. As per analysis report, clay/ inert content was ranging from 65-80%, followed by 15-20% of materials such as paper, plastic, thermocol, metal, glass, cloth, leather and others. (Analysis report is enclosed as **Annexure – 2**). Since the quantum of recoverable materials was very less as compared to inert/ clay content. Considering the non-feasibility of bio-

mining and bio-remediation of the old dumpsite, as mentioned in clause (zk) of SWM Rules 2016, scientific capping of the open dumpsite at Khajod was preferred for execution. Further, the issue related to disposal of the said legacy waste was under consideration in Hon'ble NGT Western Zone Bench Pune in this same matter i.e. O.A. 81 of 2014. In the order dated 16th May 2017 passed by Hon'ble NGT Western Zone Bench Pune, the Standing Committee of Surat Municipal Corporation was directed to take a decision and issue work order for commencing the work of closure of Khajod open dumping site within one month. (Copy of order enclosed as **Annexure – 3**) for ready reference.

Considering the above facts, SMC issued Work order (copy of Work Order enclosed as **Annexure – 4)** pertaining to said work on 16.06.2018 and the work for closure / capping of open dump site at Khajod was started in October 2017 and got completed in January 2020 as per the design and details provided by MoUD Govt. of India empaneled consultant Ms. Facile Maven Pvt. Ltd Surat. (List of empanelled agencies is enclosed as **Annexure – 5**)

A view of capped landfill site at Khajod

Close view of capped site showing leachate collection well

ii. Observation about the Sanitary Landfill Facility

SMC has developed 02 Sanitary Landfill Sites (SLF) at Khajod. As per the information provided by SMC official, SLF-1 started in 2006 with initial design capacity of 125000 M^3 which was subsequently expanded (vertically) to 825000 M^3 and SLF-2 started in 2014 with design capacity of 625000 M^3. The joint team observed that both the SLF sites are almost exhausted to their capacity. The solid waste dumped at SLF sites contains thin wrapping / packing plastic waste, cloth pieces, wood etc. Presently, bio-mining (through screening, segregation) at SLF site 1 is under progress in order to create space for disposal of incoming inert waste. 17 nos.Trommels have been engaged for the waste segregation purpose at this site. The segregated plastic, wood etc. are used for RDF preparation. Two set of RDF producing machines (Shredder, compactor, conveyor belt etc.) are provided. The segregated fine material from Trommels is used in compost preparation. A dedicated shed is provided for compost preparation. During visit composting facility was under operation. As per the record of SMC, about 3800 MT compost and 1,43,000 MT RDF /Mix Waste has been recovered from bio-mining activity at this site so far. Major portion of the compost prepared in this facility is sold to M/s Krishak Bharati Cooperative Ltd. (KRIBHCO), a Central Govt. Cooperative that manufacture fertilizer. RDF material is recovered from the Bio-mining process are presently stored at site.

Compost preparation shed

Compost packed in KRIBHCO jumbo bags

RDF Plant

Unsegregated waste disposed at SLF site

Part-B: Incoming Fresh Solid Waste Management

The solid waste collected from door to door and community bin collection system is transported to 08 Transfer Stations. As per SMC record, average total solid waste generation of Surat city is about 2100 MT/Day which includes about 280 MT /Day C&D waste, 180 MT

/Day Recyclable Waste (recovered from 08 nos. Material Recovery Facilities), 90 MT /Day Biodegradable waste processed at decentralized processing plants (50 MT / Day compost processing plant at APMC Market catering waste from APMC Market, Vegetable market, Slaughter house, Hotel & Restaurant and 40 MT /Day compost processing plants situated in zero waste housing societies)As per record of SMC, about 68,453 MT recyclable material is recovered from the 08 nos. Material Recovery facilities during September 2021 to August 2022 and revenue of Rs. 84,30,900 is generated out of it. SMC officials informed that compost prepared from the decentralized biodegradable facilities is distributed to local farmers free of cost.

Thus out of total waste quantity of 2100 MT / Day, about 550 MT /Day of C & D waste, Biodegradable waste and recyclable waste is processed separately at C & D processing facility, Material Recover Facilities and Decentralized biodegradable waste processing facilities respectively. Thus about 1550 MT /Day of remaining waste reaches to Khajod site for disposal.SMC has entrusted the work of operation and management of incoming solid waste at Khajod (12 Acre land) to M/s United facility and logistic Pvt Ltd for processing of 10 lakh MT of waste during two year time period i.e. August – 2020 to Feb – 2023 (copy of work order enclosed as **Annexure – 6**)

The facility is having 7 nos. of trommel (each having capacity of 300 TPD) for segregation of waste and a Refining unit for producing compost. As per record of SMC, approximately 5.12 Lakh MT **(Annexure – 7)** of waste has been received and processed at this site during September 2021 to August 2022 which is about 1400 MT/ Day. About 35,000 MT compost and 1,70,000 MT RDF material is produced from the total received waste during the said period of 1 year.

It is observed during the visit that huge quantity (about 1 Lakh MT as gathered from SMC officials) of incoming unprocessed solid waste is stored at this site. SMC officials informed that processing of waste was slow during last 2 to 3 months of rainy season and the remaining waste will be processed speedily in the coming months.

As per information from SMC & GPCB, exploring viable option for utilization of RDF is under process. In this regard SMC, GPCB and representatives from Surat Industries Association has

started to work out the possibilities of utilization of RDF in industrial boilers. Initial meeting in this regard has already been conducted on 24th august 2022 and it was decided in the meeting that a SOP will be prepared by SMC based on a study as per Guidelines of MoUD & CPCB and the approval for the same will be given by GPCB. It is expected that based on the outcome of the study, utilization of the RDF can be started in the industrial boilers.

SMC officials informed the joint team that considering the fact that storage of incoming waste in temporary area and increasing volume of incoming fresh waste, SMC has already invited the tender for processing of 30 lakh MT of waste in the span of 3 years, which is 2700 MT /Day. The said tender is presently in active phase and the first phase of said plant will be made functioning by Feb 2023.

It is gathered from SMC officials that closing of Khajod disposal site is under active consideration of SMC keeping in view of upcoming commercial and infrastructure projects around this site as per the master plan of Surat city in coming 3 -4 years. Accordingly the process of identifying new site has already been started, wherein joint inspection was also done by the representative of GPCB and SMC and site inspection report of the land located at UMBER village, Surat has already been forwarded to District Collector office Surat, **(Annexure – 8)** for further decision and allotment process.

Incoming waste treatment site

2. Status of Plastic Waste Management

SMC has entrusted the work of plastic waste management to a company M/s Ecovision Environmental Resources LLP on PPP mode for 20 years. SMC has issued work order to the said company on 12.06.2015. (Copy of work Order enclosed as **Annexure – 9**).The facility which is established at Moze - Bhatar is under operation since 2017.

M/s Ecovision Environmental Resources LLP has obtained consent to operate from GPCB for processing of 6000 MT/Month plastic waste. The consent is valid up to 28/04/2023. M/s Ecovision Environmental Resources LLP is also registered on CPCB portal for Extended Producer Responsibility (EPR). (Copy of CC&A is enclosed as **Annexure – 10**).

The facility receives plastic waste from Collection Center / Material Recovery Facility established by SMC in 08 different zones of Surat city and among other minor sources of waste are self-collection by facility, informal sector, industries having EPR liability and decentralized zero waste housing societies.

The facility was under operation during the visit. Present capacity of processing plant is 75 MT/Day. Various grade plastic pellets are produced from the processing of plastic waste which are utilized for production of various plastic products. The facility is maintaining the record of plastic waste received and processed by them. Last one year record shows that 26,862 MT plastic waste has been processed at the facility which is about 73 MT/Day.

A survey cum verification of plastic waste management in Surat city, carried out by CPCB Regional Directorate Vadodara during August 2021 shows that estimated quantity of plastic waste generation is about 9.3% of total municipal waste. It is further estimated that about 2% plastic waste is collected by informal sector and about 3% unsegregated plastic waste is disposed at landfill site. As per SMC record, Surat city generates about 2100 MT / Day solid waste which includes 280 MT / Day C&D Waste, 90 MT / Day Biodegradable waste processed at decentralized facilities (50 MT / Day compost processing plant at APMC Market and 40 MT / Day at zero waste housing societies). Out of 1730 MT / Day waste (subtracting C&D waste and biodegradable waste quantity from total waste) an estimated plastic waste generation @ 9.3% would be about 161MT/Day. Out of 161 MT / Day, 73 MT / Day is processed at plastic

waste processing facility and estimated 2% i.e. 34 MT / day plastic waste is collected by informal sector and estimated 3% i.e 52 MT / Day un-segregated plastic waste is disposed at landfill site. The remaining 02 MT/Day could move either with informal sector or landfill site.

Plastic waste management facility

Sorting of plastic waste

Process area

Recycled plastic granules

3. Status of C & D Waste Management

SMC has entrusted the work of C&D waste management to a company M/s Surat Green Precast Pvt. Ltd. on PPP mode for a period of 20 years (copy of work order is enclosed as **Annexure – 11**).

M/s Surat Green Precast Pvt Ltd has obtained Authorization from GPCB under C&D Rules with Authorization No. GPCB/MSW/C&D/SRT-2/623350 which is valid up to 31/08/2026 **(**Copy of Authorization enclosed as **Annexure – 12)**

The facility which is established in 13000 m^2 area at Moze- Kosad was commissioned in 2019. The maximum processing capacity of the plant is 300 MT/Day. The facility is maintaining the record of C&D waste received and processed by them. As per the logbook record, average 280 MT / day C&D waste has been processed at the facility. As per record of SMC, total C&D waste generation is 280-290 MT/Day.

It is gathered from operator of the facility that the product i.e. sand and aggregates are sold @ Rs. 750 / MT.

C&D Facility at Kosad

4. Status of E- Waste Management

SMC has entrusted the work of E-waste management on PPP mode to a company M/s Pruthvi E-waste Recycle Pvt Ltd at Unn, Surat (Copy of work order is enclosed as **Annexure – 13**). The capacity of processing plant is 5 T/D.M/s Pruthvi E-waste Recycle Pvt Ltd has obtained CC&A under E-waste Rules with Consent No. AWH-111342 from GPCB which is valid up to 10/08/2024 **(**Copy of CC&A is enclosed as **Annexure – 14).**

As per record, total 315 MT E-waste was received and processed in the facility during August 2021 to August 2022, making it about 0.8 MT/Day. The facility is engaged in dismantling and separation of components from E waste at Surat. It is informed that further recovery and final disposal is done at its another unit situated at Rajkot. Copy of CCA of M/s Pruthvi E-waste Recycle Pvt Ltd, Rajkot is enclosed as **(Annexure – 15)**. Apart from that as per GPCB Records, there are five registered E-Waste recycler in Surat district. As per the details available with GPCB, total all the five E-waste units have processed approximately 1000 Tons/Year of E-waste in the year 2021 – 22.

There is no collection center of SMC for E-waste in Surat city but SMC has provided on call facility for E-Waste collection. SMC toll free number is 8238227927.

E-Waste management facility at Unn, Surat

5. Status of Management of Textile Industries Non- Hazardous Waste

Presently, no such facility for management and disposal of non-hazardous textile waste is provided by SMC.

Textile solid waste (non-hazardous) is mainly generated from textile industrial units, commercial textile activities and house-hold textile activities. The generated waste is disposed along with municipal solid waste at present. As per GPCB records, presently there is no facility for disposal of this non-hazardous textile waste.

6. Status of Waste to Energy plant

The waste to energy plant is not yet provided. SMC officials informed that power tariff for the said project is not finalized by Gujarat Electricity Regulatory Commission (GERC) and therefore Power Purchase Agreement could not be finalized resulting in delay in the execution of the project.

7. Summary of Observations

Description	Details
Municipal Solid Waste Management	
Total waste generation	2100 TPD
Legacy Waste	• About 25, 00,000 MT of legacy waste of Surat City was dumped at Khajod disposal site which is spread in about 61.2 Hectare area. It was observed that the entire site is covered with green grass cover with provision of 8 Nos. of Leachate Collection Wells and 40 Nos. of gas venting pipes. • The work for closure / capping of open dump site at Khajod was started in October 2017 and got completed in January 2020 as per the design and details provided by MoUD Govt. of India empanelled consultant Ms. Facile Maven Pvt. Ltd Surat • SMC has developed 02 Sanitary Landfill Sites (SLF) at Khajod. The joint team observed that both the SLF sites are almost exhausted to their capacity. The solid waste dumped at SLF sites contains thin wrapping / packing plastic waste, cloth pieces, wood etc. Presently, bio-mining (through screening, segregation) at SLF site 1 is under progress in order to create space for disposal of incoming inert waste. Segregated plastic, wood etc. are used for RDF preparation and fine material from Trommels is used in compost preparation. As per the record of SMC, about 3800 MT compost and 1,43,000 MT RDF /Mix Waste has been recovered from bio-mining activity at this site so far. Major portion of the compost prepared in this facility is sold to M/s Krishak Bharati Cooperative Ltd. (KRIBHCO), a Central Govt. Cooperative that manufacture fertilizer. RDF material is recovered from the Bio-mining process are presently stored at site.
Fresh Municipal Solid	• SMC has entrusted the work of operation and management of

waste management	incoming fresh municipal solid waste at Khajod (12 Acre land) to M/s United facility and logistic Pvt ltd for processing of 10 lakh MT of waste during two year time period. • Approximately 5.12 Lakh MT of waste has been received and processed at this site during September 2021 to August 2022 which is about 1400 MT/ Day. • About 35,000 MT compost and 1,70,000 MT RDF material is produced from the total received waste during the said period of 1 year. Compost prepared in this facility is sold to M/s Krishak Bharati Cooperative Ltd. (KRIBHCO) and in open market also, however there is no option for disposal of generated RDF and presently the RDF is stores at site.
Plastic waste process	• SMC has entrusted the work of Plastic waste management to a company M/s Ecovision Enviro Resources LLP on PPP mode. • Plastic waste is collected through MRFs (Material Recovery Facilities) & other sources. • Present capacity of recycling plant is 75 MT / Day. Last one year record shows that 26,862 MT plastic wastes has been processed at the facility which is about 73 MT/Day.
C&D waste	• SMC has entrusted the work of C&D waste management to a company M/s Surat Green Precast Pvt. Ltd. on PPP mode. The processing plant capacity is 300 MT / Day. Approx. 280 – 290 MT/Day C& D Waste is processed by M/s Surat Green Precast Pvt. Ltd.
E-Waste	• SMC has entrusted the work of E-waste management on PPP mode to a company M/s Pruthvi E-waste Recycle Pvt Ltd at Unn, Surat. The capacity of processing plant is 5 T/D. As per record, total 315 MT E-waste was received and processed in the facility during August 2021 to August 2022, making it about 0.8 MT/Day. • The facility is engaged in dismantling and separation of components from E waste at Surat. It is informed that further recovery and final

	disposal is done at it's another unit situated at Rajkot. Apart from this, as per GPCB records, there are 05 registered E-Waste recyclers in Surat district. As per the details available with GPCB, total all the five E-waste units have processed approximately 1000 Tons/Year of E-waste in the year 2021 – 22. • There is no collection center of SMC for E-waste in Surat city but SMC has provided on call facility for E-Waste collection. SMC toll free number is 8238227927.

8. Conclusion

Considering the above stated facts, it can be concluded that capping of legacy waste site at Khajod is observed satisfactory. However, considering the volume of incoming fresh waste and the waste stored presently at Khajod site, processing of waste needs to be expedited. Also, large quantity of RDF is getting generated and accumulated from the waste processing facility without any disposal option and therefore scientifically viable disposal option needs to be explored at the earliest. It is to worth to mention that management of solid waste of such voluminous quantity without option for RDF disposal is practically not possible.

Observations with respect to plastic waste and C&D waste recycling facility appears satisfactory. E-waste management system needs to be strengthened.

With reference to Waste to Energy Plant, SMC has still not provided the Waste to Energy Plant due to reasons cited in para 5 above and also the disposal facility for nonhazardous textile waste is presently not existed.

1706 Annexure - 1

Surat SMART CITY

Surat Smart City Development Limited

By R.P.A.D.

WORK ORDER

PPG (Pro.Cell)/Outward No: 18
DATE: 30/07/2022

To
Devarsh Construction Co.
214, 2nd Floor, Pratik Mall,
Gandhinagar-Koba Road,
Nr. Swaminarayan Dham,
Gandhinagar-382421

Subject :- Development of Urban Forestry Theme Park-2 (Zone E1) under the main project titled- "Creating Wild Valley 'Biodiversity Park' as City Lungs by rejuvenation of existing wasteland along the Kankara Creek", Surat.

Ref. :-
1) Tender Notice No.GM/SSCDL/Biodiversity Park/01/2022-2023 (Tender ID: 528291)
2) Your letter dated. 15/07/2022.
3) Project Management Committee Resolution No.91/2022, Dated 25/07/2022

Gentleman,

With reference to subjected work, it is to inform you that the online tender quoted by you with your written consent dated 15/07/2022 under reference (02), your tender amounting to Rs. 97855963.27 which is +23.58% above the estimated cost Rs. 79184304.31 is accepted and sanctioned by Project Management Committee of Surat Smart City Development Limited vide Resolution No.91/2022, Dated 25/07/2022 subject to terms, conditions, specifications & provisions of the tender, addenda-corrigendum (if any). Hence, you are instructed to start the work immediately by making preliminary preparations, after receiving this work order.

1. You are requested to deposit 2% of the accepted tendered amount i.e., Rs. 19,57,200/- as a Security Deposit (S.D.) within 10 days from the date of this work order as detailed in the tender document. If S.D. is not deposited within schedule time limit, the penalty at the rate of 0.065% per day of Security Deposit amount will be charged and shall have to pay separately along with the S.D.

Also, arrange to execute the agreement and to give surety and undertaking on stamp papers as per Government norms. If Security deposit (SD) is deposited in the form of cash, cheque, draft or bank guarantee, the agreement shall be executed on Government stamp paper worth Rs.300=00 and if SD is deposited in the form of FDR, NSC, or any kind of saving certificates, the agreement shall be executed on Government stamp paper worth 4.90 % of SD amount. Please complete the above formalities within ten days and also start the work at site.

..2..

2. If you have failed to submit Solvency Certificate, Income Tax Clearance Certificate and list of work done experience along with the tender, you are required to submit all the information along with its proof along with the agreement / security.
3. If you are a partnership firm, you are required to submit a photocopy / certified copy of the original partnership agreement with the original contract.
4. SMC/SSCDL shall appoint special surveillance team to ensure the progress of work as mentioned in the tender documents. Hence, you are required to keep a track of the progress of the work accordingly, and also present progress specific bar charts in advance.
5. Having received this letter, you are required to contact the relevant Deputy Engineer / Assistant Engineer, in order to get the line of work / guidance / advice for starting work.
6. The time limit for completion of this work is to be considered as 18 (Eighteen) months (including monsoon season) from the date of completion of 10 (ten) days from the date of this work order.
7. Please note that you will be required to submit the Employees' Provident Fund (EPF) number and also make a timely deposit the money of the workers' Provident Fund in the Employees' Provident Fund Account.
8. **Contract Labor (Rules and Abolition) Act 1970:** You shall arrange to obtain the license from the Competent Authority under the contract Labour (Regulation and Abolition, Act, 1970) besides such other licenses and permissions as mentioned in the tender document. Also note, that in case this work is carried out without getting it, the possible responsibility pertaining to work shall be borne by you.
9. **Insurance Policy:** You will be required to maintain Contractor's All Risk (CAR) Insurance Policy of an amount to Rs. 8 (Eight) Crore from the date of commencement of the work till satisfactorily completion of the defect liability period.

Chief Executive Officer
Surat Smart City Development Limited

G/C

Copy Sent to : Executive Engineershri, South Zone(Udhna)..... For information
: Chief Finance Officershri, SSCDL ..... For information
: Tender Clerkshri..... For keeping record

Annexure 1708 2

December- 2016 **Version 1.0**

Techno-Economic Feasibility Study of Closure for Accumulated Waste at Khajod Landfill Site




Detail Project Report

Consultant:

Facile Maven Pvt. Ltd.

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Executive Summary

Municipal solid waste management is an important part of the urban infrastructure that ensures protection of environment and human health. The accelerated growth of urban population, increasing economic activities and lack of training in modern solid waste management practices in the developing countries complicate the efforts to improve this service sector. The most prevalent way of disposing MSW in the developing countries is open dumping is the easiest and considered to be the cheapest method of removing waste from the immediate environment. The decomposition of biodegradable wastes in open dumpsites results in the production of leachate and greenhouse gases long even after the site has stopped receiving wastes. The increasing awareness on public health and environmental quality concerns are expected to provide the impetus that is needed to develop and implement a sustainable approach to manage solid wastes and rehabilitation of the existing open dumps.

The present report focusing on “Dumpsite Rehabilitation” recommends a phased approach for closure of open dumps, taking into account the different physical and economic situations prevailing in India. It is aimed at improving better and environmentally sound waste disposal methods by shifting from their present practice of open dumping closure and to sanitary land filling.

Prior to actual closure of the dumpsite, an investigation of the existing conditions of the site is conducted and the risk evaluated. Efforts have been made to draw up the practical options to meet the objectives, to develop a closure plan. The closure plan is having various activities to be implemented including the stabilization of steep slopes to prevent erosion hazards, the implementation of surface water and gas management systems, and the design of the final cover. Two options were explored for capping of existing dump with estimated cost of Rs. 65 Cr including O&M cost of 10 lakhs per year for 5 years. Option 1-B capping of existing dump with estimated cost of Rs. 131 Cr. And Option 2 construction of new landfill cell and disposing existing waste into new cell with estimated cost of Rs. 160 Cr.

Landfill mining eliminates groundwater contamination and recovers valuable resources including land but project span is five years i.e. compared to other options. Land recovery is high but other recyclable waste recovery is less due to high clay content. Estimated cost of LF mining and setting up of material recovery facility is Rs. 75 Cr.

Closure Option 1-B and Option 3 has revenue possibilities and funding for external agencies and execution of this project on PPP mode is possible.

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1 Introduction

Urbanization has been one of the dominant contemporary processes as a growing share of the global population lives in cities. Considering this trend, infrastructure issues are of foremost importance to support development of country. Rapid growth in India is imposing a huge strain on the infrastructure facilities amongst other essential civic services.

Policy-makers across Asia are facing formidable demands to meet the infrastructure needs of citizens in ways which are economically, socially and environmentally sustainable. The challenge to promote and sustain an ever-evolving infrastructure in an urban area is a matter of utmost complexity which requires innovative research and action initiatives.

1.1 Surat City Profile

1.1.1 City Location

Surat is India's eighth and Gujarat's second most populous city, having an estimated population of 5.5 million (approx.) as on 2016. Surat is the commercial capital of Gujarat and diamond and textile hub of the nation. It became a metropolis in 1991, along with eleven other cities across the country, by crossing the one million population mark.

Surat is situated at latitude 21 12' N and 72 52' E on the bank of river Tapi having coastline of Arabian Sea on its West at about 19.4 kms along the Tapi stream and about 16 km by road along Dumas. It is 13 meters above the mean sea level. Figure 1 shows the location of Surat in Gujarat State as well as the map of Surat city.

Surat city located in well-developed South Gujarat region occupies a pivotal position on the Ahmedabad – Mumbai regional corridor and centrally located at a distance of 260 kms north of Mumbai, 224 kms south of Ahmadabad and on the 225 km. along industrial belt, having direct linkages with the industrial urban centers of Vadodra, Ankleshwar and Vapi. The National Highway No. 8, one of the busiest interstate trunk routes in the country, passes within 16 km of the S.M.C boundary. The city is well connected by road and rail with all the major cities and towns of the nearby states. The State Government has also established an airstrip to facilitate smaller size aircraft landings but no domestic air service has been started yet.

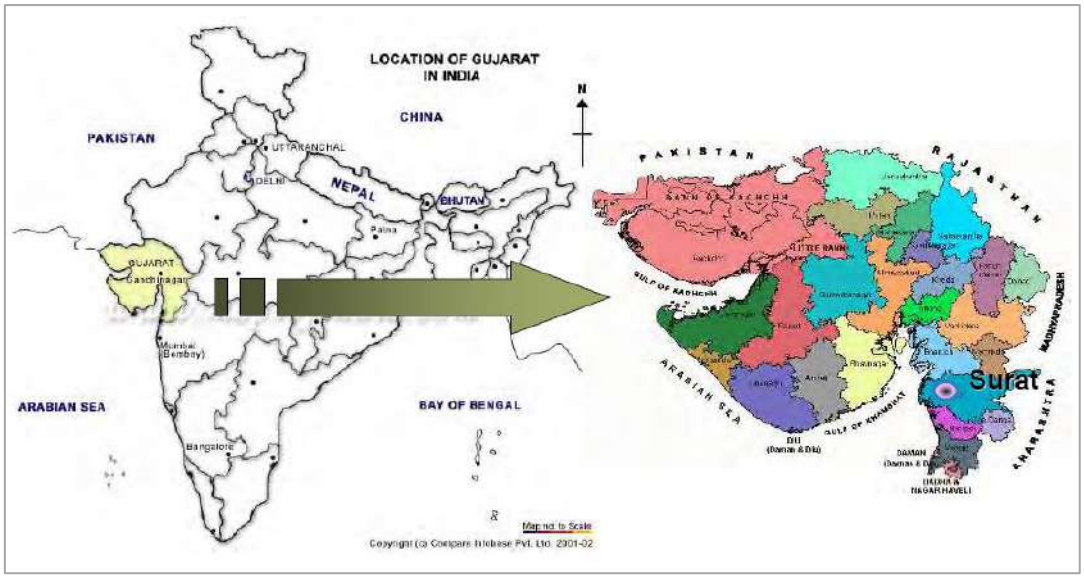


Figure 1 Location Map Surat

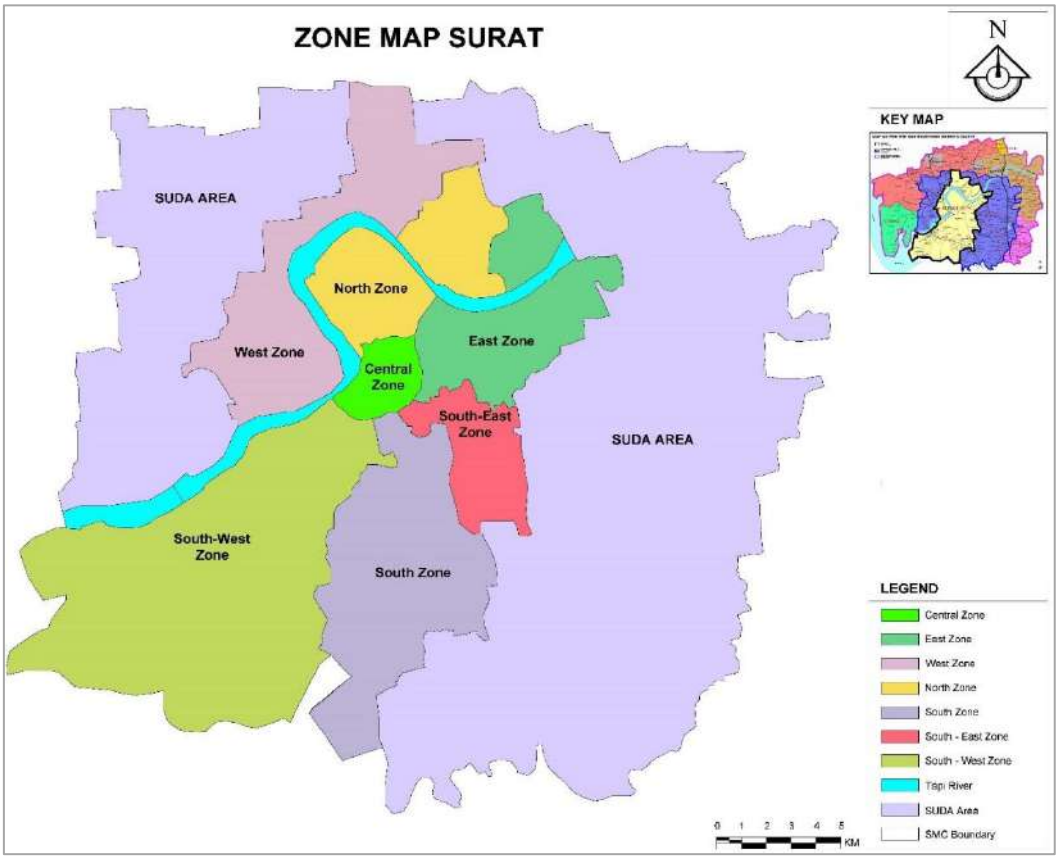


Figure 2 Zone Map Surat city

1.1.2 City Expansion

The city was originally established on the south-eastern bank of the river Tapi with a castle in the eastern bank of the river and Custom House on the northern side of the castle. In the beginning, the activities were concentrated with the inner wall, which had been constructed in the year 1664. The

area of the city at that time within this wall was 178 hectors. The entrances to the walled city area was through 12 gates, viz. to the north Variav gate, to the east Saiyadpura and Burahanpura gates, to the south Navsari and Majura gate and on the west the Mecca and Badshahi gates and along the river front the Dacca owara, the Raja owara or the Custom House water gate, Mirabehar and Lalgate. The outer wall was constructed in the year 1707, enclosing an area of 7.36 sq. km.

The municipality of Surat was established in 1853, covering area of 7.36 sq. km. The city area was expanded to 24.01 sq. km. in year 1971. Today's city of Surat is an outcome of expansion of the city's limits at various intervals as shown in the Figure 3.

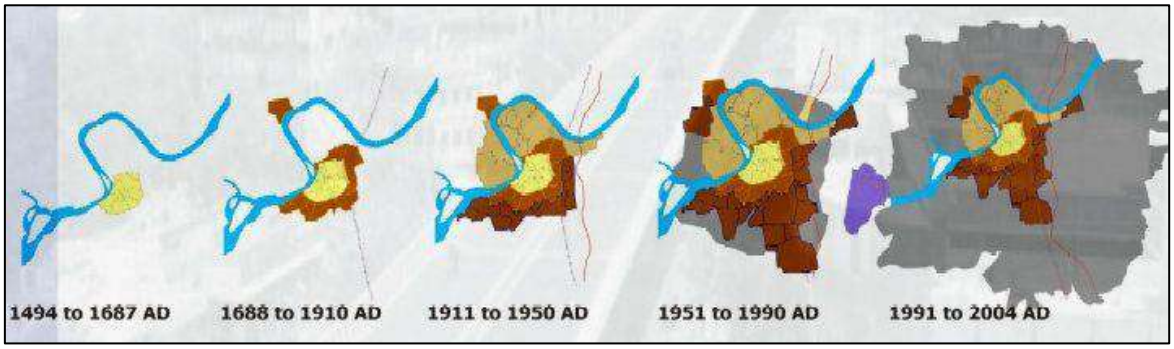


Figure 3 Progressive development of city

Surat has experienced very rapid population growth during the last 20 years. This rapid growth in a very short time span is the hallmark of Surat's demographic trends. Total area of city is 334.147 Sq. Km., which is divided into total seven (07) zones for administrative purposes. High population growth rate and large migration rate have become prime factor for increases in total city level waste generation.

1.1.3 Urbanization and Population Growth in Cities of Gujarat

Urbanization is a determinant as well as result of economic development. It is a natural consequence of economic changes that take place as a country develops. Certain activities are better performed in certain density of agglomerations of people, while others are not.

The urban population of Gujarat has mainly been concentrated in seven major cities viz. Ahmedabad, Surat, Baroda, Rajkot, Bhavnagar, Junagadh and Jamnagar. The demographic profile can be seen from Table 1.

Table 1 Population and Growth Rate of Major Cities of Gujarat State

	Surat		Ahmedabad		Vadodara	
Census year	Population	% Gr. Rate	Population	% Gr. Rate	Population	% Gr. Rate
1901	1,19,306	-	1,85,889	-	1,03,790	-
1911	1,14,868	-3.72	2,16,777	16.62	99,345	-4.28
1921	1,17,434	2.23	2,74,007	26.40	94,712	-4.66
1931	98,936	-15.75	3,10,000	13.13	1,12,880	19.16
1941	1,71,443	73.29	5,91,267	90.73	1,53,301	35.83
1951	2,23,182	30.18	8,37,163	41.59	2,11,407	37.90
1961	2,88,026	29.05	11,49,918	37.86	2,98,398	46.50
1971	4,71,656*	63.75	15,91,832	37.88	4,67,487	50.94
1981	7,76,583*	64.65	21,59,127	35.63	7,34,473	57.11
1991	14,98,817*	93.00	28,76,710	26.92	10,31,346	44.53
2001	24,33,835	62.38	35,20,085	22.36	13,06,227	26.65
2011	45,01,610	54.06	56,33,927	62.48	17,52,371	74.54

1.2 Need for this Project

Surat Municipal Corporation has total area of 334.147 Sq. Km and population of 55 Lacs generating average 1700 TPD municipal solid waste (MSW) as on 2016. Daily 1700 MT MSW is collected from household, institution, market place, commercial area and send to Khajod site for treatment and disposal. Khajod admeasures 200 hectors and it is in utilization since year 2002. Land available for treatment and disposal of waste where the solid waste is disposed is 10 Km away from city. Land available at Khajod is allotted to various treatment facilities waste to compost, waste to energy, plastic waste treatment etc. Upto 2006, cell no -1 at Khajod site was under practice for disposal of waste collected from the city. In 2008-09, another sanitary landfill cell no-2 was constructed and is still under practice. However, in the time phrase large amount of untreated waste was directly dumped in the open ground near cell no 1 and 2. Hence, the need for capping of this open dump was aroused. Also, there are two sanitary landfill cells at Khajod site. It observed that remaining land available for disposal of waste may be exhausted in near future. Hence, need for extension of the current landfill was aroused and find the alternatives for scientific disposal of the existing waste. Facile Maven Private Limited, an esteemed firm having vast experience of working in Solid Waste Management projects, was interested to provide services for preparation of Feasibility study report

for expansion of landfill site at Khajod, Surat and providing recommendations for closure of the existing dump.

1.3 Objectives of this DPR

Main objectives of this Detailed Project Report are:

- Study the existing profile of the Khajod site
- Conduct physical and chemical sample analysis for fresh waste and legacy waste
- Conduct Topographical Survey of Khajod Disposal Site
- Prepare alternatives for closure of the open dump
- Calculate the size of the new sanitary landfill site
- Suggest recommendation for the best possible option based on the study

1.4 Outline of the DPR

This Detailed Project Report on “Techno-Economic Feasibility Study of Closure for Accumulated Waste at Khajod Landfill Site” is divided into nine chapters.

Chapter 1: Introduction

Chapter 2: Solid Waste Management Profile of Surat City

Chapter 3: Current Disposal of Waste at Khajod Site, Surat

Chapter 4: Landfill, Dumpsite and Closure of Dumpsite

Chapter 5: Proposals for Landfill Closure

Chapter 6: Summary of Estimated Cost

Chapter 7: Environmental Management Plan

Chapter 8: Post Closure Maintenance Requirements

Chapter 9: References

2 Solid Waste Management Profile of Surat City

2.1 Municipal Solid Waste (MSW)

There has been a significant increase in municipal solid waste (MSW) generation in India in the last few decades. This is largely because of rapid population growth and economic development in the country. Solid waste management has become a major environmental issue in India. The per capita of MSW generated daily, in India ranges from about 100 g in small towns to 700 g in Metro cities.

Rapid industrialization and population explosion in India has led to the migration of people from villages to cities, which generate thousands of tons of Municipal Solid Waste (MSW) on daily basis. This clearly indicates that the growth in MSW in our urban centres has outpaced the population growth in recent years. This trend can be ascribed to our changing lifestyles, food habits, and change in living standards. MSW in cities is collected by respective municipalities and transported to designated disposal sites, which are normally low lying areas on the outskirts of the city. The limited revenues earmarked for the municipalities make them ill-equipped to provide for high costs involved in the collection, storage, treatment, and proper disposal of MSW. Thus, a substantial part of the MSW generated remains unattended and grows in the heaps at poorly maintained collection centres. The choice of a waste disposal site also is more a matter of what is available than what is suitable.

There are many terms, which relate to the types and sources of wastes in India. All the major cities and towns generate waste from various activities. Based on the source, origin and type of waste a comprehensive classification is described below:

2.1.1 Types of municipal solid waste

2.1.1.1 Domestic/Residential Waste:

This category of waste comprises the solid wastes that originate from single and multi-family household units. These wastes are generated because of household activities such as cooking, cleaning, repairs, hobbies, redecoration, empty containers, packaging, clothing, old books, writing/new paper, and old furnishings. Households also discard bulky wastes such as furniture and large appliances which cannot be repaired and used.

2.1.1.2 Municipal Waste:

Municipal waste includes wastes resulting from municipal activities and services such as street waste, dead animals, market waste and abandoned vehicles. However, the term is commonly applied in a wider sense to incorporate domestic wastes, institutional and commercial wastes.

2.1.1.3 Commercial Waste:

Included in this category are solid wastes that originate in offices, wholesale and retail stores, restaurants, hotels, markets, warehouses and other commercial establishments. Some of these wastes are further classified as garbage and others as rubbish.

2.1.1.4 Institutional Waste:

Institutional wastes are those arising from institutions such as schools, universities, hospitals and research institutes. It includes wastes which are classified as garbage and rubbish as well as wastes which are hazardous to public health and to the environment.

2.1.1.5 Garbage:

Garbage is the term applied to animal and vegetable wastes resulting from the handling, storage, sale, preparation, cooking and serving of food. Such wastes contain putrescible organic matter, which produces strong odours and therefore attracts rats, flies and other vermin. It requires immediate attention in its storage, handling and disposal.

2.1.1.6 Rubbish:

Rubbish is a general term applied to solid wastes originating in households, commercial establishments and institutions, excluding garbage and ashes.

2.1.1.7 Ashes:

Ashes are the residues from the burning of wood, coal, charcoal, coke and other combustible materials, for cooking and heating in houses, institutions and small industrial establishments. When produced in large quantities at power generating plants and factories these wastes are classified as industrial wastes. Ashes consist of a fine powdery residue, cinders and clinker often mixed with small pieces of metal and glass.

2.1.1.8 Bulky Wastes:

In this category are bulky household wastes which cannot be accommodated in the normal storage containers of households. For this reason, they require special collection. In developed countries, bulky wastes are large household appliances such as cookers, refrigerators and washing machines as well as furniture, crates, vehicle parts, tyres, wood, trees and branches. Metallic bulky wastes are sold as scrap metal but some portion is disposed of at sanitary landfills.

2.1.1.9 Street Sweeping:

This term applies to wastes that are collected from streets, walkways, alleys, parks and vacant lots. In the more affluent countries manual street sweeping has virtually disappeared but it still commonly takes place in developing countries, where littering of public places is a far more

widespread and acute problem. Mechanised street sweeping is the dominant practice in the developed countries. Street wastes include paper, cardboard, plastic, dirt, dust, leaves and other vegetable matter.

2.1.1.10 Dead Animals:

This is a term applied to dead animals that die naturally or accidentally killed. This category does not include carcass and animal parts from slaughterhouses which are regarded as industrial wastes. Dead animals are divided into two groups, large and small. Among the large animals are horses, cows, goats, sheep, hogs and the like. Small animals include dogs, cats, rabbits and rats. The reason for this differentiation is that large animals require special equipment for lifting and handling during their removal. If not collected promptly, dead animals are a threat to public health because they attract flies and other vermin as they putrefy. Their presence in public places is particularly offensive and emits foul smell from the aesthetic point of view.

2.1.1.11 Construction and Demolition Wastes:

Construction and demolition wastes are the waste materials generated by the construction, refurbishment, repair and demolition of houses, commercial buildings and other structures. It mainly consists of earth, stones, concrete, bricks, lumber, roofing materials, plumbing materials, heating systems and electrical wires and parts of the general municipal waste stream, but when generated in large amounts at building and demolition sites, it is generally removed by contractors for filling low lying areas and by urban local bodies for disposal at landfills.

2.1.1.12 Industrial Wastes:

In the category are the discarded solid material of manufacturing processes and industrial operations. They cover a vast range of substances which are unique to each industry. For this reason they are considered separately from municipal wastes. It should be noted, however, that solid wastes from small industrial plants and ash from power plants are frequently disposed of at municipal landfills.

2.1.1.13 Hazardous Domestic Wastes:

Hazardous wastes may be defined as wastes of industrial, institutional or consumer origin which, because of their physical, chemical or biological characteristics are potentially dangerous to human and the environment. In some cases although the active agents may be liquid or gaseous, they are classified as solid wastes because they are confined in solid containers. Typical examples are: solvents, paints and pesticides whose spent containers are frequently mixed with municipal wastes and become part of the urban waste stream. Certain hazardous wastes cause explosions in

incinerators and fires at landfill sites. Others, such as pathological wastes from hospitals and radioactive wastes, require special handling at all time. Good management practice should ensure that hazardous wastes are stored, collected, transported and disposed off separately, preferably after suitable treatment to render them innocuous.

2.1.1.14 Sewage Wastes:

The solid by-products of sewage treatment are classified as sewage wastes. They are mostly organic and derive from the treatment of organic sludge from both the raw and treated sewage. The inorganic fraction of raw sewage such as grit is separated at the preliminary stage of treatment, but because it entrains putrescible organic matter which may contain pathogens, must be buried / disposed off without delay. The bulk of treated, dewatered sludge is useful as a soil conditioner but invariably its use for this purpose is uneconomical. The solid sludge therefore enters the stream of municipal wastes unless special arrangements are made for its disposal

The very essential aspect of Municipal Solid Waste Management in India is Disposal. As per the Central Pollution Control Board, the insanitary methods adopted for disposal of solid wastes is, therefore, a serious health concern. The poorly maintained landfill sites are prone to groundwater contamination because of leachate production. Open dumping of garbage facilitates the breeding for disease vectors such as flies, mosquitoes, cockroaches, rats, and other pests

2.2 Municipal Solid Waste Management in Surat

Surat Municipal Corporation (Solid Waste Management Cell, Muglisara, Surat) has aggressively addressed the city's environmental health problems, including solid waste management since 1994. It is one of its kind in Gujarat where private contracting and private participation in solid waste management is being done. It is now one of the cleanest cities in India and is able to collect more than 98% of the Solid waste. Surat has been recognized nationally for its exemplary solid waste collection efforts, while the city faces serious problems concerning the disposal of solid waste. As a part of decentralization entire city is divided into seven zones and 54 sanitary wards for effective and efficient solid waste management.

Surat generates app. 325 gms per capita per day of waste amounting to roughly 1600 MT. This is collected by SMC, private contractors and the rag pickers. About 70 percent of the waste generated every day is contributed by households, shops and other commercial establishments. Just over 30 percent of the total waste generated is recyclable. This comprises of paper, plastic, metal, brick stone and glass primarily.

The main objective of providing Solid Waste Management is to ensure that the Solid waste

discharged from the communities is properly collected, transported and treated to the required degree and finally disposed-off, as quickly as possible, without causing any health hazard or environmental pollution in the area. The other objectives are-

- To protect the quality of surface, ground as well as coastal water quality against possible pollution due to indiscriminate discharge of untreated solid waste.
- To protect the health of the community from various diseases, caused by unscientific solid waste discharges.
- Incineration destroys waste material by burning it. It creates toxic gas and ash, which can harm local populations and pollute groundwater.
- To devise a system of storage of food/Biodegradable waste as well as recyclable waste separately at the source of generation of waste.
- To devise cost effective systems for primary collection of waste from the city in general and from the slums.
- To devise efficient system of day to day cleaning of streets and public places,
- To devise systems to eliminate the age-old practice of throwing garbage on the streets or outside the dustbins causing nuisance to the people and posing a threat to the health of community at large,
- To modernize system of wastage storage depots which may synchronize with the system of primary collection as well as transportation of waste and simultaneously eliminate manual loading of the waste into open transportation vehicles;

Domestic waste consists of primarily food waste, paper, plastics, glass, metal, rags and other packaging materials. Domestic waste is the largest part of municipal waste. To promote processing of waste for deriving Bio organic fertilizer, reduce quantity of waste going to landfill site; derive income from the processing of waste and help agricultural production.

2.2.1 Institutional Framework

Surat Municipal Corporation sets up institutional frame work for handling the project of solid waste management. The overview of set up can be seen from Fig. 4

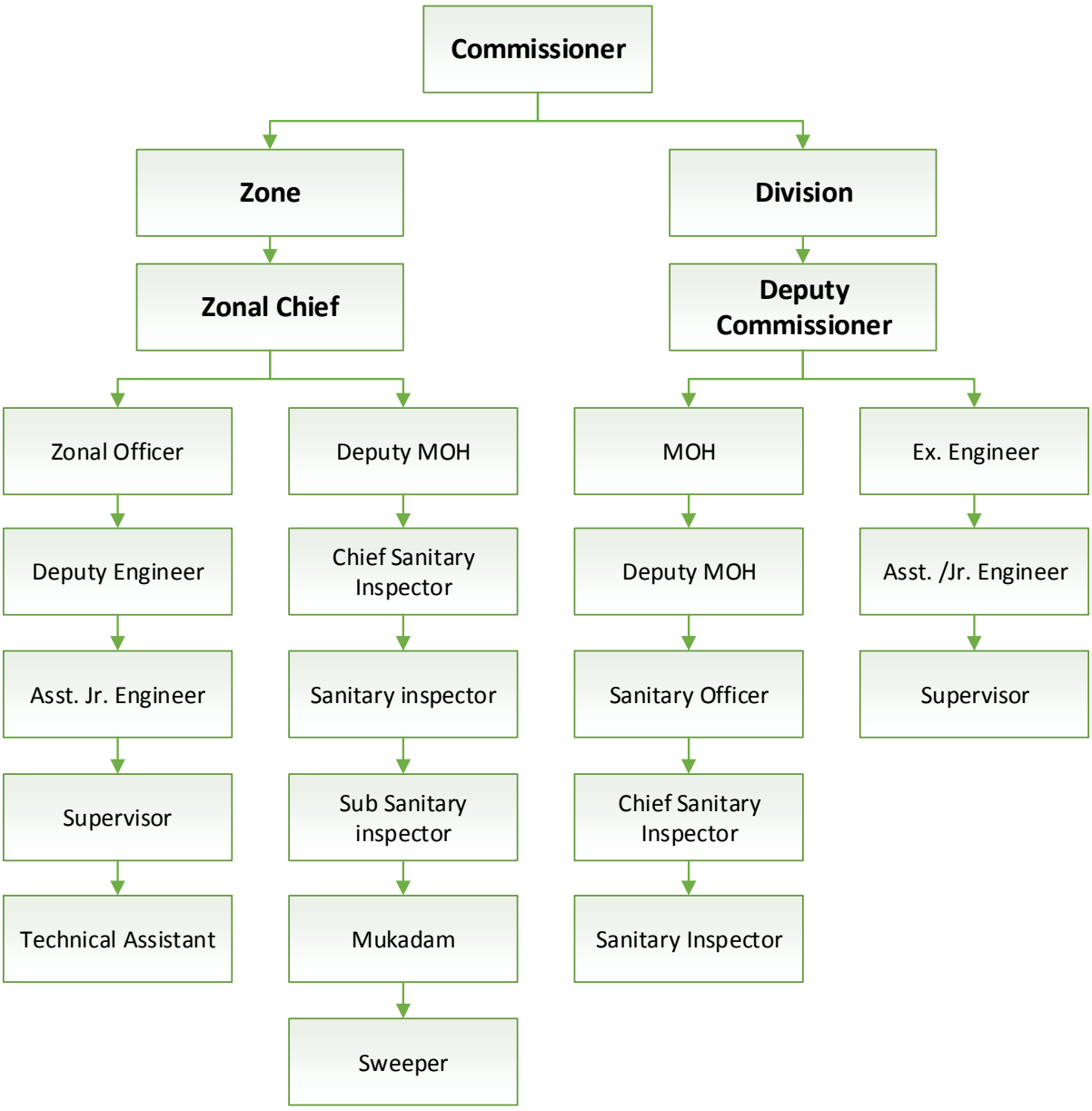


Figure 4 Administrative Setup

2.2.2 Current Status of MSW Components in Surat

The municipal solid waste management system in Surat city is divided in following main activities.

- Waste generation
- Storage at household level
- Collection
- Primary Transportation
- Secondary Transportation
- Treatment
- Disposal

The inter-relationship between the activities is identified in Figure 5

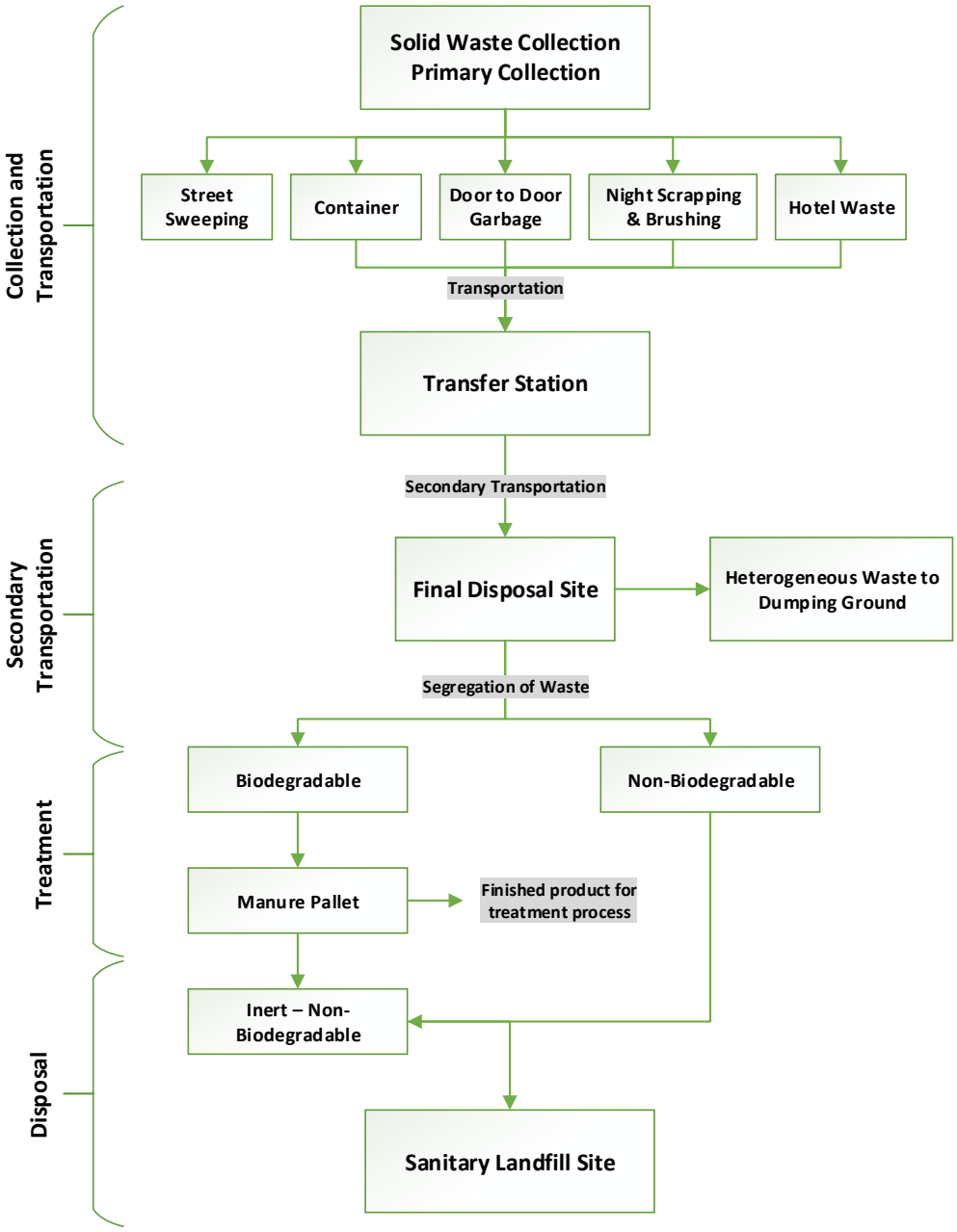


Figure 5 MSW flow chart

2.2.2.1 Storage and Collection

Surat Municipal Corporation is willing to provide better services to the citizens of Surat by the way of collection of Municipal Solid waste as per the standards and specifications for the collection of solid waste within the frame work of SWM Rules – 2016.

Collection of municipal solid waste (MSW) & bio-medical waste (BMW) through various means

- Containers
- Brushing and scrapping
- Door to door collection system
- BMW collected through vehicles engaged by agency (BOOT Base)

2.2.2.2 Containers

Quantity of MSW is lifted 530 MT/Day from containers. 33% waste is lifted by private agency while 67% waste is lifted by Surat Municipal Corporation. 625 containers, 86 dumper placers, 263 Dust Bins (2 cu. Mt), 1440 Dust Bins (4.5 cu. Mt) are used for collection activity.

Figure 6 Container

2.2.2.3 Door to Door garbage collection

The activity of Door to Door garbage collection has been implemented in accordance with guide lines provided by M.S.W. (M & H); Rules-2000 since April 2004. In April 2004, door to door service started in three zones and in remaining four zones it was started in 2006. This system is completely privatized and the corporation engages different agencies to complete the work in all seven zones. All the agencies are paid on the basis of the weight (M.T.) of garbage collected from the zone area and transported to the transfer station in respective zone. The other salient features are:

- Collection & transportation of garbage – 900 M.T. / Day.
- Collection during 7:00 am to 2:00 pm
- Average unit rate Rs. 789/- per M.T.
- Annual expenditure - Rs. 2400Lacs.
- Closed body vehicles deployed 160

Figure 7 Vehicles deployed by private agency

2.2.2.4 Brushing and Scraping (Day & Night)

Brushing and scraping during day time & night time is in practice since the year 1996. The activity of street sweeping is managed by corporation by sweeper who are regular employee of Corporation as well as 31 private agencies are engaged for the work. Municipal Solid waste collected by sweeper in hand cart of 0.60 Cu. mt. capacity is transported to various 1150 numbers of containers each of 4.5 Cu. mt. Capacity located judiciously at various spots in different seven zones. Except for Athwa zone and Katargam zone, the activity of container lifting and transportation of MSW to the transfer station of the respective zone is done through 60 dumper placers of the Corporation. The activity of container lifting for Athwa zone and katargam zone is privatized for which agencies have deployed total fourteen numbers of hydraulic dumper placers. 172 major routes, 121 daily routes and 51 alternate routes are covered in sweeping activity by deployed 99 vehicles and engaged 1183 man powers. Night brushing and scraping activity is carried out during 10:00 pm to 2:00 am.

Figure 8 Brushing and scraping during day time & night time

The paper waste content generally varies between 2.9 to 6.5% and increases with the increase in population. The plastics, rubber and leather contents are lower than the paper waste content, and do not exceed 1% except in metropolitan cities. The metal content is also low, viz. less than 1%. The low values are essentially due to the large-scale recycling of these components.

The paper waste is recycled on a priority basis while the plastics and glass are recycled to a lesser extent. The biodegradable fraction is quite high, essentially due to the habit of using fresh vegetables in India. The high biodegradable fraction also warrants frequent collection and removal of solid waste from the collection points. The ash and fine earth content of Indian municipal solid waste is high due to the practice of inclusion of the street sweepings, drain silt, and construction and demolition debris in municipal solid waste. The proportion of ash and fine earth reduces with increase in population due to improvements in the road surfaces. Percentage of inert material increases with the increase in population may be due to fast than construction and demolition waste find its way into the municipal solid waste disposal stream.

Waste pickers are observed to be more active in bigger cities. They prefer to remove paper, plastics, rags and packaging and such other material, which is light and have a high calorific value. The remaining waste hence tends to have a higher inert content and a lower calorific value. The demolition activity is observed to increase with population leading to increased inert content and reduced organic content in MSW. The method and capacity of storage, the correct type of collection vehicle, the optimum size of crew and the frequency of collection depend mainly on volume and density of wastes. Climate also has some influence. The disposal method may be dependent on the type of material recycled, organic content of waste, which could be composted, and the combustible material, which could be a source of energy.

2.2.2.5 Primary Transportation

Primary transportation is related to the transportation of municipal solid waste from containers and door to door garbage collection to the nearby transfer station. Primary transportation of MSW from various areas to nearby transfer station is done by

- Wheel burrows / Trolleys / Mini tempos
- Three-wheeler tempos/ Four wheeler tempos / Compactors of Door to Door
- Hydraulic dumper placers/ Tractor with trailers/ Dumper trucks

Figure 9 Transportation of MSW through Door to Door

2.2.2.6 Transfer station

To mitigate the disposal requirement of municipal solid waste, Surat Municipal Corporation has developed two landfill sites at, 1. Bhatar (closure has been done) and 2. Khajod (presently in operation). Surat Municipal Corporation has developed 6 transfer stations in the city boundary.

Location of the transfer stations were identified based on decentralized distribution. Furthermore Surat Municipal Corporation has planned to construct of modern transfer station at four places (namely Dindoli; Kosad; Gaviyar and Simada) to cater the day to day need.

MSW collected through various means reach to the nearby transfer station. The six transfer stations are working in the city in different six zones. Location of transfer stations, old and new disposal site at Bhatar & Khajod is shown in Map No. 2. While Zone wise details of existing and proposed transfer station is given in **Error! Reference source not found.**.

Figure 10 Transfer station

Unloading waste in hopper | Compaction of waste | Transportation of Compacted Waste

Figure 11 Functioning of RTS

Table 2 Existing and Proposed Transfer Station

Zone	Existing Transfer Station	Proposed Transfer station
East	Varachha	Vankaneda
South West & Central	Bhatar	
South East & Central	Anjana, Dindoli	
North & Central	Katargam, Kosad	
West	Pal	Variyav
South	Bhestan	--

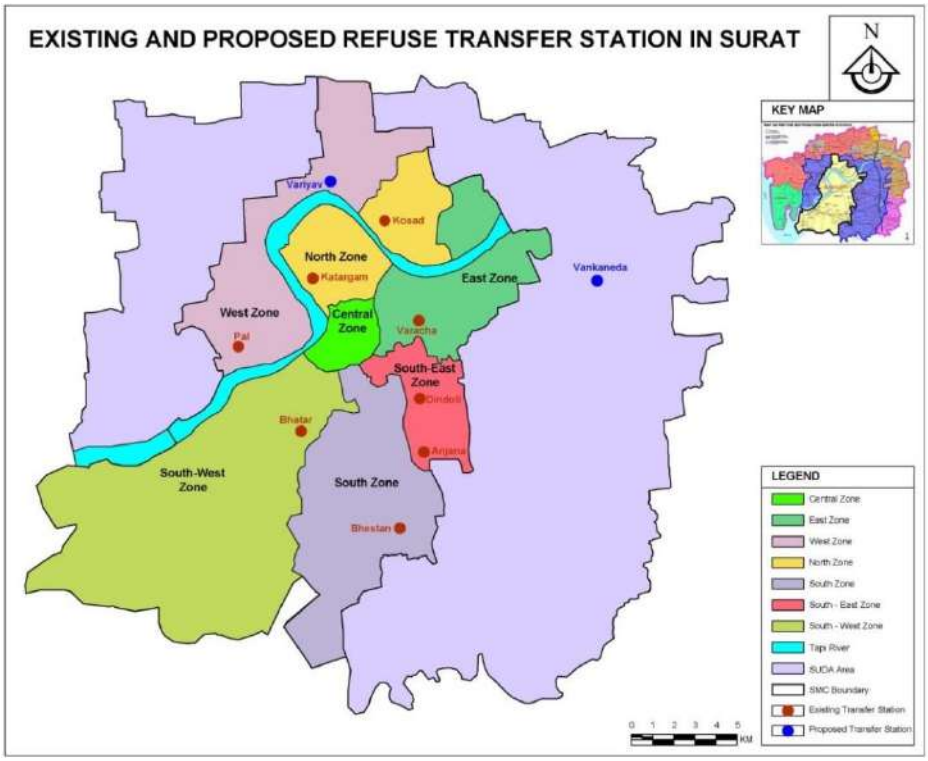


Figure 12 Location of Existing & Proposed transfer stations

2.2.3 Waste Generation Projection

Based on the population projection data and present waste collection data, projected waste generation quantity is calculated considering 1.5 % increase in waste generation per year upto 2019 and 0.7 % decrease in per capita waste generation 2020 onwards up to 2036. Table below shows the population projection for the Surat city and projected waste generated for several years from 2011 up to 2036. It can be seen in the table that there is estimated decrease in the waste generation rate from 2020 by ensuring proper segregation of the waste, treatment and awareness activities.

Year	Population	Grams per Capita	Waste generation (TPD)
2011	45,98,353	260	1194
2016	55,00,000	324	1782
2019	62,97,041	339	2133
2020	65,62,722	336	2208
2021	68,28,402	334	2281
2026	81,56,804	323	2631
2031	94,85,205	311	2945
2036	1,08,13,607	301	3251

2.2.4 Initiatives by Surat Municipal Corporation

2.2.4.1 Capacity Building

Surat Municipal Corporation has initiated a much-required in-house assets up-gradation including manpower, machinery and technology. Surat Municipal Corporation has organized various workshops and seminars for bring awareness and knowledge sharing among officials, field experts and common people. Recently SMC organized a waste to energy workshop with WTERT. Also SMC arranged a seminar on capacity building for implementation of new SWM Rule-2016. .

2.2.4.2 IEC (Information, Education, Communication)

It is important that a sense of belonging through various information, education and communication (IEC) programs can be brought to the people of the city. Always to blame or putting onus of responsibility to the civic body may not yield desired results. People's group for such voluntary measures can bring a big change. Due to the IEC activities being undertaken, it has helped in improving awareness amongst citizens. This has also helped in improving the cleanliness around the community containers. Surat Municipal Corporation has initiated IEC activities such as,

- Display of posters, Banners & hand bills, Advertisement in local News Papers & T.V. Channels
- Demonstration of Mosquitoes life cycle in schools & Fair
- Essay Competition & Quiz Competition in Schools, Puppet Shows & Street play & Hut-cycle
- Holding workshop & Seminars

3 Current Disposal of Waste at Khajod site, Surat

3.1 Site Analysis

Khajod landfill site is in south-west of Surat city. It is well connected by main roads of Surat city. Site is surrounded in north side with state highway no-156 is passing through, at south side Mindhola creek is passing by, east and west sides are covered by open land which is not used for agricultural purpose. The nearest settlement to the Khajod disposal site is Khajod village. Khajod Landfill site is located at latitude 21°6'19" N and longitude 72°48'8" E. Average ground level from mean sea level is 3 m. Land allocation of the Khajod dumpsite is shown in the Figure 13. Up till now, approximately 51 Lacs Cu Mt. of waste has been disposed at site. Summary of the area at the Khajod site is shown in the Table 3.

Table 3 Summary of Area at Khajod Site

Sr. No.	Description	Area (in Ha.)
1	Total site area	202.0
2	Total area surveyed	87.5
3	Area of existing landfill cell (cell no.1 & 2)	16.8
4	Area allocated for existing treatment plant	0.6
5	Area allocated for proposed treatment plant	15.3
6	Open dump	61.0
7	Open space for development	53.0

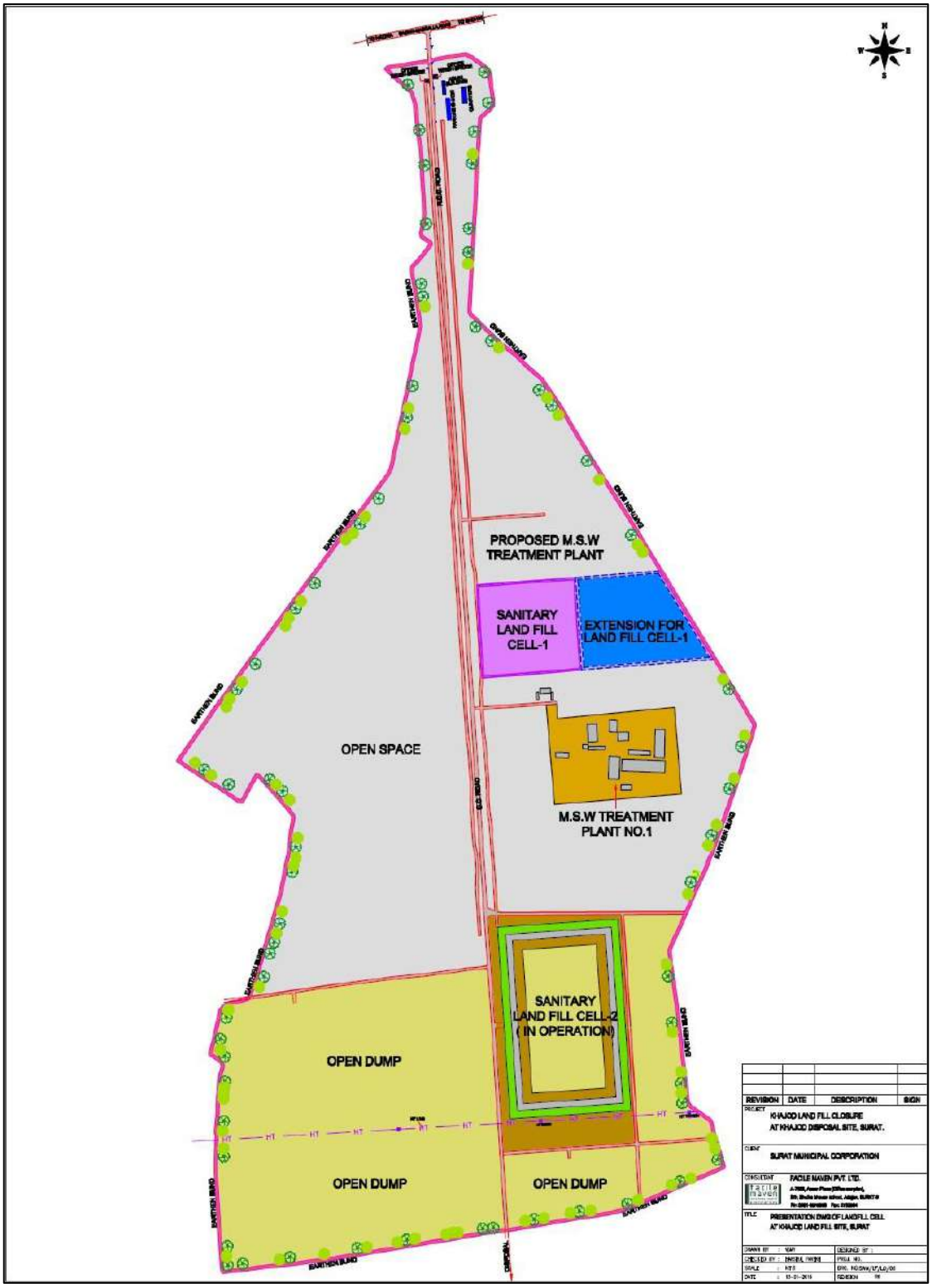


Figure 13 Land use at dumpsite

3.2 Landfill Activity at Khajod Site

Khajod landfill site has two cells for waste disposal. Cell no. 1 is completely filled and cell no. 2 is under practice of waste dumping.

Figure 14 Khajod Landfill Site

Surat Municipal Corporation has established landfill cell no-1 for waste disposal. Despite of taking precaution measures, waste was accumulated of large quantity of waste than predicted waste quantity in Surat in 2006. Landfill cell no-1 of 1,25,000 Cu.Mt capacity, become insufficient for waste disposal. The treatment plant of 400 TPD became incapable for waste treatment. The problem of open waste dumping was so prominent that another space was required for waste disposal.

In the year 2008-09, another landfill cell no-2 was constructed with capacity of 7,50,000 Cu.Mt. Gujarat Pollution Control Board (GPCB) gave permission for disposal of untreated waste in cell no-2 in 2012. As per the present waste accumulation data (refer figure 14-15) the waste disposal rate is very high and issues of open dumping still exist. At the long run, such practice will affect the health and hygiene of people. Open dumping might deteriorate surrounding environment including air and ground water quality.

Additionally, accidental burning of waste is a prominent issue at landfill site which causes air pollution. Legacy waste accumulated at landfill cell no 1 & 2 are creating Green House Gases (GHG) and bad odour which are harmful for environment as well as surrounding human habitations. Rag pickers are also observed frequently on the landfill site.

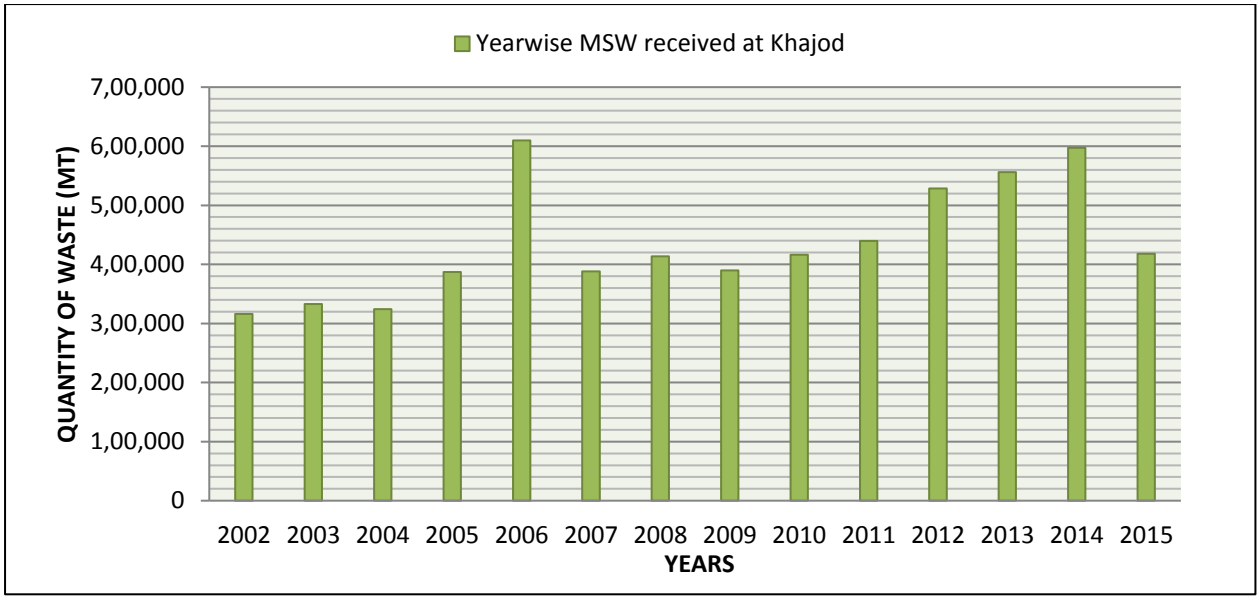


Figure 15 Yearly Waste accumulation at Khajod

Note: Waste accumlation data at Khajod Landfill site from January 2002 to September 2015

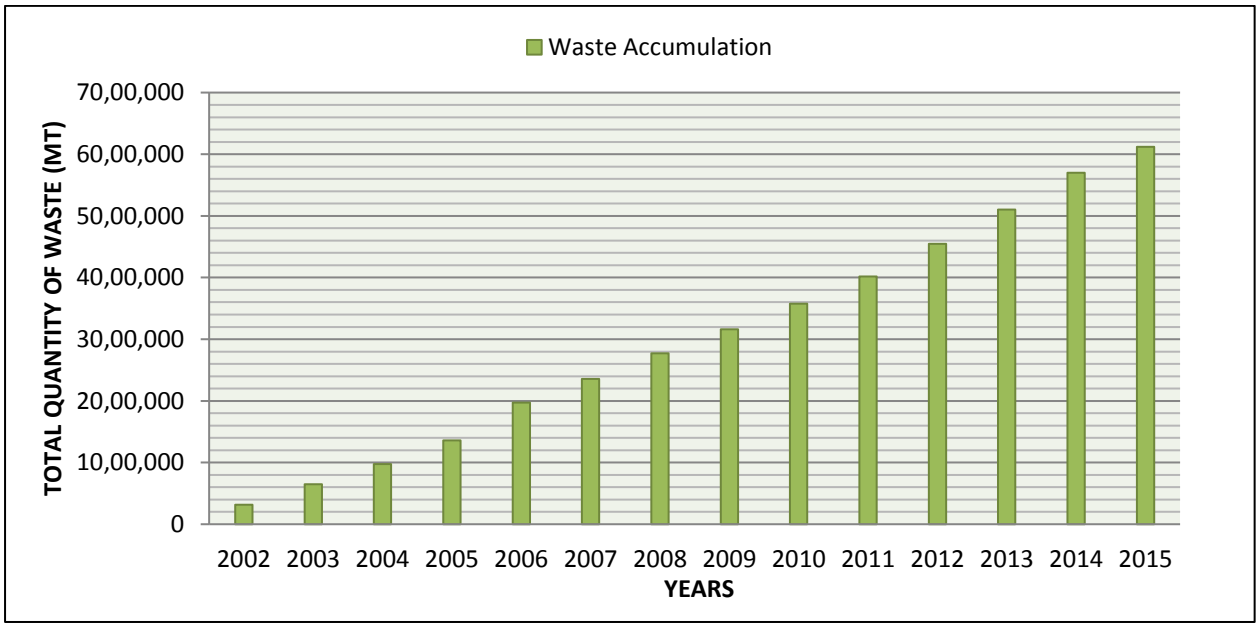


Figure 16 Total Waste accumulation at site

Note: Waste accumlation data at Khajod Landfill site from January 2002 to September 2015

Hence, capping of this accumulated waste dump is required as per CPHEEO guidelines and SWM rule 2016. Report of Task force on waste to energy (2014) project has suggested that, 'Rehabilitation and remediation of abandoned landfills including capping of dumpsites should be initiated on priority in the cities where water table is generally high and the amount of waste being deposited is large' . Scientific assessment of contamination of soil and groundwater should be undertaken and extent of

damage and possibilities of remediation may be ascertained.

3.3 Existing Infrastructures and Amenities at Khajod

Infrastructure available at landfill are; All weather CC road, Weigh bridge, Parking, Vehicle depot, Office, Laboratory, Admin building etc. Vehicles available at Khajod: Fire fighter, Water tanker, Compactor, Crawler mounted dozer, Tyre dozer, Tipper truck, loader, JCB etc.

Surat Municipal Corporation identified the Khajod landfill site for the waste disposal and practicing disposal of municipal solid waste from 2002. To comply MSW rule 2000, Surat Municipal Corporation has developed following infrastructure and amenities at landfill site at Khajod.

- R.C.C. road for ease of access to landfill cell.
- Weigh Bridge to quantify the accumulated waste at the landfill site.
- Site fencing.
- Waste to compost treatment plant with capacity of 400 TPD.
- Space allotted for treatment plant of plastic waste, C&D waste, organic waste and waste to energy plant.
- Bore-well to monitor ground water quality at the landfill site.
- Air quality monitoring at disposal site and surrounding area.
- Landfill cell for phase wise waste disposal at landfill site.

Entrance of the landfill site

Parking area at landfill site

Ramp and Leachate collection well at Cell no-2

Service road to landfill cell no-2

Service road and Layering of geo-membrane sheet

Waste dumping on geo-membrane sheet

Dumping of waste at site ramp and leachate collection well on landfill cell

Figure 17 Infrastructure and amenities at Khajod

3.4 Infrastructure Compliance at Landfill

Table 4 Infrastructure compliance with SWM Manual 2016

Description	As per Manual	As on Site
Landfill Area (>1 Million MT of landfill design life)		
Landfill Size (Active Cell-2)	>20 Ha	22 Ha
Total Landfill Area	15% more than landfill size	200 Ha
Landfill Layout (>1 Million MT of landfill design life)		
Access roads	Yes	Yes
Equipment shelters	Yes	Yes
Weighing scales (weigh bridge)	Yes	Yes
Office space	Yes	Yes
Temporary waste storage and/or disposal sites for special wastes	Yes	No
Areas for waste processing	Yes	Yes
Demarcation of the landfill areas and areas for stockpiling cover material and liner material	Yes	Yes
Drainage Facilities	Yes	Yes
Landfill gas management facilities	Yes	No
Leachate treatment facilities	Yes	Yes
Monitoring wells for ground water	Yes	Yes
Minimum Vehicular Requirement		
Bulldozers	5	Yes
Loaders	4	Yes
Excavators	3	Yes
Compactors	5	Yes
Water Tankers	2	Yes
Tractors/Trailers/Tippers	6	Yes
Infrastructure at Landfill Site		
Site entrance and fencing	Yes	Yes
Administrative and site control offices	Yes	Yes
CC roads	Yes	Yes
Waste inspection and sampling facility	Yes	Occasionally by

		external agencies
Equipment workshops and garages	Yes	No
Signs and directions	Yes	Yes
Water supply	Yes	Yes
Lighting	Yes	Yes
Vehicle cleaning facility	Yes	Yes
Firefighting equipment	Yes	water tanker available at site, Fire station is 7 Km.
Environmental Monitoring System		
Leachate head monitoring	Yes	Yes
leachate and gas quality monitoring	Yes	No
long-term movements of the landfill cover	Yes	No
quality monitoring of pore fluid and pore gas	Yes	No
quality monitoring of groundwater	Yes	Yes
air quality monitoring above the landfill	Yes	Yes

3.5 Disposal Facilities

Initially Landfill cell no-1 was constructed in 2004 and later cell no-2 was developed in 2008. Both the cells were constructed as per provision of MSW rules 2000 with following details of sanitary landfill are as under. Detailed layout plan of sanitary landfill site is attached in (annexure-1)

- Size – 210 M x 187.65 M
- Design Capacity: 1,25,000 Cu. Mt.

Landfill cell no 1 is filled with waste and formal closure of the cell is under process.

Figure 18 Existing Sanitary Landhill Cell no.1

- Size of cell no. 2 – 278 M x 432 M X ht 8 M (in operation)
- Capacity: 7,50,000 Cu. Mt.

Figure 19 Sanitary landfill cell no.2 is in operation

3.6 Existing Treatment facility

The contract of waste to compost plant was given to Hanjer Bio Tech. Energies Pvt. Limited. But the plant was failed in operation and was closed in 2012. At present, there is no treatment facility available at the Khajod dumpsite. There can be opportunity for establishing waste treatment plant and recover the recyclable materials out of waste. Bio-degradable waste can be converted to compost. Other combustible waste can be used as fuel for waste to energy plant. Leftover waste and inert from treatment plant can be disposed in sanitary landfills. A typical treatment process is described in flowing Figure 20.

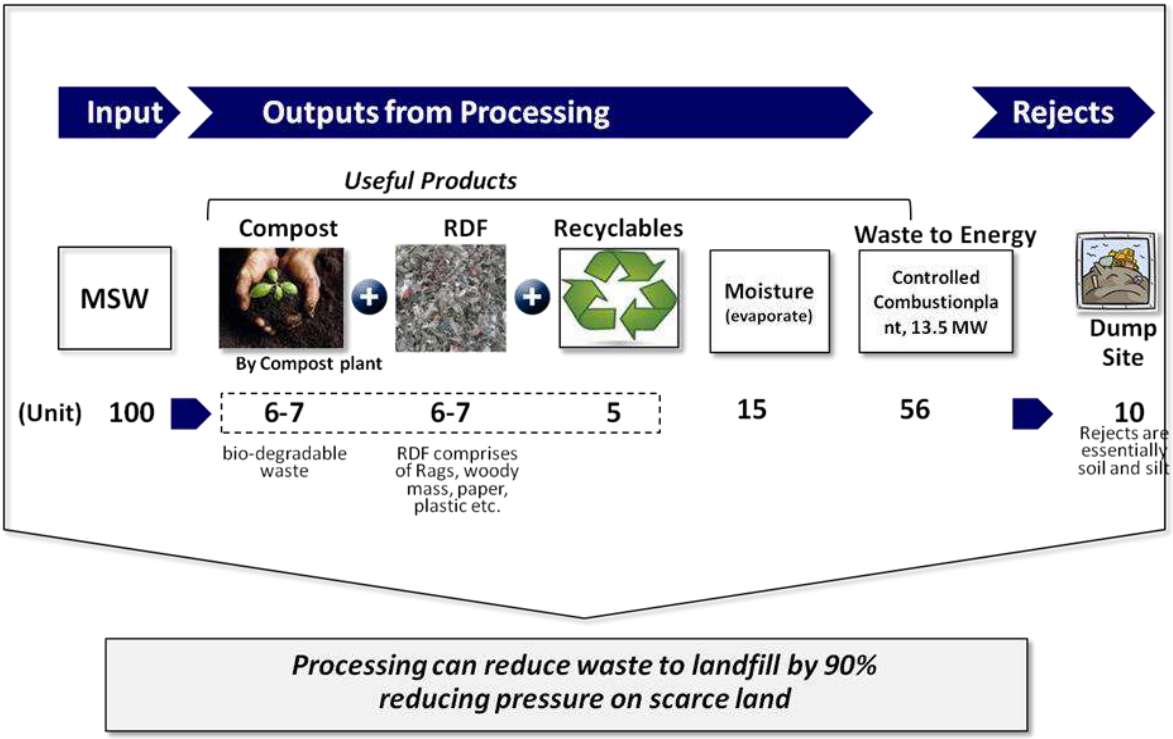


Figure 20 Typical waste processing flow chart

4 Landfill, Dumpsite and Closure of Dumpsite

4.1 Landfill and Sanitary Landfills

Landfilling is the ultimate disposal process for Municipal Solid Wastes (MSW) management. The quantity of MSW for land disposal can be substantially reduced by setting up of waste processing facilities and recycling the waste materials as much as possible. A few Urban Local Bodies (ULBs) have attempted to demonstrate “Zero garbage” on Municipal Solid Wastes Management (MSWM) by adopting method of recycling/reusing and processing of wastes. Still, some inert wastes are left out for disposal. It is estimated that the inert wastes for landfilling occupies 40-55% of the total wastes depending upon waste management system of city.

The landfill is an unavoidable component in MSW Management and its planning and design, construction, operation & maintenance involves technical skills and safety measures in terms of health and environmental protection.

The SWM Rule, 2016 specify relevant points with regard to site selection for proposed landfill site, facilities require at landfill site, specification for landfilling, pollution prevention, water quality monitoring, ambient air quality monitoring, plantation at landfill site, closure of landfill site/ post closure, etc. These specific provisions are to be implemented as per rules and need to be ensured during the planning and design stage. The adequacy and performance of these provisions are to be monitored by the regulating authorities.

Landfill identification shall be done by ‘Development Authorities’ for the area falling under ‘Development Authority’, otherwise it shall be done by the concerned ‘Municipal Authority’. The site selection shall be done based on examination of environmental issues. The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan. The landfill facility shall be nearby waste processing plant or an integral part of it. The landfill site shall be designed for 20-25 years. The proposed landfill site should be away from habitation clusters, forest areas, water bodies, monuments, national parks, wetlands and places of important cultural, historical or religious interest. Also, approval shall be taken from the concerned authorities in case the landfill site is located within 20 km from the airport or any other critical area.

Sanitary Landfills are designed to greatly reduce or eliminate the risks that waste disposal may pose risk to the public health and environmental quality. They are usually placed in areas where land features act as natural buffers between the landfill and the habitation. In addition to the strategic placement of the landfill other protective measures are incorporated into its design. The bottom and

sides of landfills are lined with layers of clay or plastic to keep the liquid waste, known as leachate, from escaping into the soil. The leachate is collected and pumped to the surface for treatment. Boreholes or monitoring wells are dug near the landfill to monitor groundwater quality.

A landfill is divided into a series of individual cells and only a few cells of the site are filled with trash at any one time. This minimizes exposure to wind and rain. The daily waste is spread and compacted to reduce the volume, a cover is then applied to reduce odours and keep out pests. When the landfill has reached its capacity, it is capped with an impermeable seal which is typically composed of clay soil.

Modern landfills are well-engineered facilities that are located, designed, operated, and monitored to ensure compliance with environmental regulations. Solid waste landfills must be designed to protect the environment from contaminants which may be present in the solid waste stream.

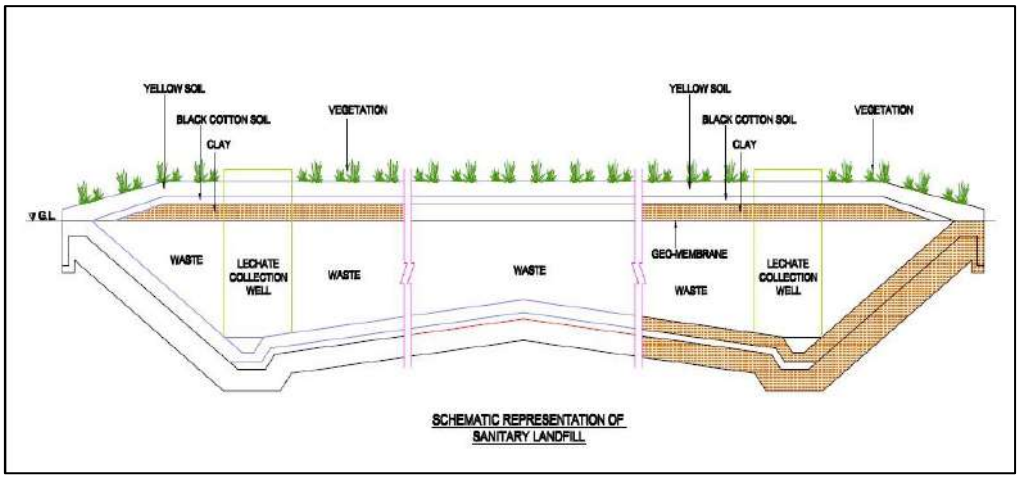


Figure 21 Schematic section of a sanitary landfill

A landfill, also known as a dump or rubbish dump (and historically as a midden), is a site for the disposal of waste materials by burial and is the oldest form of waste treatment. Historically, landfills have been the most common methods of organized waste disposal and remain so in many places around the world. Landfills may include internal waste disposal sites (where a producer of waste carries out their own waste disposal at the place of production) as well as sites used by many producers. Many landfills are also used for other waste management purposes, such as the temporary storage, consolidation and transfer, or processing of waste material (sorting, treatment, or recycling).

Typically, in non-hazardous waste landfills, to meet predefined specifications, techniques are applied by which the wastes are:

- Confined to as small an area as possible.

- Compacted to reduce their volume.
- Covered (usually daily) with layers of soil.

During landfill operations, the waste collection vehicles are weighed at a weighbridge on arrival and their load is inspected for wastes that do not accord with the landfill's waste acceptance criteria. Afterward, the waste collection vehicles use the existing road network on their way to the tipping face or working front where they unload their load. After loads are deposited, compactors or dozers are used to spread and compact the waste on the working face. Before leaving the landfill boundaries, the waste collection vehicles pass through the wheel cleaning facility. If necessary, they return to the weighbridge in order to be weighed without their load. Through the weighing process, the daily incoming waste tonnage can be calculated and listed in databases.

Typically, in the working face, the compacted waste is covered with soil daily. The space that is occupied daily by the compacted waste and the cover material is called a daily cell. Waste compaction is critical to extending the life of the landfill. Factors such as waste compressibility, waste layer thickness and the number of passes of the compactor over the waste affect the waste densities.

4.2 Dumpsites

Controlled dumps are disposal sites which comply with most of the requirements for a sanitary landfill but usually have one deficiency. They may have a planned capacity but no cell planning, there may be partial leachate management, partial or no gas management, regular cover, compaction in some cases, basic record keeping and they are fenced or enclosed. These dumps have a reduced risk of environmental contamination, the initial costs are low and the operational costs are moderate.

4.3 Closure of the Dump sites

4.3.1 Closure and Rehabilitation of Old Dumps-

As per SWM rule, 2016, Schedule-I (J), Solid waste dumps which have reached their full capacity or those which will not receive additional waste after setting up of new and properly designed landfills should be closed and rehabilitated by examining the following options:

(i) Reduction of waste by bio mining and waste processing followed by placement of residues in new landfills or capping as in (ii) below.

(i). Capping with solid waste cover or solid waste cover enhanced with geomembrane to enable collection and flaring / utilisation of greenhouse gases.

(iii) Capping as in (ii) above with additional measures (in alluvial and other coarse grained soils) such as cut-off walls and extraction wells for pumping and treating contaminated ground water.

(iv) Any other method suitable for reducing environmental impact to acceptable level.

4.3.2 Objective of closure of dumpsite

The primary objective of undertaking scientific closure of dumping ground is to,

1. Comply with the requirements of the SWM rule, 2016 notified by the MOEF, Government of India, under the Provisions of Environment (Protection) Act, 1986.
2. Improve the quality of life of people around the dumping site.
3. Eliminate frequent fires, health hazards and breeding of flies and rodents in the area and to help improve public health due to the dumping of untreated solid waste at the site.
4. Improve the quality of surface and groundwater by properly designed surface water disposal (storm water) system.
5. Reduce footprint of accumulated waste and recover land for future use.

4.3.3 Dump site closure process

The basic requirements for closing an open dumpsite include providing final soil cover, vegetation layer, drainage control system, leachate and gas management systems, monitoring systems and site security (aftercare programme). The closure of dumpsites typically requires re-gradation of site slopes, capping of landfill with impermeable cover, placement of leachate collection and treatment systems, installation of landfill gas collection and aesthetic landscaping of the closed dumpsite. It is important to promote surface water drainage from landfill areas to prevent it from infiltration and further percolation through the garbage and the soil underneath, thus creating ground and surface water degradation. As bottom, linear is not provided, from an environmental point of view, the sites may still have potential for ground water contamination.

The general transition to dumpsite closure will include the following works: shaping the main capping, topsoil application, grass sowing (and possibly bush planting), gas collection and removal, and leachate management. Vegetation must be selected so that it doesn't destroy the cap and it should fit into the surrounding natural landscape.

The scope of a Dumpsite Rehabilitation is determined by combination of the following:

- Reduce dumpsite footprint and cover
- Recover dumpsite space for continued operation
- Dumpsite upgrading or installation of liner and relocation of the entire dumpsite
- It involves three distinct stages of remedial activity:

- Planning and designing of the remedial works
- Undertaking one-time physical improvements at the site
- Changing subsequent operations at the site.

4.3.4 Issues Related to Dumpsite Closure/Rehabilitation

- How much material has to be moved in a day to reach the project goals without exceeding the budget?
- Which part of the site will the equipment be placed?
- How will the materials be moved and stockpiled on site?
- How many workers will be needed to accomplish the tasks?
- What training do the workers require?
- What should be done with the wastes/recovered components after digging them up?
- What are the sampling and analysis protocols to determine the quality of excavated material?

5 Proposals for Landfill Closure

Since 2002, the Khajod dumping ground site has been used as a disposal site for the Waste Generated in the city. The site is owned and operated by the SMC. As per the SWM Rules 2016, Clause No 15 (zh), it is mandatory for all the urban local bodies to stop land filling or dumping of mixed waste soon after the timeline as specified in rule 23 for setting up and operationalization of sanitary landfill is over.

5.1 Design Criteria

Design criteria to be considered for the Final Cover include

- Liner design meets/exceeds the recommendations of SWM Rule - 2016.
- Installation of some run-off control berms or terraces along the top of the landfill will be required, in areas with a higher potential for erosion. These berms will minimize long-term maintenance requirements.
- Installation of terraces on the side slopes of the landfill, if applicable, to minimize erosion and divert surface water runoff to the drainage ditches. The terraces must be designed and sloped to drain the storm water.
- Consideration must be given to the geotechnical stability of the final cover system to prevent failures, such as sliding, conduct slope stability analysis (if applicable).
- Installation of storm water ditches to convey concentrated flows from the landfill top slope to the perimeter ditch system, if applicable.
- Adequate care has been taken to ensure leachate is captured onsite to avoid downstream contamination.
- Control landfill gas migration using passive vent systems, if applicable (erosion control).
- Consideration must be given to selecting plant species that are not deeply rooted to prevent damage of the underlying infiltration layer.
- Landscape elements have been included to provide aesthetics and revenue generation for PMC during post-closure.

As per SWM rule, 2016, Schedule-I (C), (iv) After completion of landfill, a final cover shall be designed to minimise infiltration and erosion. The final cover shall meet the following specifications, namely:-

- a) The final cover shall have a barrier soil layer comprising of 60 cm of clay or amended soil with permeability coefficient less than 1 x 10-7 cm/sec.
- b) On top of the barrier soil layer, there shall be a drainage layer of 15 cm.
- c) On top of the drainage layer, there shall be a vegetative layer of 45 cm to support natural plant

growth and to minimise erosion.

5.2 Investigations required for planning of dumpsite closure:

- Review of geology of the site, volume and types of wastes disposed, reports, studies, historical records concerning the dumpsite (operations, unusual events such as fires, dumping of hazardous wastes, etc.)
- Review of available maps (map of the dumpsite & surroundings, topographical, geological, etc.)
- Inventory of existing settlements, structures, surface water bodies, water wells, etc.
- Identification of existing land uses around the area and points of leachate seepage and ponding within and beyond the disposal facility
- Conduct of topographic survey of the dumpsite, extending some distance from its boundaries
- Determination of depths of the dumped wastes
- Conduct of leachate sampling
- Conduct of water quality sampling of surface waters, water wells, groundwater

5.2.1 Critical review of Khajod dumpsite:

5.2.1.1 Distance to critical amenities

As Khajod landfill site on the outskirts of the urban agglomeration. There are only few critical amenities available within 5 km. of radius. Amenities like hospitals, police station, institutions, petrol pump are considered as critical amenities. Details of nearest critical amenities to Khajod landfill site are as below:

- Hospital: Noble Multi-Specialty Hospital – 7 km. (15 min. of travel time)
- Police station: Udhna Police Station – 10 km. (20 min. of travel time)
- Institutions: Bhagwan Mahavir Education Foundation – 6 km. (15 min. of travel time)
- Petrol Pump: HP Petrol Pump – 10 km. (18 min. of travel time)

5.2.1.2 Distance from the nearest connectivity

The nearest connectivity alternatives to Khajod landfill site are as below:

- Airport: Surat Airport – 11 km. (22 min. of travel time)
- Railway Station: Udhan Railway Station – 16 km. (40 min. of travel time)
- Bus Depot: Udhna Bus Stand – 13 km. (26 min. of travel time)

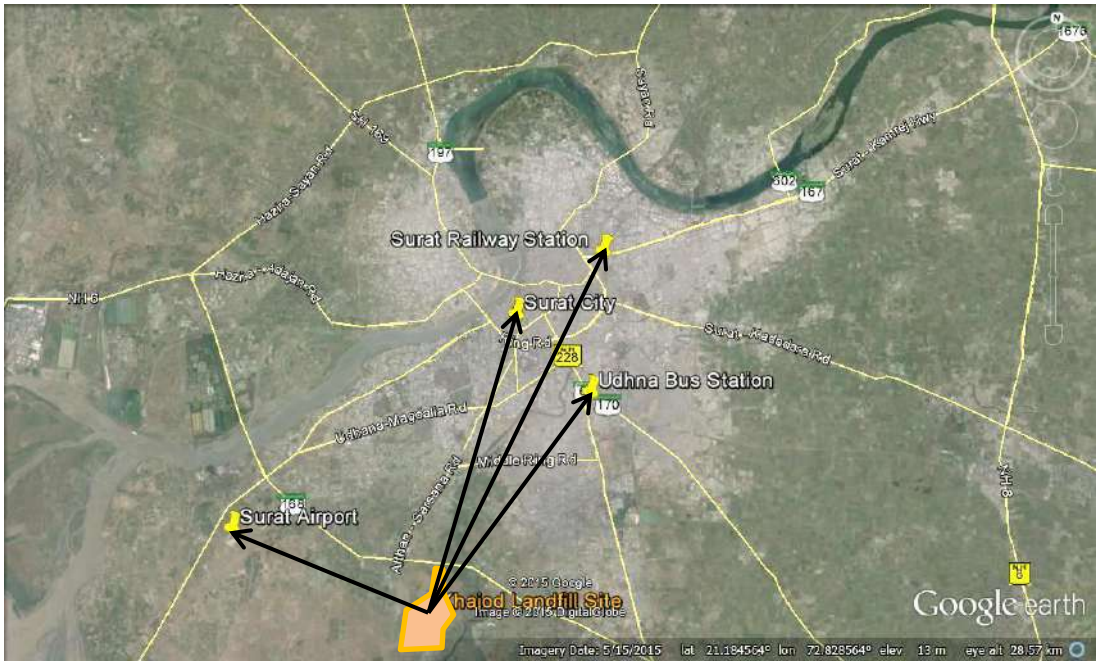


Figure 22 Distances of important locations from Khajod Landfill Site

- Distance from the city: Surat City – 12 km.
- Distance from surface water body: Mindhola River – 0.7 km.
- Distance to the nearest village: Khajod Village – 1 km.
- Habitation in the predominant wind:

Khajod landfill site is located in southern part of the Surat city. Predominant wind direction flows from South-West direction to North-East direction. In south-West directions, no habitation exists at present. In North-East direction, Sachin industrial area exists. Thus, No habitation is affected of bad odor as wind flow passing from sea approach to industrial area.

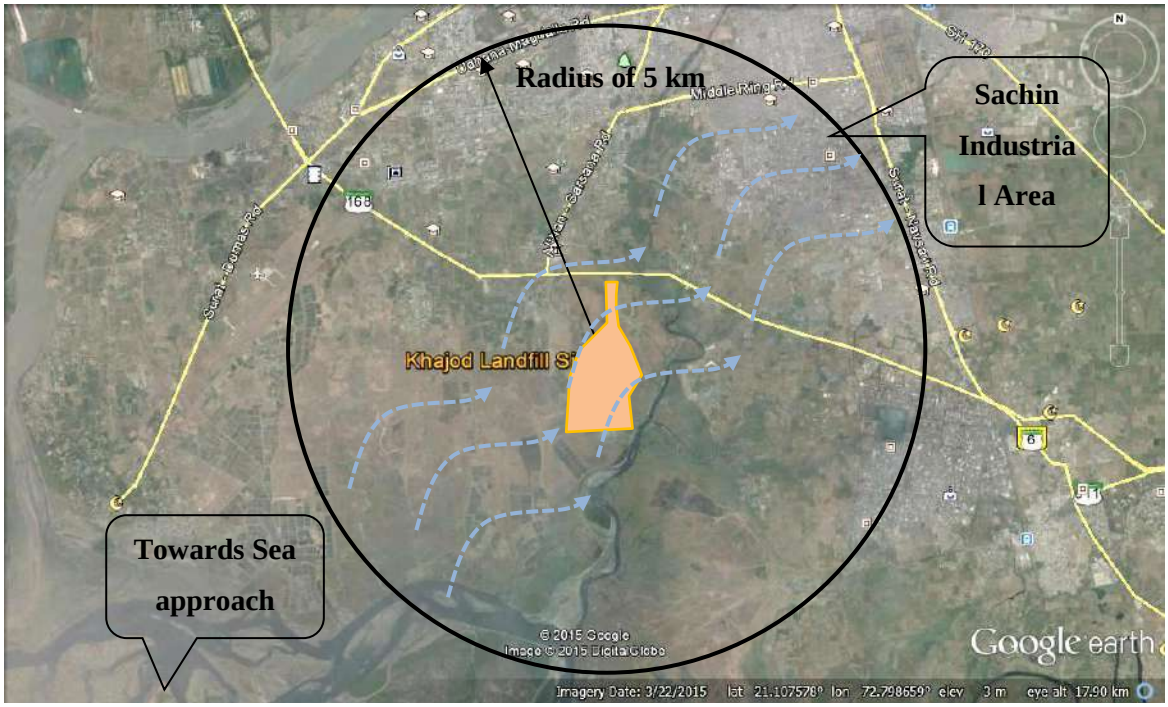


Figure 23 Habitation in the predominant wind

S-W wind direction – Sea approach N-E wind direction – Sachin industrial area

5.2.1.3 Average rainfall (cm/yr) and flood data

Surat city has average rainfall of 138.22 cm/yr of rainfall based of last five years of database released by Surat Municipal Corporation, which is applicable for Khajod landfill site, too. Surat city faced several major and minor floods in the past decade. Khajod dumpsite was partially affected due to flood in year 2006.

5.2.2 Topographical survey of Khajod disposal site

Topographic Surveys were carried out to identify the boundary, contours of the ground and existing features on the surface of the earth or slightly above or below the earth's surface. Existing level at the landfill site were recorded and topographic Ground contours were generated considering GTS benchmark level established at other information related to site, regarding surface and underground utilities were collected during survey. The survey team was equipped with advanced instruments such as Total Stations and GPS devices. The levels were taken from the mean sea level including the height of onsite waste mounds.

Figure 24 Topographical Survey and Geotechnical Investigation

Waste has been disposed openly in nearby area of cell no-2. After practice of open dumping for many years, a significant change in the natural terrain is observed. The present contour profile varies from 3m to 13m of height in open dump area and in some of the adjoining area of cell no-2 it varies from 5m to 17m of height. The elevated contours clearly indicating the open waste dump. The following figure displays contour profile of Khajod disposal site.

The quantity of open waste dump was measured based on the level difference between two topographical survey data. Large amount of waste dump accumulated at Khajod disposal site need to be managed properly as per the suggested guidelines. For the quantification purpose open waste dump divided into 10 parcels and the cumulative data is mentioned in following Figure 25

Figure 25 Existing contour of Khajod dump site

Following table is prepared based on the previous survey records (2002) and the present survey data (2015).

Table 5 Waste Volume at Khajod Landfill Site

Khajod Landfill Site	
Open Dump Waste Volume	
Sr. No.	Volume (CuM)
1	2,97,211
2	5,81,584
3	4,23,560
4	7,42,285
5	7,88,724
6	2,11,777
7	86,788
8	4,09,967
9	1,11,900
10	65,060
Total	**37,18,856**


Figure 26 Open Waste Dumping at Khajod Landfill Site

By comparing present and past topography data volume of waste in place is worked out. At present 37 Lacs MT of waste is dumped at, which is conformity with total volume of waste generated in Surat city and dumped at Khajod site (volume measured at weigh bridge)-Annexure-3

Table 6 Lowest level, highest level and level difference for initial year& present year

Year	Lowest Level (m)	Highest Level (m)	Level Difference (m)
2002	2.43	5.71	3.28
2015	6.51	15.92	10.21

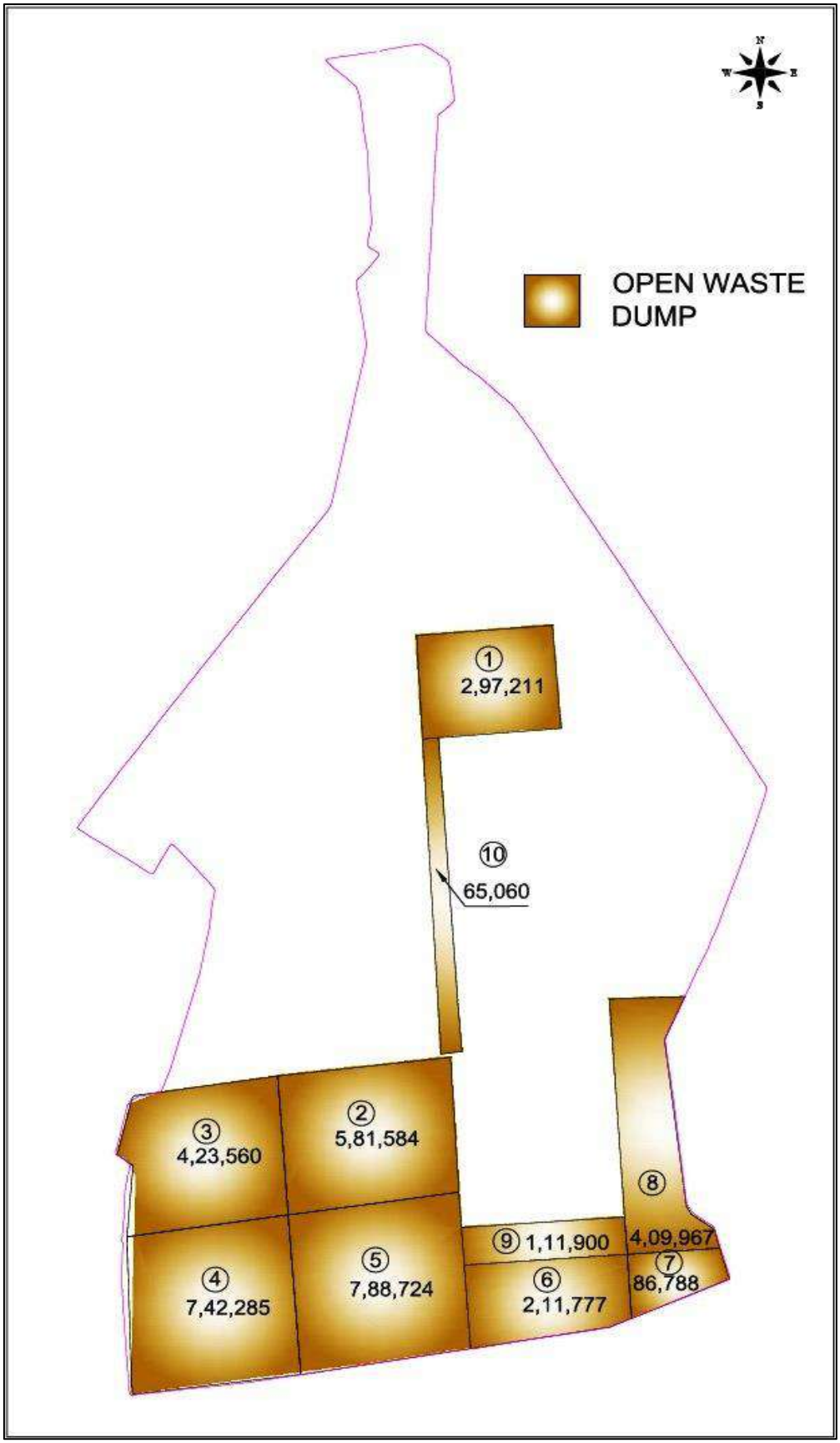


Figure 27 Existing Waste dumping spots at Khajod site

5.3 Waste Sample Analysis

Khajod dumping site is in practice for waste disposal from long time. This waste dump usually consider as mix waste and consisting of various materials like plastic, cloth, glass, paper etc. It is required to do waste analysis for identification of physical and chemical properties of waste. The test results can lead to the treatment and recovery potential of the waste.

5.3.1 Physical Properties of Waste at Khajod Dumpsite

To identify physical properties of open dump at Khajod site, waste samples from legacy waste were collected. Three different locations were identified as described in figure below from the open waste dump at Khajod dumpsite. Mix waste from the depth of 1 meter, 2 meter and 3 meter depth of open waste dump.

Figure 28 Waste sample collection for waste characterization

The waste sample shows low portion of cotton and textile waste. There are only few % contents of paper and plastic waste observed in all the samples. Clay content found in higher % in all the waste sample, which indicating the daily cover is spread on open dump by SMC .

Table 7 Test result: Physical Characterization of Legacy waste

SR. NO.	TEST PARAMETERS ELEMENTS	UNIT	Digging Pit S1 & S4 at 1 Mtr. Depth *	Digging Pit S3 & S5 at 2 Mtr. Depth *	Digging Pit S6 & S2 at 3 Mtr. Depth *
1.	Plastic	%	5.4	4.8	4.2
2.	Paper	%	7.0	4.6	1.6
3.	Cloth	%	10.5	8.4	6.2
4.	Metals	%	1.1	0.5	0.3
5.	Thermocoal	%	0.2	0.1	Nil
6.	Leather	%	0.6	0.4	0.34

7.	Glass	%	0.7	0.6	0.8
8.	Stone	%	11.0	8.0	6.0
9.	Hair	%	0.3	Nil	Nil
10.	Wood	%	1.2	0.92	0.44
11.	Clay	%	62.0	71.68	80.12

Source : Waste analysis report 2016.

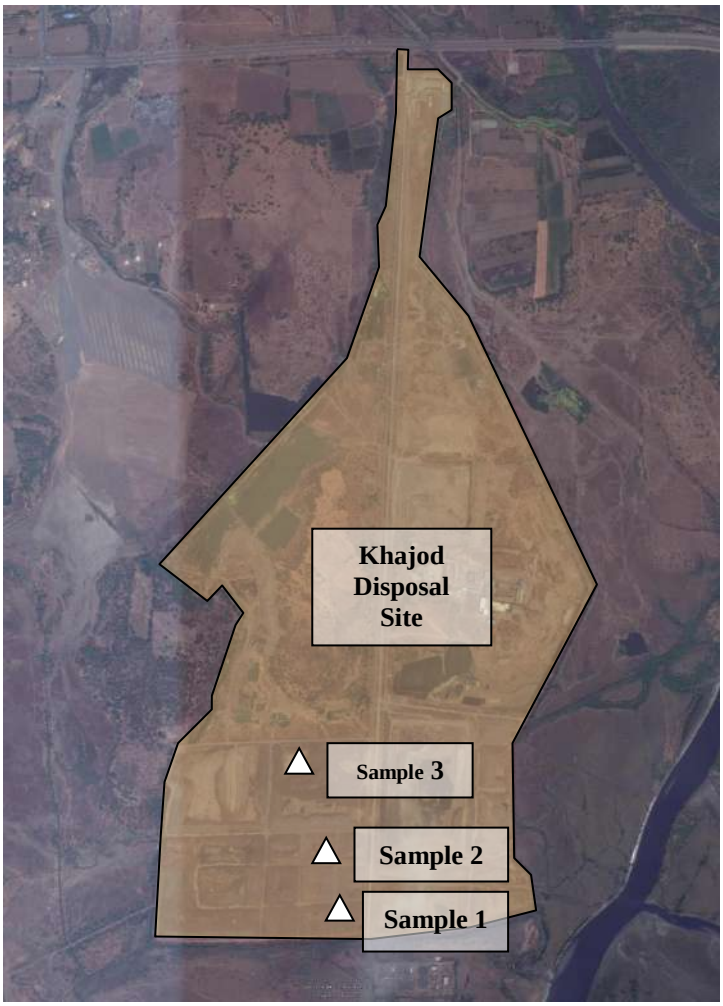


Figure 29 Waste sample location for waste characterization

5.3.2 Chemical Properties of Waste at Khajod Dumpsite

Waste samples were collected to identify chemical properties of fresh waste and legacy waste. Samples were collected from the depth of 1 meter, 1.5 meter and 2 meter from the ground level. Waste Samples were tested for to access residual organic matter and calorific value. The test results indicate the ample moisture contents in fresh waste sample and very less moisture in the legacy waste samples. Other chemical tests were conducted as follows, The Volatile organic compound (VOC), Total Organic Carbon (TOC) and Loss of Ignition (LOI) at variable temperature. The test results are indicating waste does not have much potential for landfill gas generation but it has calorific value

usable for Waste to energy project. The test results are attached in Annexures. Results are indicating that waste does not have much potential for landfill gas generation but it has calorific value usable for Waste to energy project.

5.3.3 Design Approach

Landfill closure is required to minimize pollution and enhance environmental values. Landfill closure is mandatory for compliance of SWM Rule - 2016. The following approach is proposed to be adopted for undertaking the proposed closure of Khajod dumpsite:

- Excavating and relocating relatively smaller waste mound as per the project requirement to a confined footprint area (about 38.35 Hectare) to recover maximum area of the dumpsite, the project envisages reclamation of about (28.75 Hectare) land
- Providing aesthetically appealing and structurally stable retaining structure of required height
- Providing gentle side slopes to the existing waste mound by cutting / reforming & compacting, thereby increasing height of the final profile to accommodate more waste within the optimum footprint area;
- Providing a scientifically designed cover component [in conformity with the provisions made in the SWM Rules 2016 consisting of synthetic layer having very high degree of im-permeability to prevent percolation of rain water into the waste mass, thus reducing / eliminating formation of leachate, protective layers with self-sustaining vegetation and landscaping which will provide an appealing aesthetic appearance to the area
- Providing storm water drainage system to safely divert the run-off water
- Providing landfill gas ventilation system
- Constructing allied infrastructures such as road, fencing, security cabin etc.

A landfill cover is usually composed of several layers, each with a specific function. The final cover system enhances surface drainage, intercept percolating water, minimize infiltration, support surface vegetation and control the release the landfill gases. Following are main component of dumpsite/landfill closure:

- Landfill/closure cover system
- Surface drainage
- Leachate collection
- Gas collection
- Slope protection

- Site

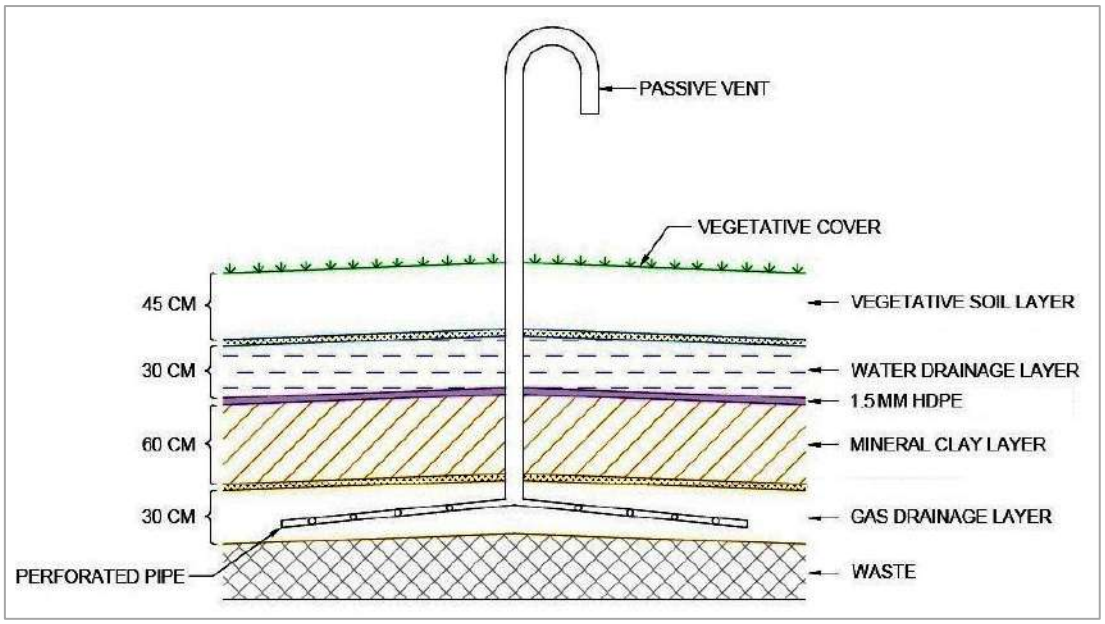


Figure 30 Typical components of Landfill Closure with passive gas vent

5.4 Proposals for Closure of Waste Dump

Report of Task for on waste to energy (2014) project has suggested that, 'Rehabilitation and remediation of abandoned landfills including capping of dumpsites should be initiated on priority in the cities where water table is generally high and the amount of waste being deposited is large. Scientific assessment of contamination of soil and groundwater should be undertaken and extent of damage and possibilities of remediation may be ascertained. Based on the outcome and cost implications, a strategic decision regarding remediation and or capping should be taken. Capping should be planned to minimize further damage and release of the part of the land by scraping and accumulating scattered waste and using it for sanitary landfills or putting it to a profitable use. Remediation to release precious land is therefore strongly recommended'.

The general transition to dumpsite closure will include the following works: shaping the main capping, topsoil application, grass sowing, gas collection and removal, and storm drainage management. Following are main components of closure;

- Shifting of the waste at site and scientifically close the dumpsite by covering the same with impermeable cover
- Final cover of the landfill - enhances surface drainage, prevents infiltration of water and supports surface vegetation;
- Development of ancillary infrastructure such as boundary wall, road, storm water drain and

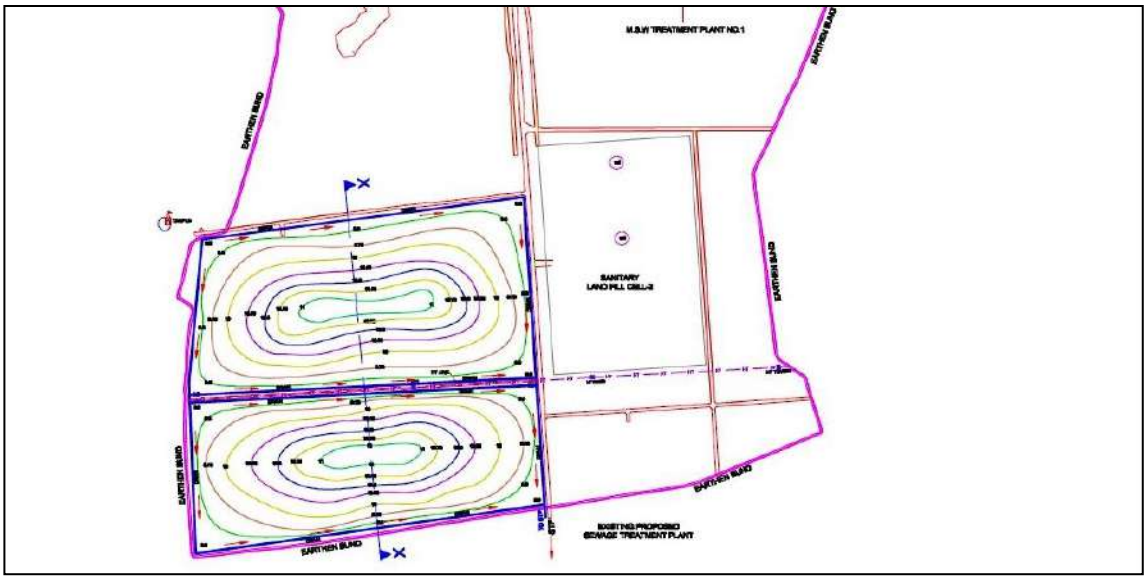
lighting for landfill cell.

- Surface water drainage system - collects and removes all surface runoff from the landfill site;
- Environmental monitoring system - periodically collects and analyses air, surface water, soil and ground water samples around the landfill site;
- Organized and well qualified work force and detailed record keeping system; and
- Landfill closure and post closure monitoring.
- Development of the site as Landscaped open area

5.4.1 Option-1-A: Closure of open dump by capping

Dumpsite Closure by capping: Capping of old waste dumps are most safe, fast and convenient method for closure of dump site. During capping process efforts are made to reduce footprint of waste to minimum and recover maximum land by shifting of waste. Waste is enclosed by 'Gabion wall' for slope protection. Storm water drains are provided on periphery and on road side. At Khajod dump site following component are proposed for the closure procedure.

Shifting of waste: Existing waste dump placed at shall be excavated from 6,7,8,9 location marked in figure 27 and shifted to location 2,3,4,5 figure 27 marked for capping. Legacy waste dumped at location at location no. 2 to 5 admeasures 36.50 Hact. area, height of dump will be increased from 7 mt. to 11. This process will recover 24.67 Ha. of land at the end of complete capping process from pocket no. 7 to 10.



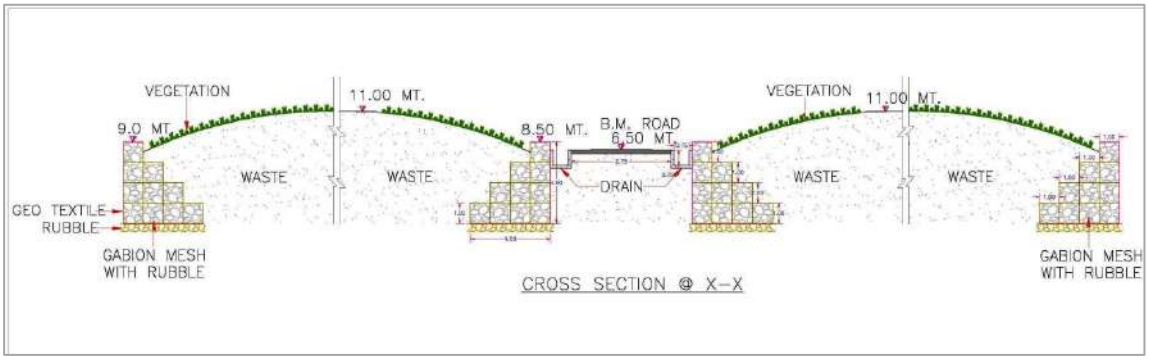


Figure 31 Capping of legacy waste and gabion wall

Area Grading: Waste scattered at site shall be shifted to capping location, levelled and contour shall be generated as mentioned in Figure 32Infiltration of surface rain water into solid waste garbage dump and generating leachate.

High tension electric overhead line is passing through proposed capping area, hence top level of certain part of capping is lowered for safety of vehicles moving during closure process. Thus capping area is divided into two terraces and inspection road is proposed on central area where HT elect. line is passing. Details are shown in following figure.

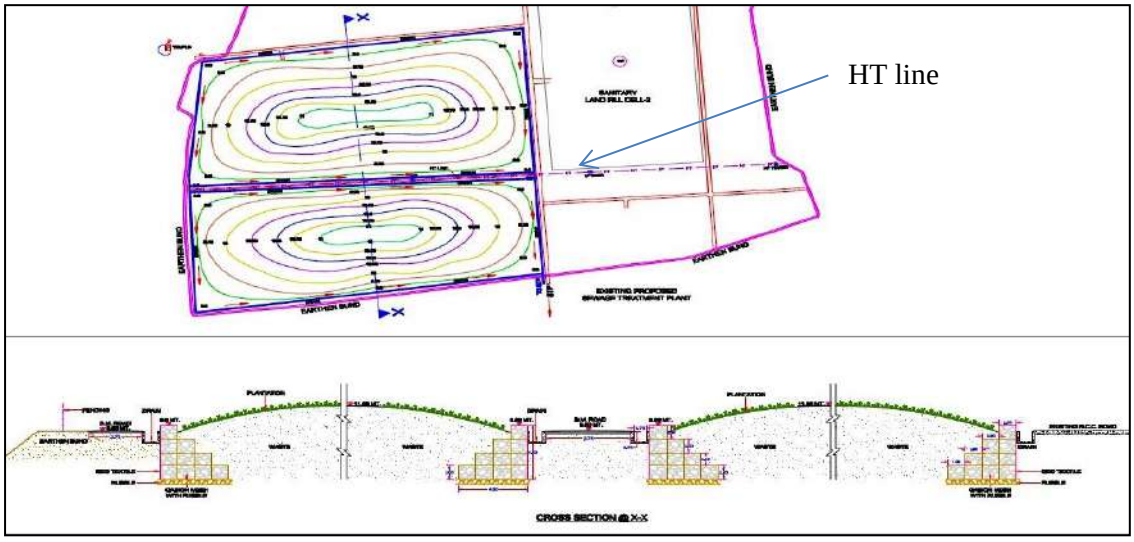


Figure 32 Area grading considering HT line

HDPE Liner: In order to prevent pollution problems resulted from landfill operations, an impermeable lining system at the sides of the waste disposal area is installed. For landfill having residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) minimum liner specifications shall be a composite barrier having 1.5 mm thick high density polyethylene (HDPE) geo-membrane, overlying 60 cm of soil (clay or amended soil) having permeability coefficient less than $1x10^{-7}$ cm/sec. Detailed specifications are placed at Annexure 7.

Barrier layer–compacted clay or amended soil: The final cover shall have a barrier soil layer comprising of 60 cm. of clay or amended soil with permeability coefficient less than $1x10^{-7}$ cm/sec. This soil shall be brought from borrow area confirming to permeability coefficient less than $1x10^{-7}$ cm/sec. or certain admixtures may be added to borrow area soil to achieve desired permeability.

Drainage layer–Granular soil: Rain water from ground may percolate through vegetative layer is collected in this layer and drained out to the main drainage line.

Surface layer (Top soil): Top soil suitable of growing vegetation/plants on sloped and flat surfaces brought from borrow area which is suitable for low rooted vegetation. A vegetation cover of locally adopted non-edible perennial plants that are resistant to drought and extreme temperature shall be provided over the complete site. Self-sustaining vegetation and landscaping will provide an appealing aesthetic appearance to the area.

Slope protection work using Gabion: Gabion wall (details in Annexure-4) is proposed for slope protection work. It is required to be constructed for avoiding earth/waste dump sliding over the years. Gabion wall are flexible and stable, cheaper, easy to repair hence, more advantageous when compared with RCC wall.

Gabions are rectangular baskets fabricated from a hexagonal mesh of heavily galvanized steel wire. The baskets are filled with rock and stacked atop one another to form a gravity type wall. Gabions depend mainly on the interlocking of the individual stones and rocks within the wire mesh for internal stability, and their mass or weight to resist hydraulic and earth forces. Gabions are a porous type of structure that can sometimes be vegetated. Gabions are considered to be a “hard” structural solution that has minimal habitat and aesthetic value. The key advantages of Gabion Wall are:

- Ease of handling and transportation
- Speed of construction Flexibility (Gabions tolerate movement)
- Permeability to water (Good drainage)
- Gabions offer an easy-to-use method for decreasing water velocity and protecting slopes from erosion.

Proposed gabion wall to protect waste from slope failure are shown in following figure.

Slope stability analysis:

Waste sample were collected from various depths and location, sample were send to laboratory for analysing field Dry density (g/cc), Modified Proctor-MDD (g/cc), Modified Proctor -OMC (%),

Cohesion (c) (kg/cm^2) and Angle of friction (ϕ) Degree. Above parameters/results are used for calculation of slope stability analysis using Gabion retaining wall (Annexure-3).

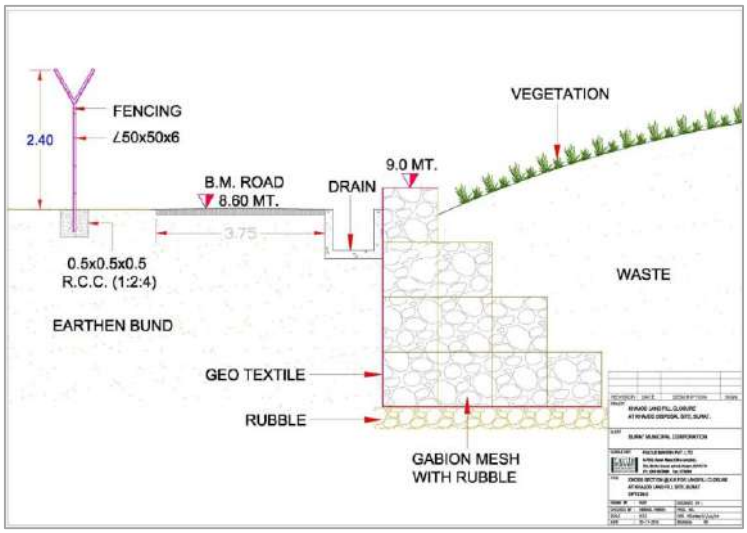


Figure 33 Slope protection using Gabion wall

Storm Drainage: It is important to collect rain water separately to minimize volume of leachate and also to prevent flooding of the Site during heavy rains. Adequately sized storm water drainage network in RCC/Brick masonry drain has been all-around of closure site for preventing storm water into closed dump site.

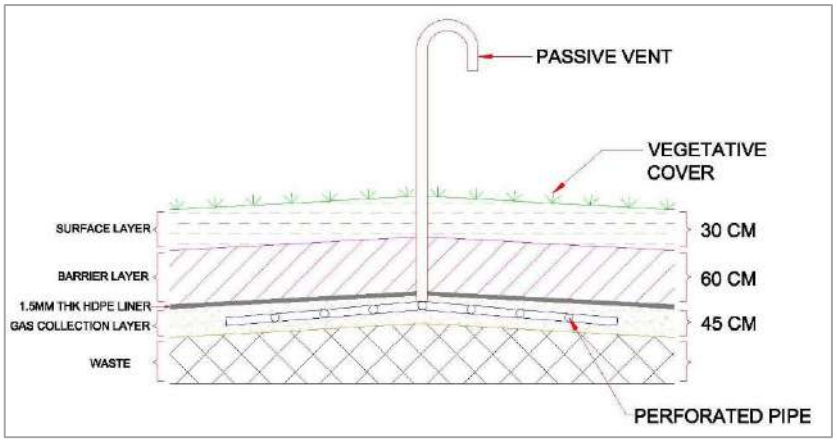


Figure 34 Proposed components for capping of existing dumpsite

Landscape Work: The primary objective of providing a top skin soil landscape treatment over the scientifically closed dumping ground is to:

- Add Landscape value to otherwise a large waste
- Utilize the plateaus or the flat table tops to create gardens/ Golf course for public use in future.
- Create an interesting visual and movement on top gardens.

Treated effluent water from nearby Sewage treatment plant may be used for gardening purpose, this will save use of fresh water for development of soft horticulture.

Figure 35 Photograph of closed dump site (Pune – Uruli - Devachi dumping ground)

Passive Venting System: Passive venting system consists of several perforated pipes installed vertically and uses the natural pressure of the gas to collect and vent or flare it at the surface. Such systems are installed where gas generation is low and off-site migration of gas is not expected. It is suitable for small municipal landfills (less than 40,000 m3) and for most non-municipal containment type landfills. The system may consist of a series of isolated gas vents, with at least one vent provided for every 7,500 m3 of waste.

5.4.2 Option 1-B: Closure of dump by capping and development of Solar Park

Solar PV development on landfills offers a significant opportunity for revenue generation. Although not every landfill is suitable to host a solar PV system, municipal landfills with advantageous site characteristics may provide an opportunity for cities and towns to generate revenue from otherwise undevelopable land. Table at below outlines some of the key advantages and challenges associated with siting solar PV projects on landfills.

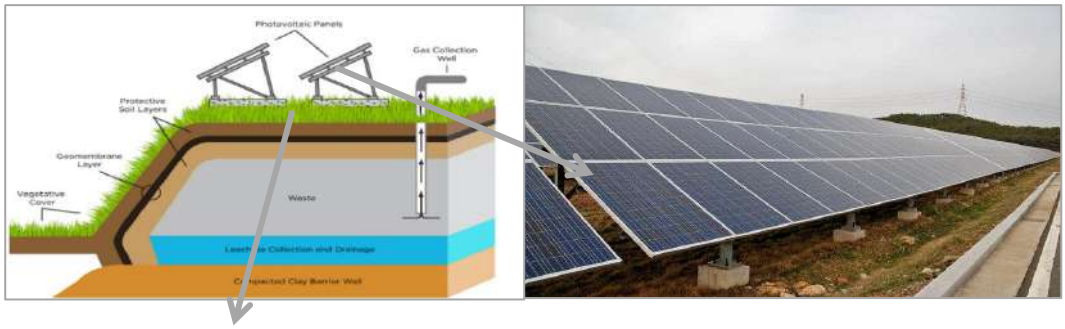


Table 8 Key Advantages and Challenges associated with siting solar PV projects on landfills

Advantages	Challenges
Large, open space	Permitting restrictions
Access for construction	Settlement issues
Remote location	Cap Restrictions
Limited shading	Weight/Load limits
Inexpensive open space	System design
New use for otherwise unusable land	Distance to interconnection
Increased site monitoring	Topography and slope

The Khajod landfill site can be used for developing a solar park after closure as per option 1-A as described above. The Khajod dump site after closure by capping has suitability due to open surrounding without any obstacles or high-rise structures. The site is likely to get ample amount of sunlight throughout the day. There are possibilities for development of Solar Farm on PPP basis which may be explored. Terraces may be suitable modified to accommodate level surface for installation of Solar panel.

5.4.3 Option 2: Dumping of waste into new sanitary Landfill Cell no.3

In this option new sanitary land fill cell construction is proposed and all legacy waste outside existing LF cell no. 2 may be excavated and transported to newly constructed cell no.3. New sanitary LF cell no. will be having bottom liner, leachate collection system, etc, complying to SWM rule 2016. Closure of LF cell no. 3 may be performed after shifting of all the legacy waste at site.

Capacity calculations for construction of municipal sanitary waste landfill cell 3 at Khajod

The calculated quantity of open dump waste is as under,

- Total quantity of waste need to be disposed is: **33,57,160 Cu Mt.**
- Considering compaction ratio – 0.8, Total amount of waste is **26,85,700 MT**

Proposed Sanitary Landfill Cell 3 Measurement:

- Bottom size of Cell: 758.0 M x 328.0 M
- Straight Height of Cell h1 : 11.0 M
- Slope of Earthen Embankment : 1 V to 2.5 H
- Hence, Top Size of Cell : 200 + 2 x 11 x 3 = 224.0 M x 224.0 M
- Height of Paraboloid Shape above top = 1.5 M Max.

CAPACITY CALCULATIONS:

PART - I : Bottom Part

Bottom shape of cell is of a frustum of Pyramid.

Bottom Area A1 = 758 x 328 = 2,48,624 SqM

Top Area A2 = 810 x 380 = 3,07,800SqM

Height of Cell h1 = 11.0 M

Volume : h1/3 [A1 + A2 + √(A 1 x A 2)]

=11/2.5[248624 + 307800 +√ (248624 x 307800) **= 27,24,900 CuM**

PART –II : Top Part

Its shape is of Paraboloid

Approximate Vol. = (2 x h2 x A2)/3

= (2 x 1.5 x 50176)/3 **= 3,07,800 CM**

Total Volume of Cell = Part I + Part II

= 27,24,900 + 3,07,80

Total Volume of Cell = 30,32,700CuM

With density of waste = 0.95 T/CM, (When compacted using mechanical equipment)

Total Tonnage Capacity of cell = 30,32,700 x 0.95

Total Tonnage Capacity of cell =28,81,065 MT

Hence, proposed landfill cell can accommodate legacy waste dumped at Khajod site.

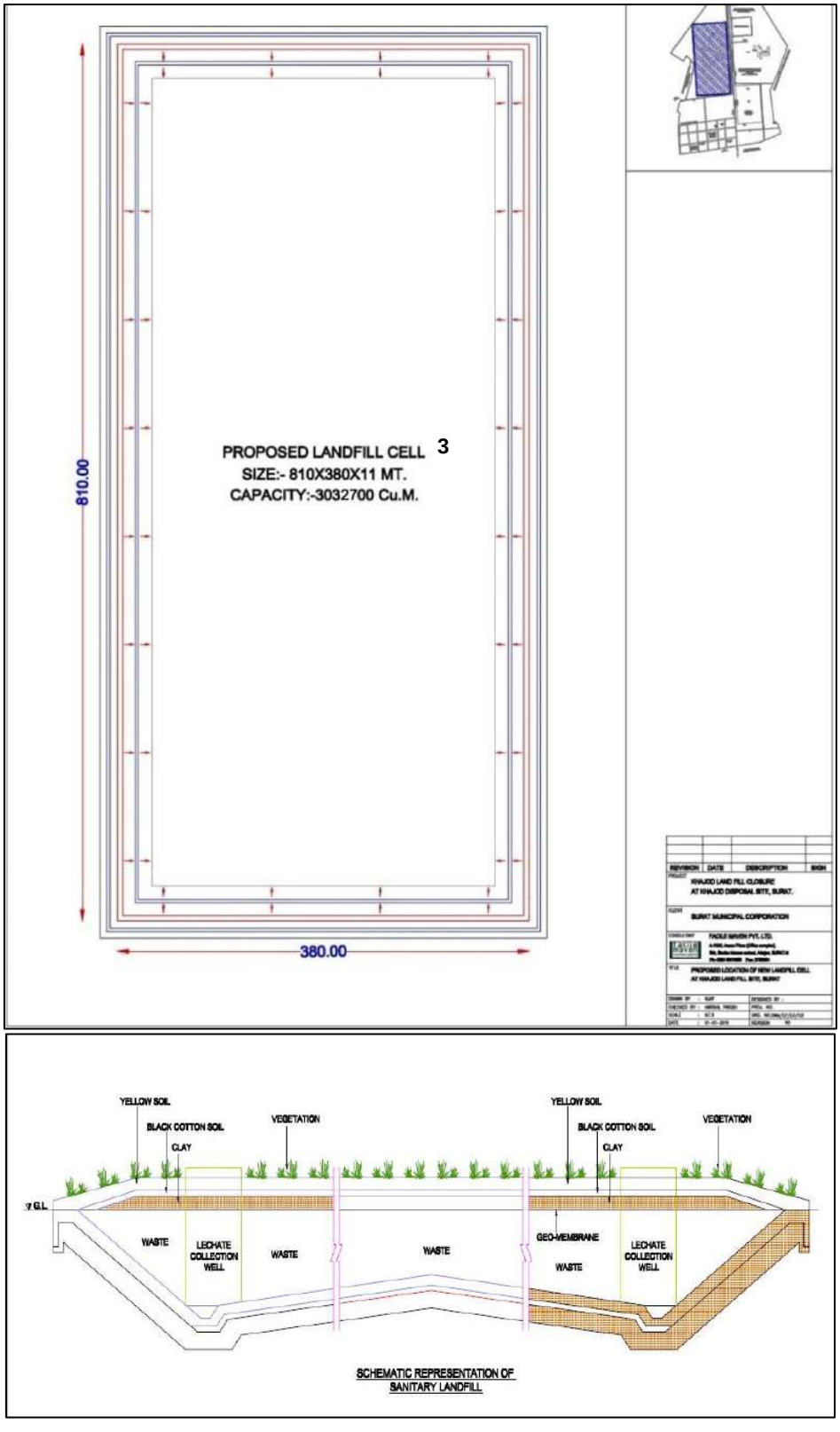


Figure 37 New sanitary Landfill Cell for disposal of legacy waste

5.4.4 Option 3: Landfill Mining and Material Recovery Facility

The principle of landfill mining may be used as the driver to convert this challenging task into an opportunity. The possible outcome would include recovery of space for future landfills, soil fraction for growing non-edible crops as well as landfill cover material and the plastics for making refuse derived fuel.

The main objectives of dumpsite/landfill mining are as under;

- Conservation of landfill space.
- Reduction in landfill area.
- Elimination of potential contamination source.
- Rehabilitation of waste dump.
- Reuse of recovered materials.
- Reduction in waste management costs.
- Redevelopment of landfill sites.

SWM rule 2016 Schedule -1 (J) Closure and Rehabilitation of Old Dumps states that;

Solid waste dumps which have reached their full capacity or those which will not receive additional waste after setting up of new and properly designed landfills should be closed and rehabilitated by examining the following options:

(i) Reduction of waste by bio mining and waste processing followed by placement of residues in new landfills or capping as in (ii) below.

(i). Capping with solid waste cover or solid waste cover enhanced with geomembrane to enable collection and flaring / utilisation of greenhouse gases.

(iii) Capping as in (ii) above with additional measures (in alluvial and other coarse grained soils) such as cut-off walls and extraction wells for pumping and treating contaminated ground water.

(iv) Any other method suitable for reducing environmental impact to acceptable level.

Dumpsite Reclamation or Mining is the process of excavating from operating or closed solid waste landfills, and sorting the unearthed materials for recycling, processing, or for other dispositions It is the process whereby solid waste that has been previously land filled or dumped is excavated and processed (Strange, 1998). Typical landfill mining processes are presented in following figures.

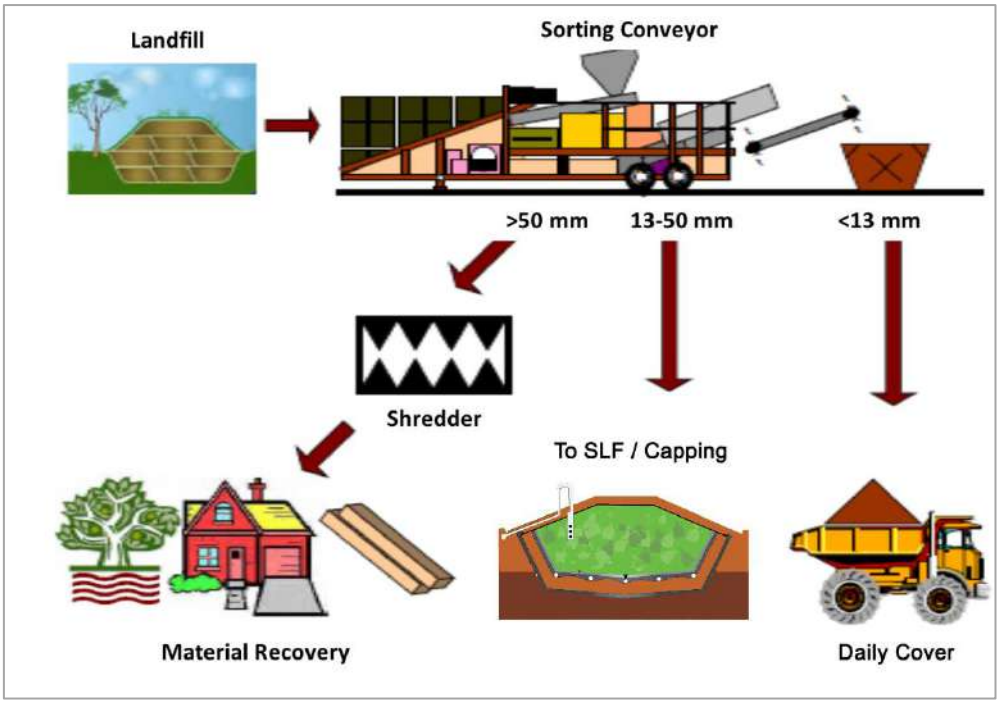


Figure 38 Schematic of dumping site mining process

The key to dumpsite mining operation is a set of conveyers and screens that sorts the solid wastes into three fractions: oversized material, intermediate-sized waste, and dirt/humus. The oversized materials consist of recyclable metallic goods, white goods, plastics and rubber. The intermediate-sized materials consist of partly decomposed organics, combustibles, recyclables and the fine fraction will mostly be stabilised soil. The main part of the process is the screening where the main separation is done for the oversized and the soil elements. Ferrous metals are generated from the main stream by employing a magnetic separator and the non-ferrous parts using an air classifier, which leaves behind the residue. The residue can be dispose to landfill as inert.

In dumpsite mining operations, an excavator removes the contents of the landfill cell. A front-end loader then organizes the excavated materials into manageable stockpiles and separates out bulky material. A trommel (a revolving cylindrical sieve) or vibrating screen separates soil (including the cover material) and solid wastes from the reclaimed waste. Trommel screens are more effective than vibrating screens for basic landfill mining. The size and type of screen used depends on the end use of the recovered material. For example, if the reclaimed soil were to be used as landfill cover, a 6.25 mm screen is used for separation. A smaller mesh screen (2.5 mm) may be used to remove smaller pieces of metal, plastic, glass, and paper, if the reclaimed soil were meant for construction fill, or for another end use requiring fill material with a high fraction of soil content. The separation of dirt/ humus material from the intermediate sized waste is made using a screen grid with 6.25 mm openings. The success of materials recovery is dependent on the composition of the waste, the effectiveness of the mining technology and the efficiency of the technology. The recovery of various

materials ranges from 50 to 90% of the waste. The average soil fraction in recovered municipal waste from landfill tends to be around 50-60%. However, it can vary between 20 and 80%.

The non-recyclable part of the intermediate-sized and oversized materials is typically reburied in the mined area of the landfill. If this portion is reburied as inert without further processing, this landfill mining operation typically achieves about **70% volume reduction**.

Table 9 Soil to waste ratio in landfill mining

Landfill	Soil-to-waste ratio (%)
Edinburg, New York, USA	75:25
Horicon, New York , USA	65:35
Hague, New York , USA	50:50
Chester, New York USA	25:75
Coloni, New York, USA	20:80
Sandtown, Delaware, USA	46:54
Burghof, Germany	71:29*
Schoneiche, Germany	77:23*
Döbeln-Hohenlauft, Germany	62:38*, 21:79**
Schoneiche, Germany	20-80*, 30:70**
Dresden, Germany	74:26*, 19:81**
Sengenbühl, Germany	11:89*, 45:65**
Basslitz; Germany	50:50*, 34:66**
Cagliari, Italy	31:69*
Filborna, Sweden	65:35

* Screen gauge 40 mm ** Screen gauge 8-40 mm *Source: USEPA, 2012*

There are around 60 projects around the world that constituted landfill mining. Most of these projects are designed on pilot basis. The cost of the project is high compared to landfill capping. In majority of these projects, land clearance and land reutilization was the objective.

5.4.4.1 Landfill mining and material recovery

Assuming that the legacy waste shall be cleared in 5 years from the commercial start of the project,

Plant capacity calculations are shown in the following table.

Table 10 Landfill mining plant capacity calculation

Description	Qty.	Unit
Estimated Waste Quantity	**37,00,000**	**CuM.**
Density of legacy waste	0.80	MT/Cum
Waste Quantity in MT	29,60,000	MT
Implementation Time Period	5	Years
i.e.	1,825	Days
If plant operated for all 365 days	1,622	MT
Plant Capacity (@ 65% working days- excluding monsoon period)	**2,495.26**	**MT**
Required Plant capacity: Say	**2500**	**MT/day**

Average 2500 MT per day plant capacity is needs to excavate and utilize legacy waste in five year period. Legacy waste needs to be revitalized for the better Material (resource) recovery efficiency.

The most potential economic benefits associated with landfill reclamation are indirect. However, a project can generate revenues if, markets exist for recovered materials. Although the economic benefits from reclamation projects are facility specific, they may include the following:

- Increased disposal capacity
- Avoided or reduced costs of:
    - Landfill closure
    - Post closure care and monitoring
    - Purchase of additional capacity or sophisticated systems
    - Liability for remediation of surrounding areas.
- Revenue from:
    - Recyclable and reusable materials (e.g., ferrous metals, aluminium, plastic, & glass)

- Combustible waste sold as fuel
- Reclaimed soil used as cover
- Materials sold as construction fill or sold for other uses
- Land value of sites reclaimed for other uses.

The capital cost (CAPEX) and operational cost (OPEX) of landfill mining includes excavation, processing and residue dumping from legacy waste. The cost description is as below:

Capital costs:

- Site preparation
- Rental or purchase of reclamation equipment
- Rental or purchase of personnel safety equipment
- Construction or expansion of materials handling and recovery facilities
- Rental or purchase of hauling equipment

Operational costs:

- Labor (e.g., equipment operation and materials handling)
- Equipment fuel and maintenance
- Administrative and regulatory compliance expenses (e.g., record keeping)
- Worker training in safety procedures
- Hauling costs

Estimated development cost come around **INR 75 Cr.** Out of which, 7% to 8% of the capital should be considered as operational cost (OPEX) cost.

5.4.4.2 Feasibility of landfill mining:

Waste sample were Physical characterization of legacy waste were conducted

Table 11 Test result: Waste Physical Characterization

SR. NO.	TEST PARAMETERS ELEMENTS	UNIT	Digging Pit S1 & S4 at 1 Mtr. Depth *	Digging Pit S3 & S5 at 2 Mtr. Depth *	Digging Pit S6 & S2 at 3 Mtr. Depth *
1.	Plastic	%	5.4	4.8	4.2
2.	Paper	%	7.0	4.6	1.6
3.	Cloth	%	10.5	8.4	6.2
4.	Metals	%	1.1	0.5	0.3
5.	Thermocoal	%	0.2	0.1	Nil

6.	Leather	%	0.6	0.4	0.34
7.	Glass	%	0.7	0.6	0.8
8.	Stone	%	11.0	8.0	6.0
9.	Hair	%	0.3	Nil	Nil
10.	Wood	%	1.2	0.92	0.44
11.	**Clay**	**%**	**62.0**	**71.68**	**80.12**

Source : Waste analysis report 2016

Above results shows that at various depth quantity of clay/inert varies from 60 to 80 %. As we go deeper content of clay/inert is higher. This shows that if we utilize legacy waste for mining, only 20 to 30% of materials like paper, plastic, glass, cloths etc. can be recovered and subsequently only 20 to 30% of waste volume can be reduced after recovery process over the period of five years.

In 2009, SMC has conducted similar study on legacy waste sample and results shows that "The total organic content of the waste ranged from a low of 0.72% to a high of 10.77%, with the volatile organics being non- detectable. The methane content of the gas samples collected from the wells ranged from a low of 0.9 to a high of 0.29, unusually low for a solid waste landfill. This data, combined with the low Total Organic Content, indicates that most of the organic matter in the landfill has either been scavenged or burnt, and **mostly demolition waste and low permeability inert silt is present in the landfill**. (Pilot Testing for Landfill Gas Estimation, Bhatar,Surat, 2009)

Estimated development cost come around **INR 75 Cr.** Which includes excavation and transportation of legacy waste, installation of trommel, construction of shed for trommel, shifting of inserts to landfill etc. 7% to 8% of the capital should be considered as operational cost (OPEX) cost.

Considering high operation cost, long period of operation and little land recovery landfill mining options does not seems feasible.

Other assumptions are SMC shall provide land for plant, guarantee of free waste, water, sewage, power connections, roads and street lights at the site.

6 Summary of Estimated cost

The cost estimates workout are based on the following:

1. Schedule of Rates for Road & Bridge, Gujarat Works for the year 2015-2016, applicable to Surat district
2. Schedule of Rates of Gujarat Water Supply & Sewerage Board (GWSSB), Gandhinagar for the year 2014-2015, which is still in vogue & applicable to Surat district

For the specialized and non-scheduled items such as HDPE Geomembrane, Geotextile, gas monitoring equipment and landscaping works prevailing market rates have been adopted.

OPTION-1 A- On site capping

SR NO	ESTIMATE	AMOUNT IN RS.
1	Landfill closure	493852921
2	Gabion wall for slope protection	111750747
	Total Cost in Rs.	60,56,03,669
	5 % Contingency Charge	30280183
	2 % Work charge established	12112073
	Gross Total	**647995926**
	Say	**64,79,96,000**

OPTION-1 B- On site capping and Solar Power farm

SR NO	ESTIMATE	AMOUNT IN RS.
1	Capping of dumpsite (option 1-a)	64,79,96,000
2	Installation cost of solar power plant	66,60,00,000
	Total Cost in Rs.	**131,39,96,000**

OPTION-2 Waste disposal in New Sanitary Landfill Cell

SR NO	ESTIMATE	AMOUNT IN RS.
1	Construction of New Sanitary Landfill Cell	99,86,82,872
2	Closure of LF Cell	49,38,52,921
		149,25,35,793
	5 % Contingency Charge	156,71,62,582
	2 % Work charge established	3,13,43,252
	Gross Total	159,85,05,834
	Say	**159,85,06,000**

OPTION-3 Landfill Mining and Material Recovery Facility		
SR NO	**Block cost**	**AMOUNT IN RS.**
1	Landfill Mining	
A.	Excavation and Shifting of Legacy Waste to MRF (35,00,000 CuM x 100 Rs. /Cum)	35,00,00,000
B.	Installation of Trommel (2500 MT)	7,00,00,000
C.	Disposal of inert	19,60,00,000
D.	Construction of shed for Trommel	7,00,00,000
E.	Operation & Maintenance	6,40,00,000
	Gross Total	**75,00,00,000**

6.1 Financial analysis

Capital cost and operation cost for all three options are worked out and listed in Table 12

Table 12 On site capping and Solar Power farm - Option 1-B

Option 1-B - On site capping and Solar Power farm			
Production Capacity of MW			
Description		**Unit**	**1 Panel Detail:**
Flat Area for PV Solar Panel	193547	Sq.mt.	**Size receivers: 5.37 Sq.Mt.**
PV Panel Req. area for inst.	5.37	Sq.mt.	**250 Watt**
No of Panel will be Installed on area	36,056	Nos.	
	9013925	watt/flat area	
	9014	KW	
Total MW Produced	**9.0**	**MW**	
Cost of 9 MW Solar Power Plant			
Cost of 1 MW Plant	74,000,000	Rs./1MW	Source: TGP Solar
Cost of 9 MW Plant	66,60,00,000	Rs./9MW	
Cost of capping	64,79,96,000		
Total	**131,39,96,000**	**Rs./9MW**	
Revenue Detail			
Unit(Electricity) Produced per MW	1700000	Unit(kWh)/1 MW	Source: TGP Solar
Govt. purchase rate of Electricity	5.86	Rs./Unit	
Revenue from 1MW	99,62,000	Rs./Year/1 MW	
Revenue from 9MW	8,97,96,722	Rs./Year/9 MW	

Total	**8,97,96,700**	**Rs./Year/9 MW**	
Payback Period	15	Year	
Total revenue	134,69,50,830	Rs./15 Year/9MW	
Total	**134,69,50,000**	**Rs./15 Year/9MW**	
O&M Cost			
O&M cost	2,00,00,000		
Total	**2,00,00,000**	**Rs./15 Year/9 MW**	

6.2 Techno-commercial analysis

Table 13 Techno-commercial analysis of closure options

Techno-Commercial Analysis					
Sr. No.	**Description**	**Landfill Closure**		**Dumping of waste into new Landfill Cell**	**Landfill Mining and MRF**
		(Option-1)		**(Option-2)**	**(Option-3)**
		A- Only Capping	**B- Capping with Solar Panel**		
					All amount in Rs.
1	**Capital Cost, Rs.**	**64,79,96,000**	131,39,96,000	159,85,06,000	75,00,00,000
2	**O&M Cost, Rs. /Year**	10,00,000	16,95,24,800	1,00,00,000	
3	**Land Recovery, Sq.mt**	2,87,409	2,87,409	3,50,000	2,00,000 (at the end of 5th year)
4	**Land Occupied/ Land Req. for Closure, Sq. Mt**	3,83,500	3,83,500	3,07,800	50,000
5	**Source of Funding**	SMC own fund	1. Revenue by Renewable Source of Energy (PV Solar Panel) on PPP mode 2. Earning Carbon Credit (If Project approved as per CDM criteria)	1. SMC	Institutions one reluctant to finance MSW project. (Ref. Planning Commission report, 2014)
6	**Economic life of project, Year**	0	15 Year	0	5 Year
7	**Revenue (Rs.)**	0	114,92,75,445	0	Depending of recovered material

8	**Revenue Modelling**	No	9 MW Solar Power Plant	No	Revenue by selling of recovered recyclable material
9	**Execution Time**	1 Year	2 Year Execution Time 15 Year O&M Time	2 Year	5 Year Execution Time
10	**Risk Factor**	Nil	Change in Power Tariff	Nil	Low

6.3 Recommendation for Khajod Site

Option 1a: Capping of Dumpsite

This option considers shifting of partial waste, levelling and the capping the dump site as it is. It will have one-time capital expense with annual monitoring expenses. However, the land remains largely unutilized and whenever that needs to be reclaimed, additional expenses of mining will be required. Capping cost is estimated at 65 crores which includes covering, providing drainage, and creating landscapes and O&M cost of 10 lakhs per year for 5 years. This option involves lesser capital investment, faster execution (construction period 1 year), reduces foot print of legacy waste (24 Hect. land is recovered).

Option 1b: Solar Power Plant on Closed Landfill Site

Development of closed landfills for the renewable energy is a relatively new and growing practice. Numerous tested engineering techniques and solar technologies are available to facilitate the placement of solar energy systems on closed landfills. More over climate and location of Surat is suitable for setting up power plant. Setting up solar power system is in line with state and national policy, which encourages such units. Additionally, solar energy is clean energy, which does not cause any environmental damage. There is minimal environment and hazard risk to the project. Solar power plants require relatively low operation and maintenance cost. It is politically acceptable. In view of advantages of Solar Power Plant system (Option 1b) appears to be quite appealing.

Financially, the option of setting up 9 MW solar power plant requires an investment of 131 crores in capping the landfill and setting up power plant. It further requires nominal operational expenses. The institutional funding is not going to be difficult considering the ownership of land and possibility of evacuation power agreement with DISCOM. This project is having good revenue potential. Considering the plant has economic life of 25 years, payback period 15 years. (Refer table-9), hence project is profitable from 16th year onwards. This is with the assumptions that, prevailing government policy remains same throughout the life of project. Electricity tariff have reduce drastically during last 10 years and Gujarat is energy surplus state with sufficient green energy production through renewable resources.

Option 2: Dumping Waste into New Landfill Cell

This option requires clearing the land of existing waste dump by creating a new scientific landfill cell. This option involves substantial cost in creating a new landfill and immediately filling it with available waste. The transportation of waste to new location does not add any value and hence the project

has no benefit except land reclamation. The cost of clearing the waste dump and creating a new landfill site is set to cost approximately Rs. 160 crores.

Option 3: Landfill mining and Material Recovery Facility

This option considers mining the existing waste dump and setting up Material Recovery Facility (MRF) which separate the available waste to get material which can be reuse or recycle. The estimated mining cost for waste dump is 75 crores. After mining activity, waste material will be sent to material recovery facility. The facility will utilize average daily 2500 MT per day from existing dump and inerts will be sent to SLF. Such facilities will require installation of 2500 MT material recovery facility is estimated as Rs. 50 crores. The plant has projected operational life of 5 years considering improvement in technology as per requirement.

Material recovery facility has sizable operation and maintenance cost and requires good amount of management to efficiently run the operations. Looking at the revenue generation potential, recovered material can be sold to various recycle plants and scrape metal factories. But the waste contains of high amount of clay, hence recyclable waste is in very less percentages. Hence the output of the Material Recovery Facility will be quite less that won't match the operation cost of the facility, reduction in footprint will not be sizeable and operation period is very large i.e. five years. Considering above facts landfill mining option is not feasible.

Conclusion:

There are three major feasible options for closure of dump sites i.e 1-a) capping of dumpsite, 1-b) capping of dumpsite with Solar panel on terrace, 2) Dumping of legacy waste in to new sanitary landfill cell and closure, 3) landfill mining and material recovery. Taking consideration into account capital cost, project execution period, operation & maintenance cost, risk factors it appears that, option 1 a has techno-commercially got edge over other options and seems to be acceptable.

6.4 Future Planning for Waste Treatment and Disposal

6.4.1 SMC Future Planning for Waste Treatment

Table 14 Summary of Waste Treatment Plants

Type of Waste	Name of Agency	Tentative collection and Processing Capacity in TPD
Waste to compost	Hanjer Bio Tech.	200
Waste to Energy Plant	RGE, Surat	1000
Waste to Energy Plant (EPC)	SMC	600
MSW Processing plant (BOOT)	Under Process	500
Total		**2300 TPD**

Table 15 Summary of Segregated Waste Treatment Plants

Type of Waste	Name of Agency	Tentative collection and Processing Capacity in TPD	Tentative time of functioning	
Plastic Waste collection and processing plant	Eco Vision Resources LLP	100	1st Phase: June-2016	2nd Phase: Dec-2017
E-Waste Collection and treatment plant	Pruthvi E-waste recyclers Pvt. Ltd.	10	Dec- 2016	
Construction & demolition waste Processing plant	Under Process	200	Feb- 2017	
Organic waste treatment facility	Under Process	150	Mar- 2017	
Industrial Waste Management	Under Process	50	Mar- 2017	
Total	**510 TPD**			

6.4.2 SMC Future Planning for Waste Disposal

At present, there is one active cell at Khajod site (LF cell-2), this cell is which is having remaining capacity to accommodate approximate 2 Lac MT of waste i.e. can accommodate MSW for next few years. In the light of the above fact SMC has already allotted work of construction of (extension of cell-1) landfill cell near old cell-1, having capacity of 5 Lacs MT., hence this could cater need for next two year.

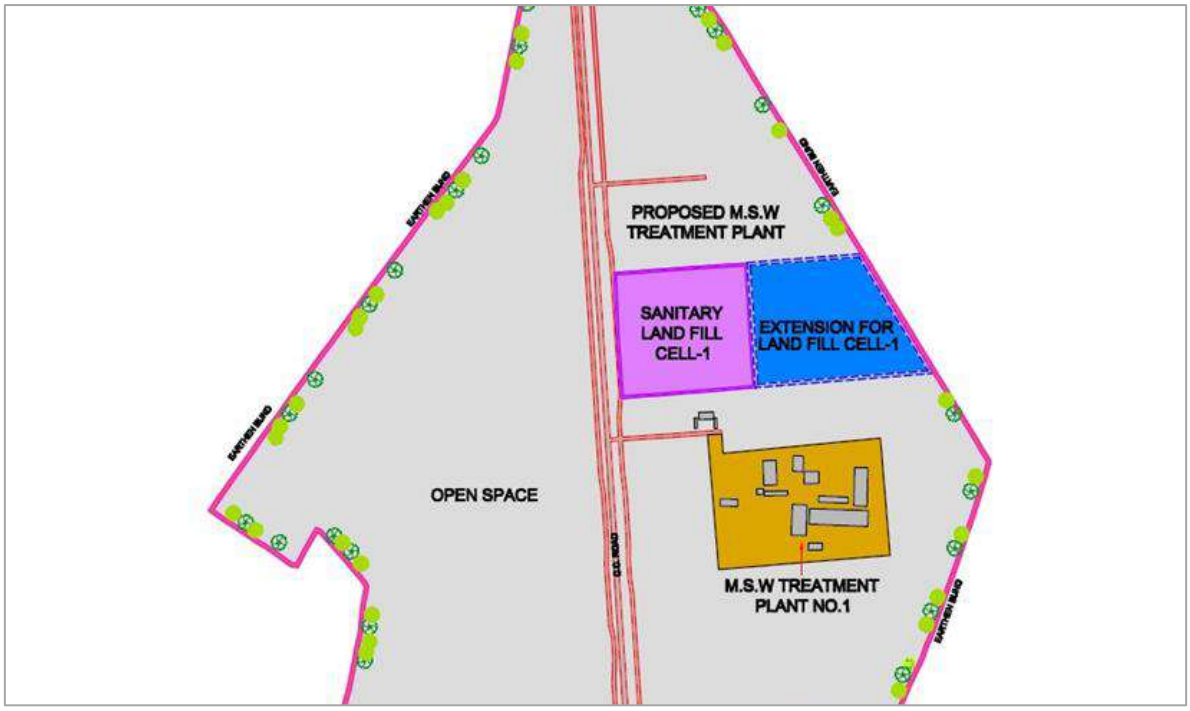


Figure 39 Proposed extension of Landfill cell - 1

SMC is also searching for new landfill location around Surat city within Surat Urban Development Authority (SUDA) area. SMC has identified new landfill sites at four locations namely, Vankaneda, Kamrej and Olpad. These sites are also earmarked as site for refuse disposal purpose (public purpose plots) in development plan of SUDA. Pre-feasibility study for these sites was conducted as per EIA, CPHEEO guideline and it is found that these sites are suitable for development as MSW disposal site. The layout plan of two identified waste disposal sites (Vankaneda and Variyav) are mention below.

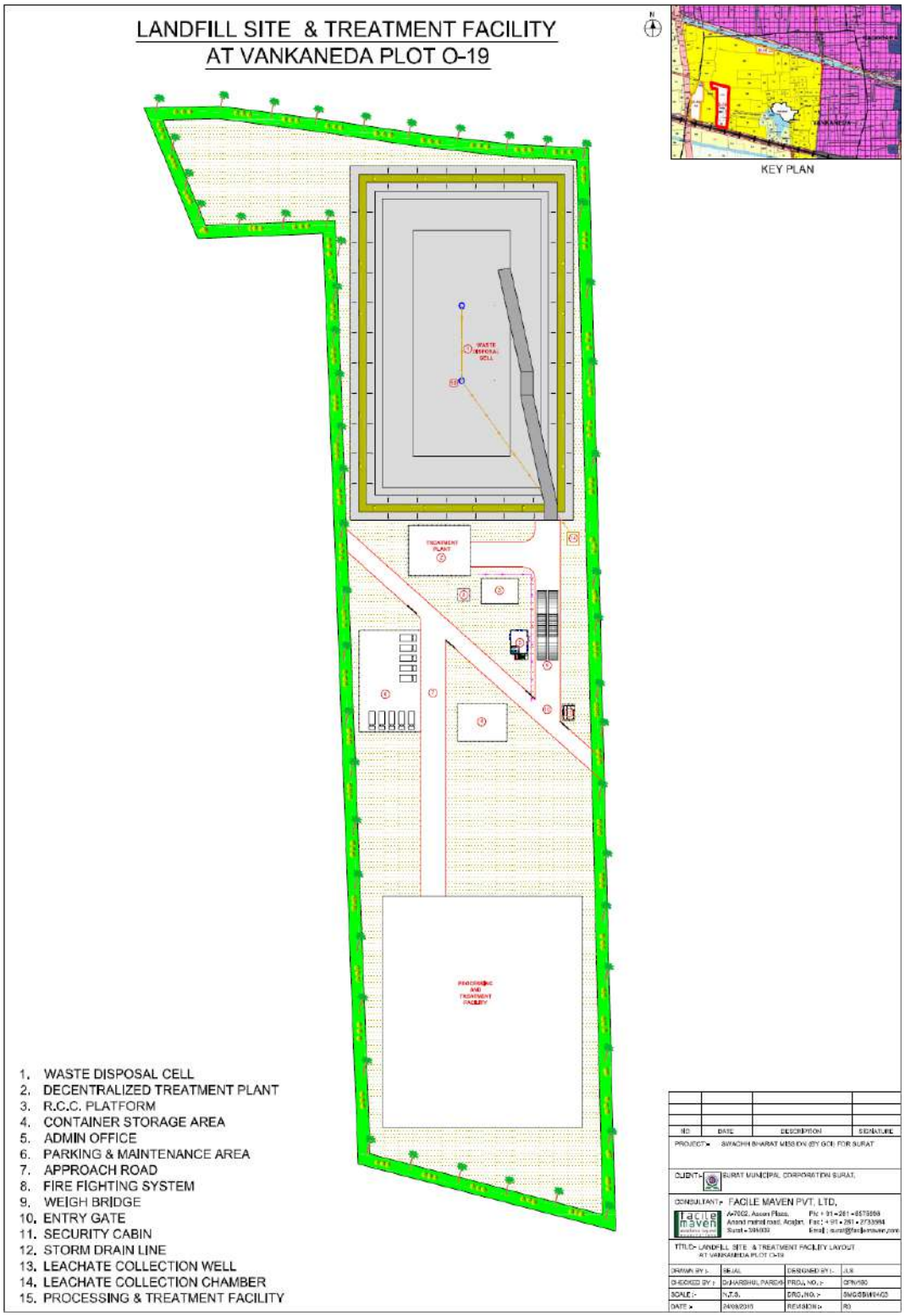


Figure 40 Layout plan for Vankaneda disposal site

Detailed feasibility studies like, topographic survey, soil investigation; hydrology study, Environmental Impact assessment, traffic survey, stack holder consultation etc. are required before development of disposal site.

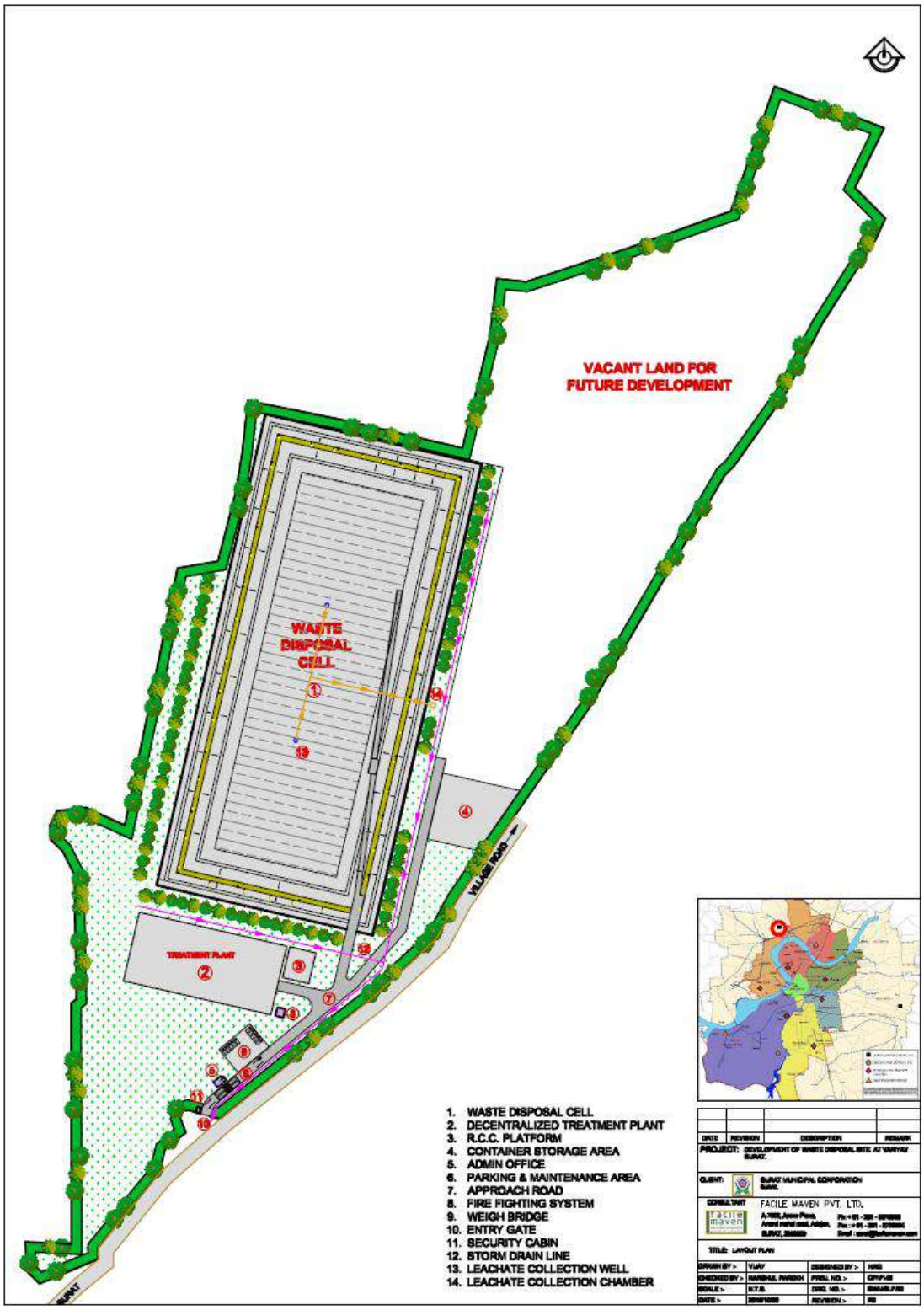


Figure 41 Layout plan for Variyav disposal site

Plot identification and allocation process is under progress for two waste disposal sites, Kamrej and Olpad. The proposed location of all disposal site is mentioned in following map.

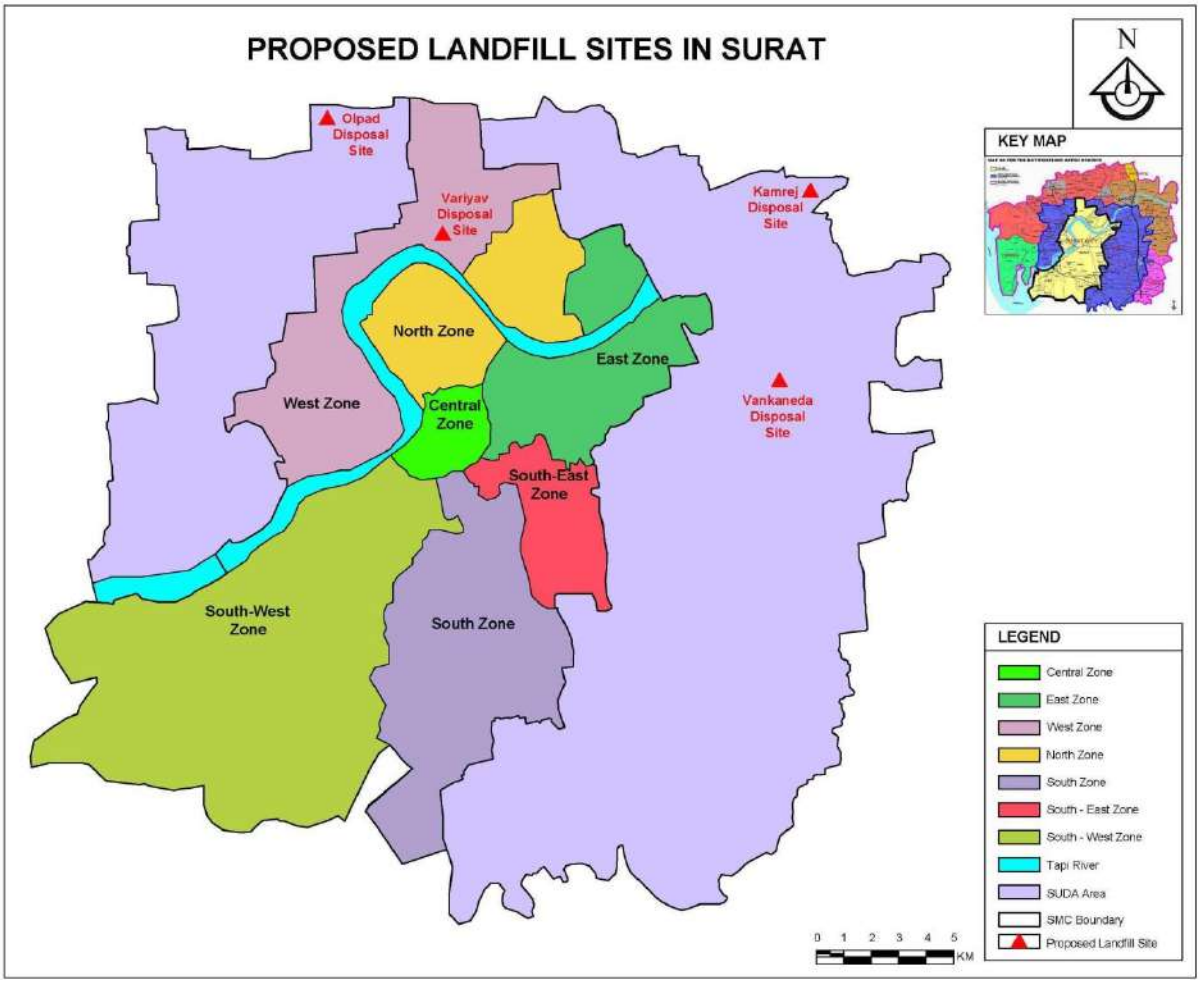


Figure 42 Location of proposed waste disposal sites

All the proposed waste disposal sites are fulfilling the norms based on SWM Rule-2016. All the proposed sites are out of 20 Km proximity from airport and fulfilling all CRZ regulation norms.

7 Environmental Management Plan

Environmental management plan is delineated to minimize adverse impact on the environment due to various activities involved in solid waste management. The various mitigation measures to be adopted during collection and disposal of waste required compliance with the SWM Rule – 2016. To minimise the environmental impact by waste following mechanisms and strategies need to be implemented.

- The workers directly exposed to waste should be provided with goggles, gum boots, hand gloves, mask, etc. as per health and safety requirement.
- Soil cover should be applied over the compacted waste at the disposal site.
- Regular monitoring of carbon monoxide, methane and hydrogen sulphide should be carried out to check the emissions of such pollutants
- Open burning of waste should be controlled
- Piped water supply should be provided at the site for sprinkling of water to keep down the dust and for fire-fighting
- Continuous monitoring of ground water quality adjoining landfill site should be carried out
- The surface water run-off should be collected and safely treated and disposed off. This will prevent accumulation of water and avoid breeding of flies, mosquitoes
- Leachate collection and treatment system should be monitored at the landfill site
- Tree plantation on the completed section of the landfill site as well as around the landfill site should be carried out to reduce the dust emission and minimize adverse aesthetic impact. It will also help in minimizing noise level in the surrounding.
- Necessary first aid facilities should be provided to the working staff Environmental management of waste.

7.1 Criteria for pollution prevention.-

As per SWM rule 2016, Schedule –I (D) to prevent pollution from landfill operations, the following provisions shall be made, namely:-

(i) The storm water drain shall be designed and constructed in such a way that the surface runoff water is diverted from the landfilling site and leachates from solid waste locations do not get mixed with the surface runoff water. Provisions for diversion of storm water discharge drains shall be made to minimise leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions.

(ii) Non-permeable lining system at the base and walls of waste disposal area. For landfill receiving

residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) shall have liner of composite barrier of 1.5 mm thick high density polyethylene (HDPE) geo-membrane or geo-synthetic liners, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than 1 x 10-7 cm/sec.

The highest level of water table shall be at least two meter below the base of clay or amended soil barrier layer provided at the bottom of landfills.

(iii) Provisions for management of leachates including its collection and treatment shall be made. The treated leachate shall be recycled or utilized as permitted, otherwise shall be released into the sewerage line, after meeting the standards specified in Schedule- II. In no case, leachate shall be released into open environment.

(iv) Arrangement shall be made to prevent leachate runoff from landfill area entering any drain, stream, river, lake or pond. In case of mixing of runoff water with leachate or solid waste, the entire mixed water shall be treated by the concern authority.

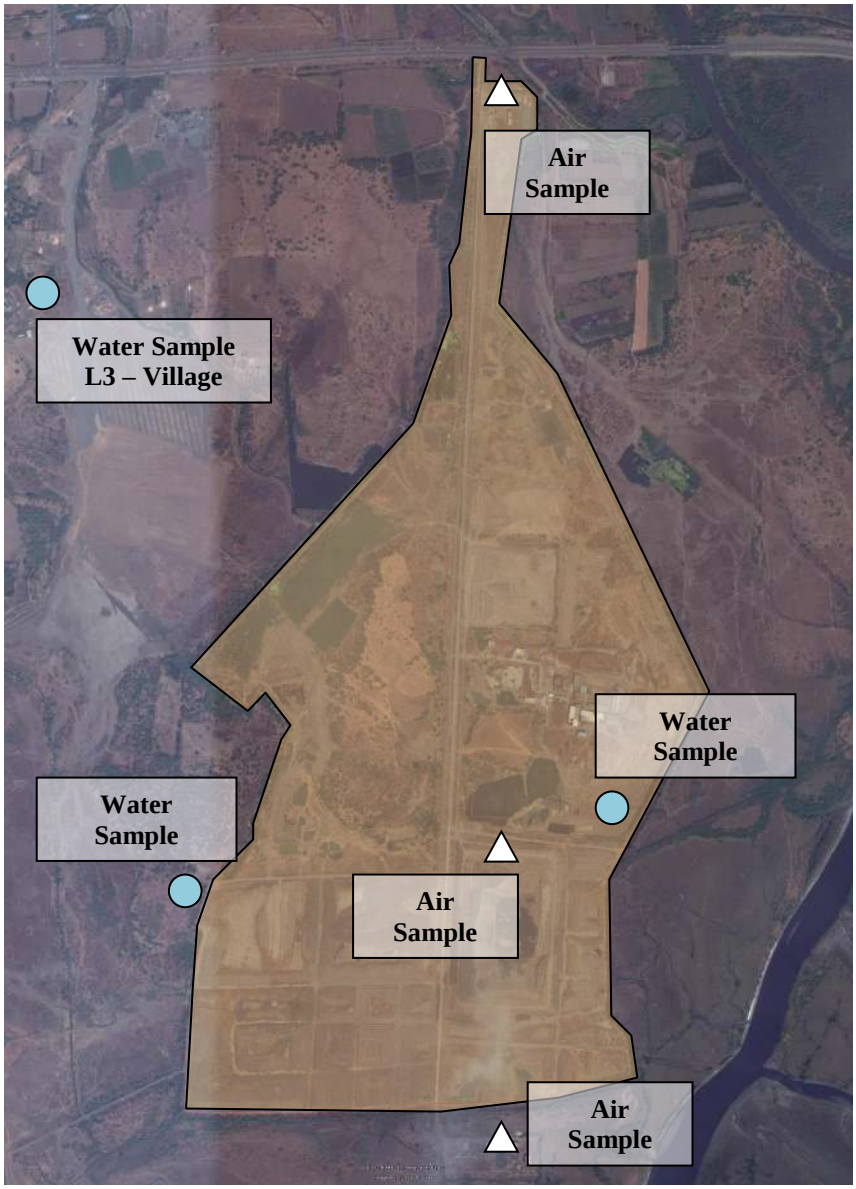
7.2 Environmental Monitoring at Khajod

- The ground water quality is monitored regularly.
- Stability of the slopes/embankments is monitored regularly

Monitoring of the ground water quality is carried out at the following places:

- Inside the facility
- Outside the facility

At present Surat Municipal Corporation conducted air and ground water monitoring process with co-operation of Detox Co-operation Pvt. Ltd. Location for air sample and ground water sample have been identified, which are marked in the following figure.



Source: Surat municipal Corporation

Figure 43 Location of sample taken for Air and Ground Water monitoring at Khajod landfill site

7.2.1 Air Monitoring

Each MSW landfill installing a collection system must monitor the nitrogen or oxygen concentration and the temperature of the LFG at each well on a monthly basis. Also, the owner or operator can propose and use an alternative method for detecting infiltration such as, monitoring for carbon monoxide, the methane to carbon dioxide ratio, or the composting ratio.

1. Particulate Matter, PM10, PM2.5
2. Sulphur Oxide
3. Nitrogen Oxides
4. Carbon Monoxide

Air quality shall be monitored on a monthly basis except in the monsoon season and compared with the AAQ monitoring results obtained during the baseline monitoring to record changes in the AQ and undertake suggested measures to mitigate the adverse impacts.

As per SWM rule 2016, Schedule –I (F) Criteria for ambient air quality monitoring are as follows,

(i) Landfill gas control system including gas collection system shall be installed at landfill site to minimize odour, prevent off-site migration of gases, to protect vegetation planted on the rehabilitated landfill surface. For enhancing landfill gas recovery, use of geomembranes in cover systems along with gas collection wells should be considered.

(ii) The concentration of methane gas generated at landfill site shall not exceed 25 per cent of the lower explosive limit (LEL).

(iii) The landfill gas from the collection facility at a landfill site shall be utilized for either direct thermal applications or power generation, as per viability. Otherwise, landfill gas shall be burnt (flared) and shall not be allowed to escape directly to the atmosphere or for illegal tapping. Passive venting shall be allowed in case if its utilisation or flaring is not possible.

(iv) Ambient air quality at the landfill site and at the vicinity shall be regularly monitored. Ambient air quality shall meet the standards prescribed by the Central Pollution Control Board for Industrial area.

As per the primary test results, temperature and humidity level were found as normal as the surrounding local environment. Parameters like suspended particulate matter, Sulphur Dioxide and Ammonia were found in very minor quantity compared to NAAQS Notification Nov. 2009 limits. Hence, there was no prominent air pollution observed in test results.

The test results of air quality monitoring are included as annexure-5

7.2.2 Ground Water Monitoring

Only a few landfill investigations have focused on both the quantity and the quality of leachate as a source of groundwater pollution. Surat Municipal Corporation has identified three locations in the nearby area of landfill site for ground water sample collection.

As per SWM rule 2016, Schedule –I (E) Criteria for water quality monitoring are as follows;

(i) Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 meter of the periphery of landfill site shall be periodically monitored covering different seasons in a year that is,

summer, monsoon and post-monsoon period to ensure that the ground water is not contaminated.

(ii) Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) shall be considered only after ensuring its quality.

As per the test results, the ground water pH value was bit higher and water quality was found as saline in test. Other physical properties like total hardness and total dissolved solids were found within limits compare to permissible limits.

Chemical properties of ground water test sample were moderate. Perimeters like chloride, sulphate, nitrate, iron were found in very low amount compared to permissible limit. Harmful chemicals like cyanide, arsenic, cadmium and phenolic compounds were absent in all ground water sample. Hence, it is concluded that ground water contamination is not present in surrounding area of Khajod landfill site.

The test results of ground water monitoring are included as annexure-6

7.2.3 Criteria for plantation at landfill Site.-

A vegetative cover shall be provided over the completed site in accordance with the following specifications, namely:-

(a) Locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be planted;

(b) The selection of plants should be of such variety that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilized;

(c) Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition;

(d) Plantation to be made in sufficient density to minimise soil erosion.

(e) Green belts shall be developed all around the boundary of the landfill in consultation with State Pollution Control Boards or Pollution Control Committees.

7.2.4 Flora and Fauna monitoring

The Common Flora observed in the surrounding area (10 km) during preparation of Environmental Impact Assessment is discussed below. The detail of Flora is given in Table 16.

Table 16 Details of Flora of Study Area

Sr. No.	Common name	Scientific name	Importance
1.	Babool	Acacia nilotica	Commercial
2.	Khair	Acacia catechu	Commercial
3.	Australian acacia	Acacia auriculiformis	Commercial
4.	Neem	Azadirachtaindica	Commercial & Medicinal
5.	Shirish	Albizialebbeck	Commercial
6.	Bougainvillea	Bougainvillea glabra	Ornamental
7.	Bamboo	Bambusaarundinaceae	Commercial
8.	Ak	Calatropisprocera	Medicinal
9.	Amaltash	Cassia fistula	Ornamental
10.	Narial	Cocosnucifera	Commercial
11.	Shivan	Gmelinaarborea	Commercial
12.	Saru	Casuarinaequisetifolia	Commercial
13.	Tendu	Diospyrousmelanoxylum	Commercial
14.	Gulmohar	Delonixalata	Ornamental
15.	Sheesam	Dalbergiasissoo	Commercial
16.	PahariSheesham	Dalbergialatifolia	Commercial
17.	Bass	Dendro - calamusstrictus	Commercial
18.	Amla	Emlicofficinalis	Commercial & Medicinal
19.	Nilgiri	Eucalyptus	Commercial & Medicinal
20.	Jasmine	Hibiscus schizopetalus	Ornamental
21.	Lalambadi	Hibiscus sabdariffa	Ornamental
22.	Akashneem	Millingtoniahortensis	Medicinal
23.	Kaner	Neriumindicum	Ornamental & Medicinal
24.	Deshibadam	Terminaliacatappa	Commercial
25.	Sagwan	Tectonagrandis	Commercial
26.	Arjun	Terminaliaarjuna	Commercial & Ornamental
27.	Behda	Terminaliabellirica	Medicinal
28.	Imli	Tamarindusindica	Commercial
29.	Jamun	Szygiumcumini	Commercial & Medicinal
30.	Asoka	Saracaindica	Commercial & Ornamental
31.	Vilayati Babul	Prosopisjuliflora	Commercial
32.	Keerar	Parkinsoniaaculeata	Commercial
33.	Aam	Mangiferaindica	Commercial
34.	Bargad	Ficusbengalensis	Commercial & Ornamental
35.	Peepal	Ficusreligiosa	Commercial & Medicinal
36.	Mahua	Madhucaindica	Commercial
37.	Ber	Zyzyphusmauritiana	Commercial
38.	Lasora	CordiaMoixa	Commercial & Medicinal
39.	Dhatura	Dhaturafastusa	Medicinal
41.	Gurhal	Hibiscussrosasinesis	Ornamental
42.	Rose	Hibiscussrosasis	Ornamental & Medicinal
43.	Tulsi	Oscimumsunctum	Medicinal
44.	Palas	Nuteafrontosa	Commercial & Medicinal

Source : SMC, 2015

The main crops of study area are wheat, Paddy, Maize, Bajra, Jowar, Moong, Tuvor, Gram, pea, Sugarcane etc. In the field of villages of study region where the soil condition is good, following crops are cultivated by the farmers.

Clusters of industries & urban areas are situated in the study area due to the reason that there is no forest, sanctuaries or national parks. There is less vegetation except cultivated fields of surrounding villages. Urbanization & Industrialization is increasing day by day and hence positive shifts towards industrial employment, better living condition and other related activities.

There is not even a single endangered animal and bird species have been reported in the study area. Some species have been found in the study area which is the habitant of cool, shady & bushy environment. Annelids, Arthropods, reptiles, mammals have been seen during our zoological survey. Some terrestrial & water birds species, terrestrial animals have been observed in the study area. The details of Avifauna and water birds are tabulated in table.

Table 17 Details of animal species of Study Area

Sr. No.	Common name	Scientific name	Included in Schedule of Wild Life Protection Act
Terrestrial Avifauna			
1	Bengal vulture	Gyps bengalensis	IV
2.	Black drongo	Dicrurusadsimilis	-
3.	Blue rock pigeon	Columba livia	-
4.	Common myna	Acridotherestristis	IV
5.	House crow	Corvussplendens	V
6.	House sparrow	Passer domesticus	-
7.	Jungle crow	Corvusmacrorhynchos	V
8.	Little cormorant	Phalacrocoraxniger	IV
9.	Pariah kite	Milvusmigrans	-
10.	Purple sunbird	Nectariniaasiatica	-
11.	Redvented bulbul	Pycnonotuscafer	-
12.	Small green bee-eater	Merops orient alis	
13.	Wiretailed swallow	Hirundosmithii	-
14.	Parrot Parakeet Rose-ringed	-	-
15.	Baya	Plocsusphilippinus	-
16.	Peacock	-	-

Water Birds			
1.	Blackheaded Gull	Larusridibundus	-
2.	Blackwinged Stilt	HimanropusHimantopus	IV
3.	Brahminy Duck	TadornaFerruginea	IV
4.	Brahminy Kite	Haliastur Indus	-
5.	Bronzewinged Jacana	MetopidiusIndicus	IV
6.	Brownheaded Gull	LarusBrunnicephalus	IV
7.	Cattle Egret	Bubulcus Ibis	IV
8.	Comb Duck	Sarkidiomis	IV
9.	Common Coot	FulicaAtra	IV
10.	Common Pochard	AthyaFerina	IV
11.	Common Sandpiper	TringaHypoleucos	IV
12.	Common Teal	AnasCrecca	IV
13.	CommonTern	Sterna Hirundo	-
14.	Common Teal	NettapusCoromandelianus	IV
15.	Curlew	NumeninusArquata	-
16.	Dabchik	Popdicepsrufiicollis	IV
17.	Garganey	AnasQuerquedula A	IV
18.	Green Sandpiper	TringaOchropus	IV
19.	Grey Heron	ArdeaCinerea	IV
20.	Indian River Tern	Sterna Auranita	-
21.	Large Egrett	Aardea Alba	IV
22.	Lesser Flamingo	Phoeniconaias Minor	IV
23.	Lesser Whisting Teal	DendrocygnaJavanica	IV
24.	Little Cormorant	PhalacrocoraxNigar	IV
25.	Little Egret	EgrettaGarzetta	IV
26.	Little Tern	Sterna Albifrons	-
27.	Marsh Harrier	Circus Aeruginosus	-
28.	Moorhen	GallinulaChloropus	-
29.	Pheasant–Tailed Jacana	HydrophasianusChirurgus	IV
30.	Pied Kingfisher	CeryleRudis	IV

Source : SMC, 2015

8 Post Closure Maintenance Requirements

Maintenance of the capped area and of the green cover to be developed on it is a very important aspect. The maintenance requirements are enumerated below:

- Regular detailed site inspection to identify areas of subsidence and their repair by levelling the areas with earth and recapping with landfill cover material as per the specifications used for closure
- Regular watering and maintenance of landscape areas
- Regular cleaning and maintenance of storm drain channels
- Periodic environmental monitoring to ascertain ground water and air quality as prescribed by the Gujarat Pollution Control Board
- Monthly detailed inspection of gas collection manifold and repair of any malfunctioning units/sections
- Provide security at the site to regulate access of public and ensure safety of the facilities.

8.1 Post Closure Requirement for Disposal Site.

Dump are resource ground for rag pickers, stray animals, birds, rodents etc. hence fencing and Security is required at site. For closure of open dump and, operation and maintenance required during post closure all weather access roads are required. Following ancillary facilities are required at closure site;

- Sign and direction boards
- Environmental monitoring
- Surface water runoff management and effective drainage system
- Periodical inspection and maintenance of dumpsite cover
- Plan for encourage recreational use of closed dumpsite
- Promotion of waste segregation at source
- Progressive rehabilitation including leachate and landfill gas management, compaction, daily cover and organised Landfill mining
- For at least two years after site closure, the landfill facility should be checked monthly to ensure vegetation reestablishment and to monitor any erosion or settling of the final cover. The closed landfill should continue to be monitored on a less frequent basis for up to thirty years after site closure. As appropriate, the landfill site may need additional covering applied, additional erosion control structures installed, and/or reseeding of the vegetative cover.

9 References

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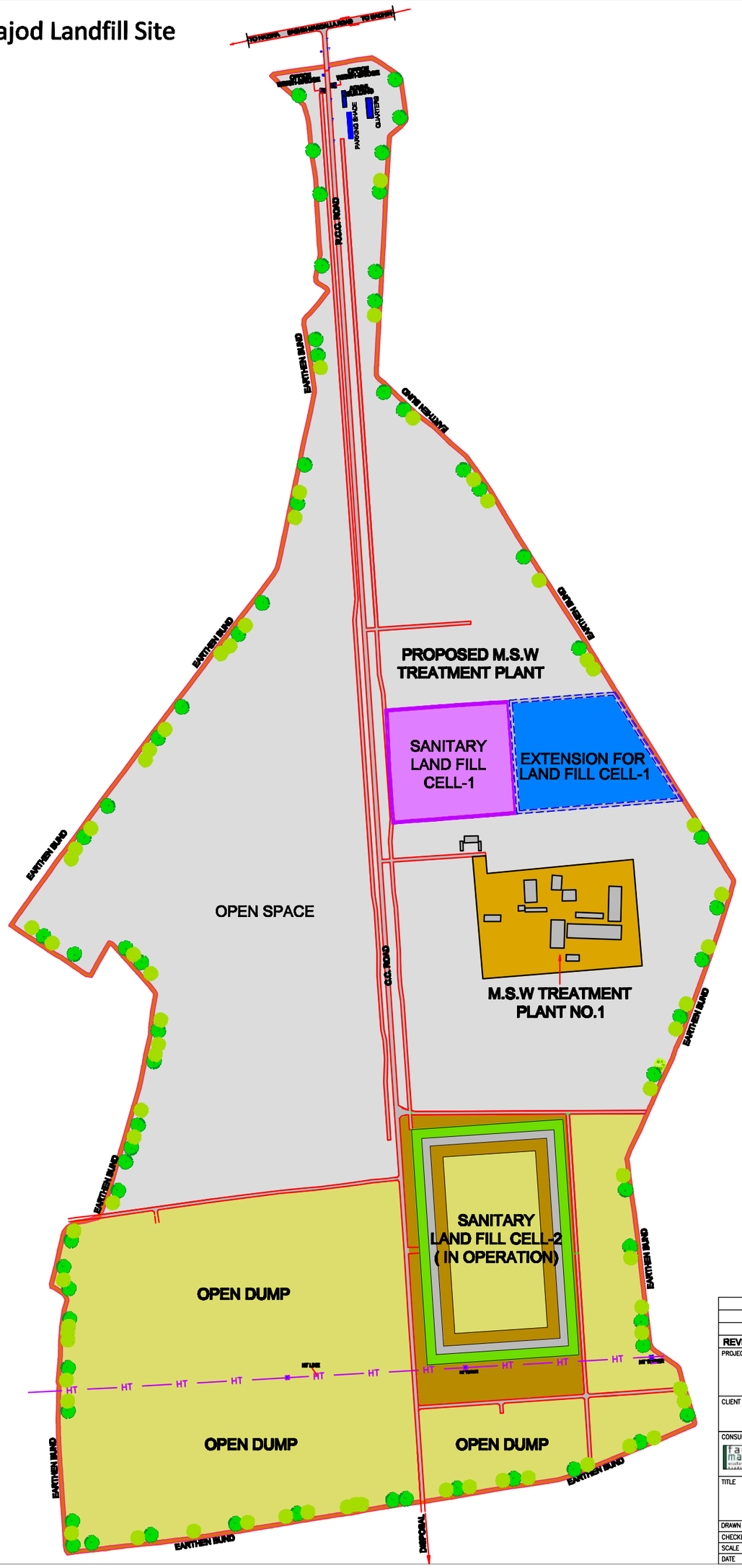
Annexure – 1 Khajod Landfill Site

Annexure - 1 Khajod Landfill Site



REVISION	DATE	DESCRIPTION	SIGN

PROJECT
KHAJOD LAND FILL CLOSURE
AT KHAJOD DISPOSAL SITE, SURAT.

CLIENT
SURAT MUNICIPAL CORPORATION

CONSULTANT
FACILE MAVEN PVT. LTD.
A-7002, Accon Plaza (Office complex),
Bh, Bhatia Internet school, Adajan, SURAT-6
Ph: 0261-6570000 Fax: 2736004

TITLE
PRESENTATION DWG OF LANDFILL CELL
AT KHAJOD LAND FILL SITE, SURAT

DRAWN BY	: VIJAY	DESIGNED BY :	
CHECKED BY	: HARSHUL PAREKH	PROJ. NO.	
SCALE	: N.T.S	DRG. NO.	SWM/LF/LO/06
DATE	: 13-01-2016	REVISION	R0

1797

Annexure – 2 Survey Data for Khajod Landfill Site

Annexure - 2

Survey Data for Khajod Landfill Site

REVISION	DATE	DESCRIPTION	SIGN

PROJECT	KHAJOD LAND FILL CLOSURE AT KHAJOD DISPOSAL SITE, SURAT.
CLIENT	SURAT MUNICIPAL CORPORATION
CONSULTANT	FACILE MAVEN PVT. LTD. A-7002, Avance Plaza (Office complex), B/h, Bhatia Umrao school, Adajan, SURAT-6 Ph: 0261-6570000 Fax: 2730004
TITLE	TOPOGRAPHICAL SURVEY OF KHAJOD LANDFILL SURAT

DRAWN BY	: VIJAY	DESIGNED BY	:
CHECKED BY	: HARSHUL PAREKH	PROJ. NO.	
SCALE	: N.T.S	DRG. NO.	SWM/LF/LO/02
DATE	: 04-01-2016	REVISION	R0

Annexure – 3 Details of Gabbion Wall

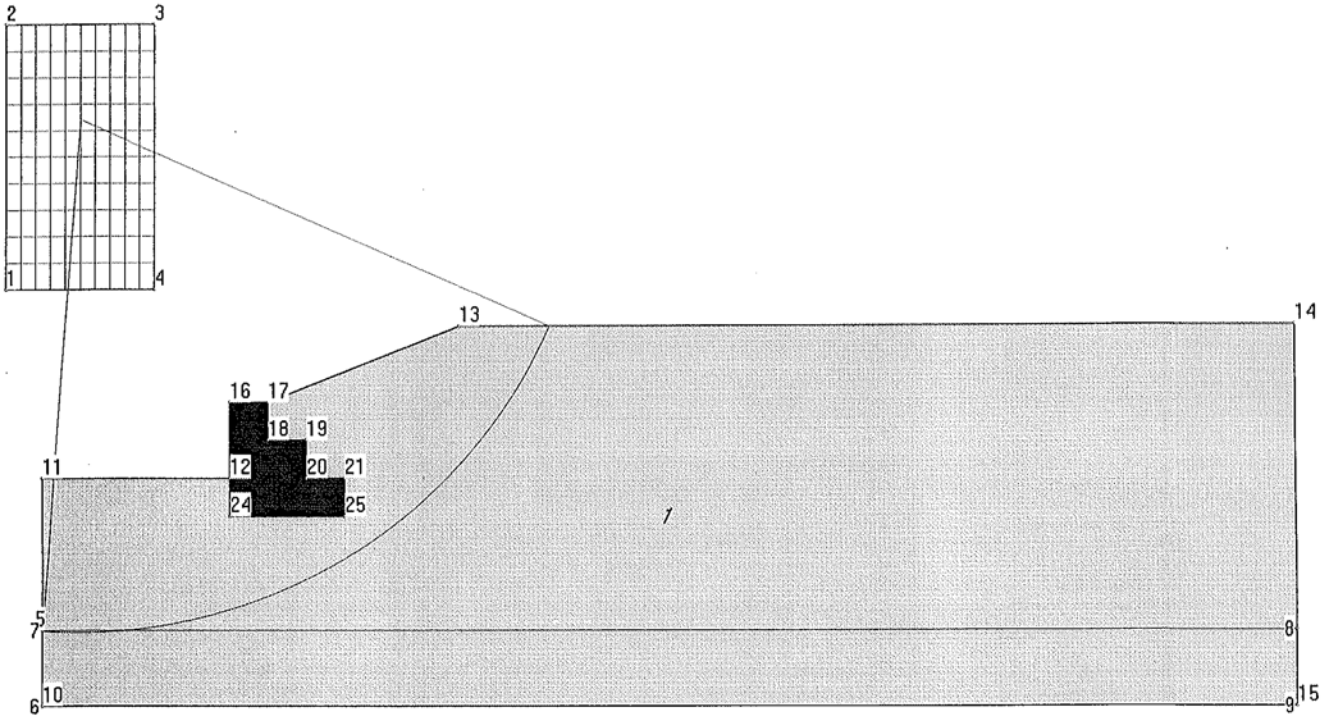
STB2010 - Slope Stability

Students of Geotechnics, Gabion-3m

General Data

Licensed User : Students of Geotechnics
File Name : MT-10-2016-BA-2983-02.stb
Problem Name : Gabion-3m
Number of Slices : 1000
Relative Horizontal Force: 0.000000
Number of Nodes : 25
Number of Soil Polygons : 2

Definition Figure



Input Data

Coordinates of Nodes

Node	x	y
1	0.000	11.000
2	0.000	18.000
3	4.000	18.000
4	4.000	11.000
5		2.000
6	1.000	0.000
7	1.000	2.000
8	34.000	2.000
9	34.000	0.000
10	1.000	0.000
11	1.000	6.000
12	6.000	6.000
13	12.000	10.000
14	34.000	10.000
15	34.000	0.000
16	6.000	8.000
17	7.000	8.000
18	7.000	7.000
19	8.000	7.000
20	8.000	6.000
21	9.000	6.000
22	9.000	5.000
23	9.000	5.000
24	6.000	5.000
25	9.000	5.000

Students of Geotechnics, Gabion-3m

Structure of Polygons

Window of centers of slip circles
Nodes 1 2 3 4
Deepest point of all slip circles
Node 5
Water Polygon
Nodes 6 7 8 9
Soil Polygons
1: Nodes 10 11 12 16 24 25 23 22 21 20 19 18 17 13 14 15
2: Nodes 16 24 25 23 22 21 20 19 18 17

Properties of Soils

Soil	Wd kN/m³	Ws kN/m³	Ko –	c kN/m²	phi degrees	P/F	p=0 m	cap m
1	17.000	20.000	1.000	57.000	10.000	P		0.000
2	21.000	21.000	1.000	0.000	40.000	P		0.000

Output Data

Safety Factors

0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Critical slip circle

Center: x = 0.000, y = 0.000, Radius: 13.553, F = 0.000

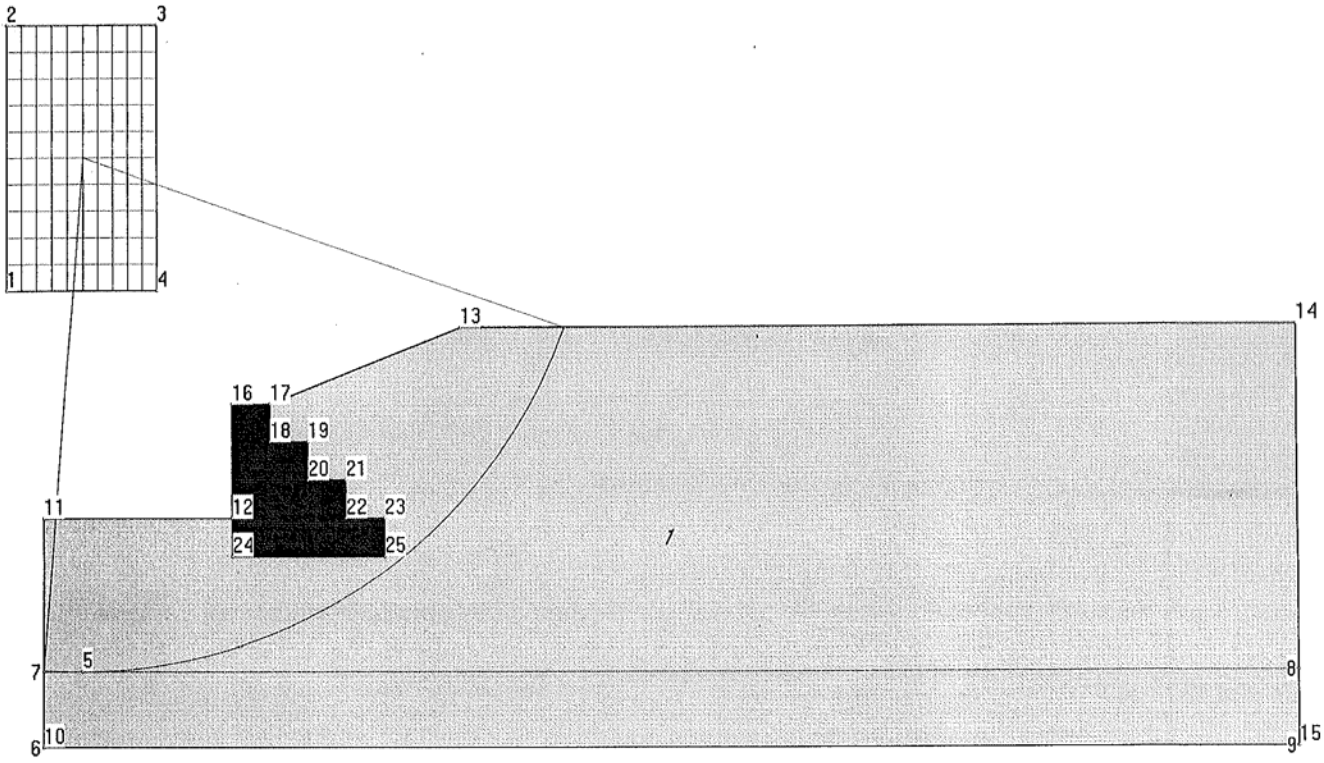
STB2010 - Slope Stability

Students of Geotechnics, New Problem

General Data

Licensed User : Students of Geotechnics
File Name : MT-10-2016-BA-2983.stb
Problem Name : New Problem
Number of Slices : 1000
Relative Horizontal Force: 0.000000
Number of Nodes : 25
Number of Soil Polygons : 2

Definition Figure



Input Data

Coordinates of Nodes

Node	x	y
1	0.000	12.000
2	0.000	19.000
3	4.000	19.000
4	4.000	12.000
5		2.000
6	1.000	0.000
7	1.000	2.000
8	34.000	2.000
9	34.000	0.000
10	1.000	0.000
11	1.000	6.000
12	6.000	6.000
13	12.000	11.000
14	34.000	11.000
15	34.000	0.000
16	6.000	9.000
17	7.000	9.000
18	7.000	8.000
19	8.000	8.000
20	8.000	7.000
21	9.000	7.000
22	9.000	6.000
23	10.000	6.000
24	6.000	5.000
25	10.000	5.000

Students of Geotechnics, New Problem

Structure of Polygons

Window of centers of slip circles
Nodes 1 2 3 4
Deepest point of all slip circles
Node 5
Water Polygon
Nodes 6 7 8 9
Soil Polygons
1: Nodes 10 11 12 16 24 25 23 22 21 20 19 18 17 13 14 15
2: Nodes 16 24 25 23 22 21 20 19 18 17

Properties of Soils

Soil	Wd	Ws	Ko	c	phi	P/F	p=0	cap
	kN/m³	kN/m³	–	kN/m²	degrees		m	m
1	17.000	20.000	1.000	57.000	10.000	P		0.000
2	21.000	21.000	1.000	0.000	40.000	P		0.000

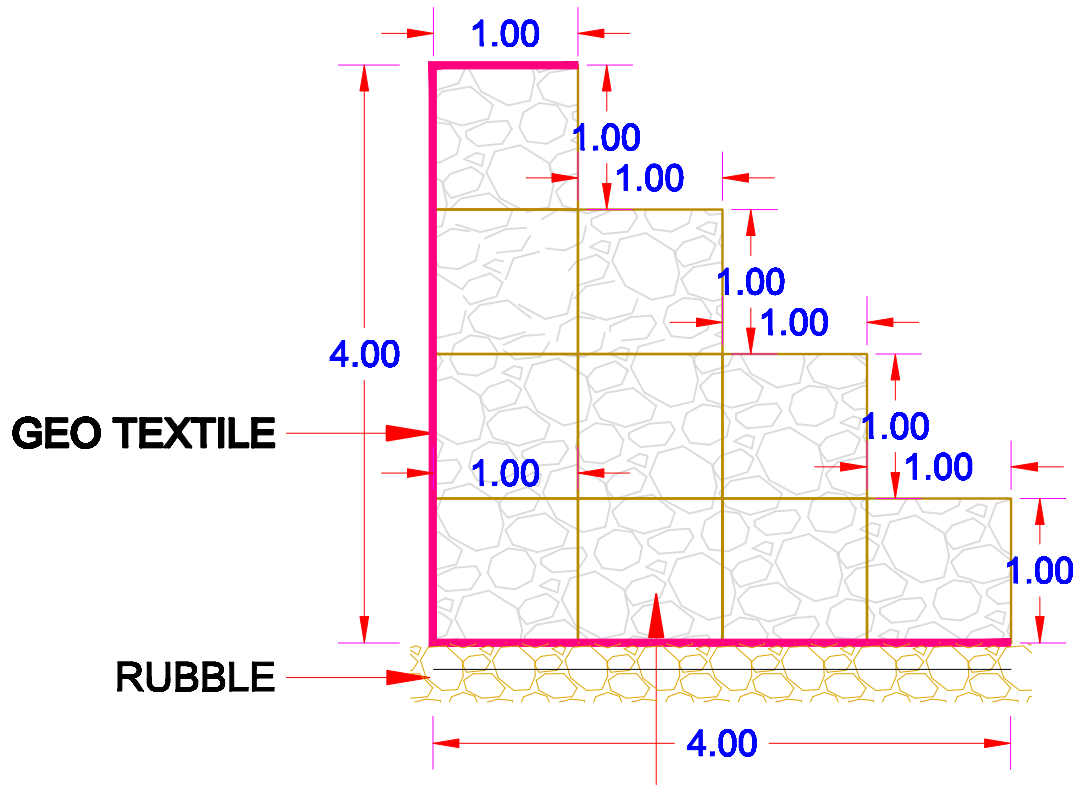
Output Data

Safety Factors

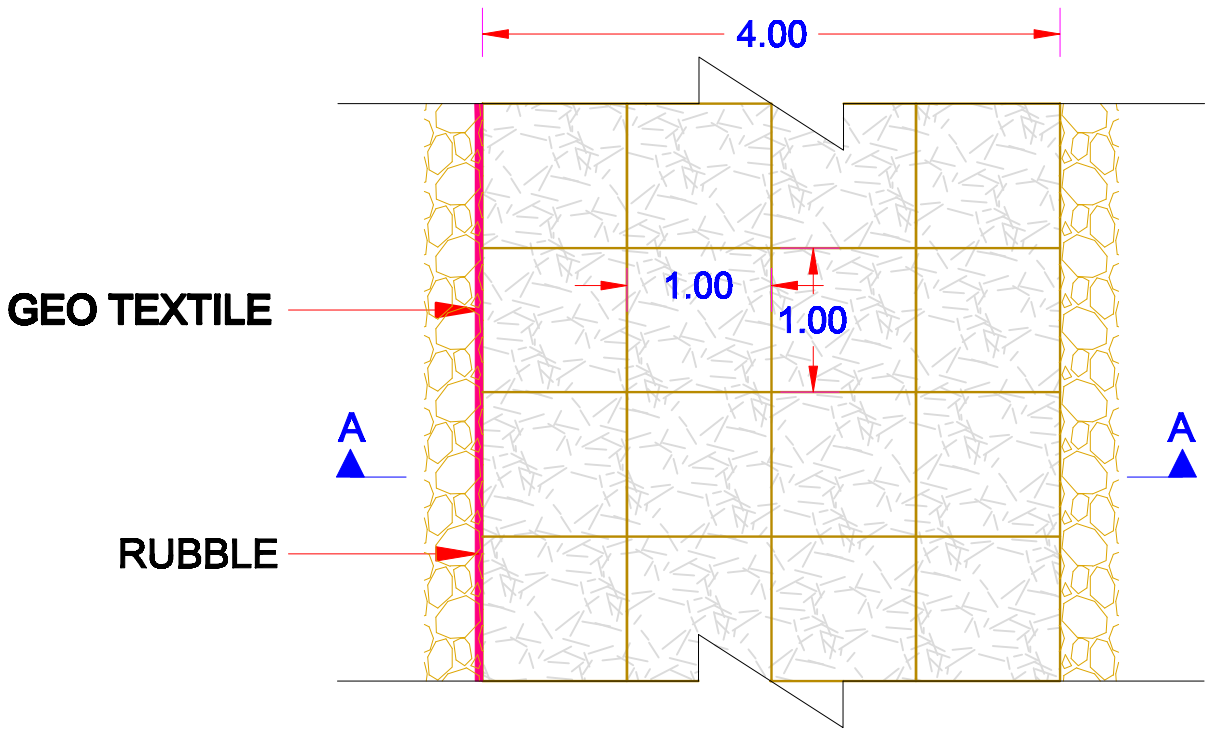
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Critical slip circle

Center: x = 0.000, y = 0.000, Radius: 13.500, F = 0.000



SEC @ A-A



PLAN
TYPICAL DETAILS OF GABION

REVISION	DATE	DESCRIPTION	SIGN

PROJECT
KHAJOD LAND FILL CLOSURE
AT KHAJOD DISPOSAL SITE, SURAT.

CLIENT
SURAT MUNICIPAL CORPORATION

CONSULTANT
FACILE MAVEN PVT. LTD.
A-7002, Ascon Plaza (Office complex),
B/h, Bhulka bhavan school, Adajan, SURAT-9
Ph: 0261-6575998 Fax: 2733584

TITLE
DETAILS OF GABION FOR LANDFILL CLOSURE
AT KHAJOD LAND FILL SITE, SURAT
OPTION-1

DRAWN BY : VIJAY	DESIGNED BY :
CHECKED BY : HARSHUL PAREKH	PROJ. NO.
SCALE : N.T.S	DRG. NO.SWM/LF/LO/05
DATE : 01-01-2016	REVISION R0

Annexure – 4 Air Quality Monitoring

Test-1 (The test results are reproduced)

Client's Details:	
M/S Surat Municipal Corporataion	Test Report No : 50000000155
	Issue Date: 25.09.2014
	Report Page (s): Page 1 of 1

Sample Details:	
Protocol Purpose: Ambient Air Quality Monitoring & Analysis	Sample Lab ID : A28-16/AL1 TO AL3/200315
Date of Sampling: 16.09.2014	Sampling Duration : 24 Hrs.
Sample Received date: 17.09.2014	Client's Representative : I. H. Pathan
Test Start Date: 17.09.2014	Location of Sampling:
Test Completion Date: 23.09.2014	L1: Nr. Admin Bldg, L2 : Nr. STP Plant

Results:

Sr. No.	Test Parameter	Unit	Results as per Locations			Limits as per NAAQS notification Nov. 2009
			L1	L2	L3	
1	Temperature	℃	31.0	31.0		
2	Humidity	%	49.0	49.0		
3	Particulate Matter	$\mu g/m^3$	121.0	283.0		500.0
4	Dioxide	$\mu g/m^3$	12.3	9.22		120.0
5	Ammonia	$\mu g/m^3$	46.49	38.6		400.0
6	Methane	$\mu g/m^3$	ND	ND		650.0
7	Carbon Monoxide	mg/m^3	ND	ND		2.0

ND - Not Detected

For, Detox Co-operation Pvt. Ltd.

Place – Surat

Test-2 (The test results are reproduced)

Client's Details:	
M/S Surat Municipal Corporation	Test Report No : 50000000821
	Issue Date: 22.12.2014
	Report Page (s): Page 1 of 1

Sample Details:	
Protocol Purpose: Ambient Air Quality Monitoring & Analysis	Sample Lab ID : A28-16/AL1 TO AL3/200315
Date of Sampling: 12.12.2014	Sampling Duration : 24 Hrs.
Sample Received date: 13.12.2014	Client's Representative : I. H. Pathan
Test Start Date: 13.12.2014	Location of Sampling:
Test Completion Date: 20.12.2014	L1: Nr. Admin Bldg, L2 : Nr. STP Plant, L3:CELL 2

Results:

Sr. No.	Test Parameter	Unit	Results as per Locations			Limits as per NAAQS notification Nov. 2009
			L1	L2	L3	
1	Temperature	℃	28.0	28.0	28.0	
2	Humidity	%	83.0	83.0	83.0	
3	Particulate Matter	$\mu g/m^3$	184.0	22.0	55.0	500.0
4	Dioxide	$\mu g/m^3$	30.73	9.22	12.3	120.0
5	Ammonia	$\mu g/m^3$	74.51	156.8	162.27	400.0
6	Methane	$\mu g/m^3$	ND	ND	ND	650.0
7	Carbon Monoxide	mg/m^3	ND	ND	ND	2.0

ND - Not Detected

For, Detox Co-operation Pvt. Ltd.

Place – Surat

Annexure - 3

1808

141

સુરત મહાનગરપાલિકાની સ્થાયી સમિતિની તા.૧-૬-૨૦૧૭ ના રોજ મળેલ સભામાં નીચે મુજબનો ઠરાવ પસાર થયો હતો :-

* * * * * *

મ્યુ.કમિશનરશ્રીના તા.૫-૫-૧૭ના પત્ર નં.સી.સ્થા.સ./૧૧૦ તથા તા.૨૩-૫-૧૭ ના પત્ર નં.સી.સ્થા.સ./૧૪૧ થી વિદિત થઈ, "સ્વચ્છ ભારત મિશન" યોજના અંતર્ગત ખજોદ ખાતેની ફાયનલ ડીસ્પોઝલ સાઈટ ખાતે ખુલ્લી જગ્યામાં એકત્રિત થયેલ કચરાના સાયન્ટીફીક કલોઝરની કામગીરી માટે ટેન્ડર નોટીસ પ્રસિધ્ધ કરી માંગવામાં આવેલ ટેન્ડરોના સંદર્ભમાં નિયત સમય દરમ્યાન આવેલ કુલ-૭ ટેન્ડરો પૈકી ખોલવામાં આવેલ પ્રાઈસ બીડના કુલ-૩ ટેન્ડરો પૈકી સૌથી નીચા ભાવના ટેન્ડરના ટેન્ડર મે. ડી. એચ. પટેલ (ડી.એચ.પટેલ- Maharshee Geo Membrane (India) Pvt. Ltd. જોઈન્ટ વેન્ચર પાર્ટનરના લીડ મેમ્બર)નું ટેન્ડરની અંદાજી રકમ રૂા.૬૨,૧૧,૩૮,૯૯૫/- થી ૧૪.૯૭% નીચું એટલે કે રૂા.૫૨,૮૧,૫૪,૪૮૭-૯૬નું બીનશરતી ટેન્ડર, ટેન્ડરની શરતો અને સ્પેશીફીકેશનને આધિન વ્યાજબી હોય કબુલ રાખવાનું તથા તેઓ સાથે કરારનામુ કરવા મ્યુ.કમિશનરશ્રીને અધિકૃત કરવાનું ઠરાવવામાં આવે છે.

ઠરાવ નં.૭૪૧/૨૦૧૭ સર્વાનુમતે મંજુર.

સ.ર.મ્યુ.કમિશનરશ્રી પ્રતિ,

ઈ.ચા. સેક્રેટરી,
સુરત મહાનગરપાલિકા
તા. ૭-૬-૨૦૧૭.

UMP

DMC 7-6-17

Received On
Dt. 9.6.17

નં. સીસ્થાસ/૨૫૬
તા.૭/૬/૨૦૧૭

આર.ને.સી./૨/૬/ ૩૬૭
તા. ૦૯/૦૬/૧૭

(RAC) W/O

DNC/N/No.629
Dt. 6/6/17

Ex. Eng (DD).

...ment Stamp paper worth
... Nothing in this work order shall be deemed to dilute

B.I. DALAL
I/c. City Engineer
Surat Municipal Corporation
Muglisara, Surat – 395 003.

Annexure 4

1809

DNG/OUT NO./W/ 79
Date. 16 - 6 - 17

Work Order
By Register Post A.D.

To,
M/s. D.H. Patel
(J.V. Partner Maharshee Geo Membrane (India) Pvt. Ltd)
305,306, Ratna Sagar Apartment,
Beside Varachcha Police Station,
Varachha Road, Surat-395006

Sub.:- CLOSURE OF ACCUMULATED WASTE & RELEVANT INFRASTRUCTURE DEVELOPMENT WORKS AT KHAJOD DISPOSAL SITE, SURAT.

Ref.:- 1. TENDER NOTICE NO: ADCE (Civil) / Drainage / 21 / 2016-17
2. Your Tender Dated 17/01/2017
3. Std. Committee Resolution No.741/2017, Dt. 01/06/2017
4. Letter Of Intent: DNG/OUT no./W/69 Dt.05/06/2017.

Gentleman,

Surat Municipal Corporation had invited tenders for the above subjected work vide tender notice under reference-1. Your tender under reference-2 amounting 14.97% below to Estimated cost of Rs. 62,11,38,995.00 having total **tender amount of Rs. 52,81,54,487.96 Ps.** is accepted by Standing Committee resolution no. 741/2017, Dt. 01/06/2017 subject to terms and conditions of the tender and clarifications mentioned in errata, Addenda, Corrigendum issued for this work. The LOI was issued vide our letter under reference-4. You are here by instructed to carryout following primary activities within 15 (fifteen) days from receipt of this work order.

(A) Security Deposit and Agreement:-

(1) You are instructed to pay the Initial Security Deposits (S.D.) at 2 % of the sanctioned project costs i.e, Rs. 1,05,70,000/- (Rupees One Crore Five lacs Seventy thousand only) within 15 days from the date of this Work Order. If the Security Deposit is not paid within said time limit, the penalty at the rate of 0.065 % per day, of the S.D. amount shall be charged and shall have to be paid separately along with the S.D. Security Deposit shall be in the form of Bank Guarantee/ Fixed Deposit/ Demand Draft, favoring "The Municipal Commissioner, Surat Municipal Corporation, Surat" by nationalized Bank/ Scheduled Bank located at surat only or in Cash, for the period of 36 months.

(2) After complying with above requirements, arrange to execute the agreement and to give surety and under taking on stamp papers as per Government norms. If Security Deposit (S.D.) is deposited in the form of cash, cheque, draft or bank guarantee, the agreement shall be executed on Government stamp paper worth Rs.100.00 and if S.D. is deposited in the form of FDR, NSC or any kind of Saving Certificate, the Agreement shall be executed on Government Stamp paper worth 4.25 % of the S.D. amount. Nothing in this work order shall be deemed to dilute

or contradict any provisions, terms and conditions as stipulated in the bid document which shall be final and binding to the parties.

(B) Other Instructions:-

(1) In Order to start the work, kindly contact the respected Asst. Engineer/Environmental Engineer of the department for proper guidance and scheduling of work.

(2) The time limit for the Civil work is 15 (Fifteen) months excluding monsoon, while time period of operation & maintenance is five (5) years after completion of Civil work. The time limit shall commence after 15 days from the date of issue of this Work Order. It should be noted that, time is the real essence of the Contract and proportionate stipulated penalty shall be recovered from you even during the progress of the work, if it does not meet with the mile stones specified in the tender.

(3) You are also requested to submit complete Bar chart to complete the work within time limit and get it approved immediately.

(4) **Labour License:-** You shall have to obtain the License from the Competent Authority under the Contract Labour (Regulation and Abolition Act, 1970) and such other Licenses and permissions as mentioned in the tender documents.

(5) No Child labour should be deployed for the concern work else penalty action will be taken as per norms and regulations.

(6) **Insurance:-** The contractor shall take "Contractors all risk insurance policy" for the project cost of the work viz. **Rs. 52,81,54,487.96 Ps.** "workman compensation policy" for all the workers and labours of contractor and client working at the site and "Third Party Insurance Policy" to fully cover all third party type risk. The insurance policy so taken by the contractor for such purposes shall be in the joint name of the contractor and the client .The policy shall be deposited with the client. The Contractor All Risk (CAR) policy with third party insurance shall be submitted for Construction period (1) plus Defect liability period (2).

(8) If you are going to use Water apart from SMC, you have to apply in writing within 30 days for the waiver in water charge to this office. Application received after time limit will not be taken into consideration.

Please, complete the above formalities within fifteen days and arrange to start the work. Please acknowledge the receipt of this letter.

Thanking you,

16.06.2017

I/c City Engineer
Surat Municipal Corporation

Copy wrs to : Hon'ble Municipal Commissioner shri ..... for information pls.
C.C to : Vigilance & Inspection officer shri ..... for information.
C.C to : Chief Accountant shri ..... for information.
C.C to : S.O. shri ..... for information.

O/c Send O/c to A.R.Jain

File No. A-46020/3/2013-EA
Ministry of Urban Development
Government of India

LIST OF AGENCIES EMPANELLED FOR PROVIDING SUPPORT TO THE CITIES/TOWNS FOR SOLID WASTE MANAGEMENT

Sr No	Name of Firm	Contact Details
1	AECOM India Pvt. Ltd., Gurgaon	9th Floor, infinity Tower C. DLF Cyber City, DLF Phase II, Gurgaon 122002 0124-4830138, Somnath.mukherjee@aecom.com
2	Agricultural Finance Corporation Ltd in association with M/s N H Consulting Pvt Ltd	B-1/9, III Floor, Community Centre, Janakpuri, New Delhi - 110058 T: 011-45791190-96, 25596976 F: 011-45791189 Email: afcdelhi@afcindia.org.in / nro.afc@gmail.com Web: www.afcindia.org.in
3	All India Institute of Local Self Government, New Delhi	Pinnac Memories, Phase II , L Building, Near Bhujbal Bag, Kothrud, Pune -411038 020-25461624/ 25460793, ailsg@bom3vsnl.net.in
4	Anuj Construction Pvt Ltd	23 MIG, Indira Nagar, Kanpur - 208026 Telefax: 0512-2570476, Email: acpl.knp@gmail.com
5	Asian Consulting Engineers Pvt Ltd. In association with Innovative and Comprehensive solutions for Urban Climate	66, Hemkunt Colony, IInd Floor, New Delhi - 110048 T: 011-41635644, F: 011-41634926, Email: info@asianconsulting.org, Web: www.asianconsulting.org
6	CDM Smith Inc. , Bangalore	#8, 2nd Floor, 80 Feet Road, RT Nagar Banglore - 560032, Karnataka, India tel : 080-3918-7500 /7529 fax : 080 2363 4097
7	Central Agricultural and Allied Farmers Co-operative Limited (Central Agro Limited)	Door No 4/ 299, Selas Katry, PO, The Nilgiris, Tamil Nadu, 643213 0423-2284255, info@centralagro.in
8	Consulting Engineering Services (I) Pvt Ltd., New Delhi (A Jacobs Group Company)	57 (5th Floor) , Manjusha Building Nehru Place, New Delhi - 110019 Tel : 011-4139 2300, 4139 2316 email milan.debb@cesinter.com

9	DeloitteTouche Tohmatsu India Pvt Ltd in association with M/s Foundation for Greentech Environmental Systems (FGES) and SAI Consulting Engineers Pvt Ltd	7th Floor, Building 10, Tower B, DLF Cyber City Complex, DLF City phase-II, Gurgaon - 122 002, Haryana, India. T: 0124-6792000, F: 0124-6792012, Web: deloitte.com
10	Eco Pro Environmental Services., Indore	302, Swastic Chamber 9, Manoramaganj, A B road, Indore -452001 0731-4065172, ecopro@rediffmail.com
11	Emergent Ventures India in association with M/s Ricardo-AEA	5th Floor, Universal Trade Tower, Sohna, Gurgaon Road, Sec 49, Gurgaon 0124-6653100, contact@emergent-ventures.com
12	Ernst & Young Pvt Ltd., in association with M/s Paradigm Environmental Strategies Pvt Ltd.	Golf View Corporate Tower 'B' Sector 42, Gurgaon -122002 0124-4644000
13	Facile Maven Pvt Ltd. Ahemdabad	A-2, Sarita darshan, opp Jay Hind press, Nr Mithakali Underpass, Ashram Road, Ahmedabad 079-26580102, info@facilemaven.com
14	Feedback Infrastructure Services Pvt Ltd.	15th floor , Tower 9B, DLF Cyber City, Phase III, Gurgaon - 122002 Haryana tel : 0124- 4169100 Fax : 0124-4169175, 0124- 4629255 email : inquiries@feedbackinfra.com www.Feedbackinfra.com
15	GHK Development Consultants Pvt. Ltd. In association with Athena Infonomics & Excel Industries	304-305, Lotus Chambers, 207/38, Nalwa Street, Karol Bagh, New Delhi -110005 011-64721312, delhi@ghkint.com
16	Grant Thornton India, LLP (Formely Grant Thornton India), Gurgaon	21st Floor floor, DLF Square Jacaranda Marg, DLF Phase II Gurgaon 122002 India Phione : 0124-4628000 Fax 0124 - 4628001 www.grantthornton.in
17	HUDCO , New Delhi	Core 7 A, HUDCO Bhawan, India Habitat Centre, Lodhi Road, New Delhi -110003 011-24616209, prs@hudco.org

18	ICRA Management Consulting Services Ltd.	1105, Kailash Building , 11th Floor, 26, Kasturba Gandhi Marg, New Delhi -110001 011-23357940-50, raghuttama.rao@imacs.in
19	IL&FS Environment, Mumbai	B 303, Citypoint, Andheri Kurla Road, Andheri (East), Mumbai - 400059 , T: 022-40298568 / 21 / 13, F: 022-40298512, Web: www.ilfsenv.com, Email: chetan.zaveri@ilfsenv.com
20	IPE Global , New Delhi	IPE Towers, B 84, Defence Colony, Bhisham Pitamah Marg, New Delhi 011-40755904, ipe@ipeglobal.com
21	IRG Systems South Asia Pvt. Ltd, New Delhi	LGF, AADI Building, 2 Balbir Saxena Marg, Hauz Khas, New Delhi - 110016 011-45974597, irgssa@irgssa.com
22	J. M. EnviroNet Pvt Ltd., Gurgaon	SCO 16, Sector 10A, Gurgaon, 122001 0124-3206559, jmenviron@hotmail.com/ jmpkdeepa@hotmail.com
23	JPS Associates Pvt Ltd., New Delhi	R-16, Hauz Khas Enclave, New Delhi - 110016 011-26862487, 26862193, jpsdelhi@del3.vsnl.net.in, info@jpsconsultantsindia.com
24	M/s Kadam Environment Consultants in association with M/s COWI A/S, Denmark.	871/B/3, GIDC Makarpura, Vadodara - 3900100265-3001000, kadamenviro@kadamenviro.com
25	MaRS Planning & Engineering Services Pvt Ltd., Ahemdabad	601, Sur Mount Building, Opp. Iscon Maga mall, On S.G.Highway, Ahmedabad PIN 380015 Phone 0179- 26860890 Fax : 26860130 email : info@marsconsultancy.com
26	Mott Mc Donald India Pvt Ltd	501, Sakar _II, Ellis Bridge, Ahmedabad 079-26575550, pankaj.trivedi@mottmac.com
27	MSV International Inc.(USA) in association with MSV International, (India) Ltd. Gurgaon.	D-7 , South City - I Gurgaon- 122002 Haryana, India email - 1nfo@msvgroup.com Tel : 0124 - 4002603,4671200 Fax 0124 - 4002605

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28	Mukesh & Associates, Tamil Nadu	Division - 2' , 2/6 Ranganathar Avenue Perumal Malai Main Road Narasothipatty SALEM - 636004 Tamil Nadu, India Phone : 0427-2333563/2330568 Fax : 0427- 2333564 email : info@mukeshassociates.com, mukeshassociates@vsnl.com www.mukeshassociates.com
29	National Institute of Urban Affairs (NIUA) in association with The Energy and Resources Institute (TERI) and Centre for Environment Education (CEE).	I & II Floor, Core 4 B, India Habitat Center, Lodhi Road, New Delhi -110003 011-24643576, niua@niua.org
30	NCPE Infrastructure India Pvt. Ltd. , Hyderabad	12-2-826/A/12, LIC Colony, Mehdipatnam Hyderabad - 500028 tel : 040 - 2351 7558 Fax : 040 - 23514379 email : info@ncpe.org.in www.ncpe.org
31	NK Buildcon Pvt Ltd., Jaipur	B-62, 'UGANTA" University Marg, Bapu Nagar, Jaipur (Raj) 01412710841 -44, bussiness@nkbuildcon.com
32	Operations Research Group Pvt Ltd. ,New Delhi	Beetal House, Ground Floor, 99 Madangir, B/H LSC, New Delhi - 110062, India Tel No : 011-29964445/29964446/29964448 Facsimile : 011- 29964450 email : orgpl@orgplindia.com Web : www.orgplindia.com
33	PBS Consultancy Services Pvt Ltd. , Hyderabad	H No 6-2-966/5/1/2, Hill Colony, Opp lane of Hindi Prachara Sabha, Khaitrabad, Hyderabad -500004 040-23316336, pbsconsultancy@rediffmail.com, pbsconsultancy9@gmail.com
34	Ramky Enviro Engineers Ltd., Hyderabad	Door No 6-3-1090, 4th Floor, TSR Towers, above standard chartered bank, Rajbhavan Road, Somajiguda, Hyderabad 040-44422147/148, consultancy@ramky.com
35	Socio Economic and Educational Development	No .1, Iind Floor, 54th Street, 9th Avenue, Ashok Nagar, Chennai - 600083, Tamilnadu.

	(SEED) Trust, Chennai.	T: 044-42318467, Web: www.hihindia.org
36	Senes Consultants India Pvt Ltd., Noida	1st Floor , Tower B, Logix Techno Park Plot No 5, Sector 127, Noida, U.P. India Tel (EPBX) - 0120 - 4368400 Fax : 0120 - 4368401 email : senes@senesindia.com website : www.senesindia.com
37	Shah Technical Consultant Pvt Ltd. Mumbai	407, Raheja Centre, Nariman Point, Mumbai - 400021 T: 022- 22871061, 22820018, 22820121 Email: stcmumbai@vsnl.com, stc@stc.co.in, Web: www.stc.co.in
38	SMEC India Pvt Ltd. In association with M/s SMEC International Pty Ltd and M/s Brisbane City Enterprises	5th Floor, Tower C, DLF Building No 8, DLF Cyber city Ph II, Gurgaon 122002 0124-4552800, 4501100, india@smec.com
39	SREI Infrastructure Finance Ltd., New Delhi	D 2, 5th Floor, Southern park, Saket Place, Saket, New Delhi -110017 033-22850112, nro@seri.com
40	Sriram Institute for Industrial Resources	19, University Road, Delhi -110007 Phone : 011 - 27667267, 27667860, 27667436 Fax 011- 27667676, 27667207 email : sridhi@vsnl.com www.shriraminstitute.org
41	Stantec Consulting Pvt Ltd. , Ahmedabad	71/72, Titanium Corporate Road, Nr Prahladnagar Auda garden, Satellite, Ahmedabad 079-66128870/71/72, manish.shah@stantec.com
42	Sycom Projects Consultant Pvt Ltd.	H 22, Jungpura extension, New Delhi - 110014 011-24329452, sycomprojects@gmail.com, pdadlani01@gmail.com
43	TATA Consulting Engineers Ltd. , New Delhi.	17-18, Zamurdpur Commercial Complex, Kailash Colony Extension, New Delhi-110048. T: 011-66169180, F: 011-66169100 Email: mail@tce.co.in Web: www.tce.co.in
44	Tide Technocrates Pvt Ltd., Bangalore	768, 14th cross, 33rd main, J P Nagar, Phase I, Bangalore 91-8026656191, sampath@tidetechnocrats.in
45	Urban Management Centre(UMC), Ahmedabad	III Floor, AUDA Building, Usmanpura, Ashram Road, Ahmedabad 079-27546403/5303, manvita@umcasia.org

46	Urban Management Consultant (UMC Global), Ahmedabad	403, 4th Floor, Gala Argos, Gujarat College Road, Ellis Bridge, Ahmedabad, Gujarat 380006 Phone : 079 - 26423487 Fax : 079 - 26466652 info@uranmanagementconsultants.com www.urbanmanagementconsultants.com
47	Wapcos Ltd, Gurgaon	76-C, Sector 18, Gurgaon -122015 0124-2397396, environment@wapcos.gov.in

E. H. PATHAN
Executive Engineer (Drainage)
Surat Municipal Corporation

Work Order

DNG/Out/W/No. 152
DT. 9 /01/2020

To:

United Facilities and Logistics Pvt.Ltd.

(J.V.Partner M/s Blackberry Overseas Pvt.Ltd)

WZ/376B, Shri Nagar,

Shakur Baati, Rani Bagh

New Delhi-110008

Subject: Processing of Municipal Solid Waste for Maximum quantum of 10, 00,000 M.T. in Surat for 02 (Two) years

Ref:- (i) Tender Notice no. C.E. /Drainage/04/2019-20

(ii) Your Tender dated 04/07/2019

(iii) Standing Committee's resolution no. 1343/2019 dated 12.12.2019

Dear Sir,

With reference to the above, this is to inform you that your tender for the work under captioned subject, with total contract value of Rs. 27,93,00,000/- (Rupees Twenty Seven Crores Ninety three lacs only) has been accepted by the Standing Committee of Surat Municipal Corporation vide Res. No.1343/2019, Dated 12.12.2019 subject to the terms, conditions, specifications of the tender documents

Sr. No.	Name of Work	Unit Rate/ MT, (Rs.)	Max work order Amount (Rs.)	Remarks
1	Processing of Municipal Solid Waste for maximum quantum of 10,00,000 M.T. in Surat for 2 (two) years	Rs 399 per MT of output quantity or part thereof	Rs. 27,93,00,000/-	Maximum work order amount is inclusive of Electricity charges.

Note:- The amount shown above is including all duties, levies & taxes etc. as applicable. Monthly Electricity charges shall be paid by SMC and shall be deducted from Running Bills.

You are requested to complete the following formalities within 15 days of issue of this work order.

(1) You are instructed to pay the Initial security Deposit (S.D.) at 2% of the sanctioned project cost i.e. Rs. 55,86,000.00 (Rupees Fifty Five Lacs Eighty Six Thousand only) within 15 days from the date of this Work order. If the Security Deposit is not paid within said time limit, the penalty at the rate of 0.065% per day, of the S.D. amount shall be charged and shall have to be paid separately along with the S.D. Security Deposit shall be in the form of Bank Guarantee/Fixed Deposit/Demand Draft/ favoring "The Municipal Commissioner, Surat Municipal Corporation, Surat " issued by Nationalized bank/Scheduled Bank located at Surat only for the period of 03 years.

E. H. PATHAN
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Surat Municipal Corporation

(2) After complying with above requirements, arrange to execute the agreement and give surety and undertaking on stamp papers as per Government norms. If Security Deposit (S.D.) is deposited in the form of cheque, draft or bank guarantee, the agreement shall be executed on Government stamp paper worth Rs. 300.00 and if S.D. is deposited in the form of FDR, the Agreement shall be executed on Government Stamp paper worth 4.90% of the S.D. amount. Nothing in this work order shall be deemed to dilute or contradict any provisions, terms and conditions as stipulated in the bid document which shall be final and binding to the parties.

(3) Land lease and detailed concession agreement incorporating terms and condition of original tender and as mentioned in Annexure;1 shall be executed between Surat Municipal Corporation and United Facilities & Logistics Pvt. Ltd. with necessary stamp paper within 15 days from the issue of Work order.

This work order is issued herewith to make necessary arrangement for execution of work from your end and also requested to start the project immediately subject to necessary permission/ clearances from relevant department.

Executive Engineer
Drainage Department
Surat Municipal Corporation

Drainage Department, Surat Municipal Corporation
Old West Zone Office, Tadwadi,
Rander Road,
Surat – 395 009

(261) 278 0057 Ext.201
(261) 245 1935, 242 2110
xen.drg.smc@gmail.com
Visit us at www.suratmunicipal.gov.in

E. H. PATHAN
Executive Engineer (Drainage)
Surat Municipal Corporation

Annexure:1

- **Definitions:**
  - **Input Quantity** - Cumulative Waste accepted in MT by United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) during the year
  - **Untreated Quantity** – Cumulative Waste returned to SMC by United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) for disposal into Landfill during the year
  - **Output Quantity** = Input Quantity – Untreated quantity

- **Contract Terms:**
  - United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) shall establish, construct, commission, Operate & maintain plant at its own cost with its own technology as per the prevailing MSW rules to Process MSW.
  - Agreement will be for a confirmed minimum quantity of 10,00,000 MT of Municipal Solid Waste.
  - Land for establishment of the processing plant will be provided Free of Cost for the project at Khajod Solid Waste Disposal Site.
  - Land Lease deed and agreement shall be for a minimum period of 3 years.
  - At the time of termination of concession period of two years, United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) will demolish the plant and vacant the land at own cost and ownership of machinery will be of United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd)
  - United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) shall start the proceedings for obtaining various statutory/legal clearances from various statutory authorities within 15 days from the issue of Work order and intimate the same to the office of the undersigned.
  - Leachate shall be disposed through the nearest STP of SMC and that shall be considered as part of output quantity.
  - Monthly Electricity bills shall be paid by Surat Municipal Corporation and the same shall be deducted/ recovered from United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) running bills.

- **Mode of payment:**
  - Invoicing shall be done on a monthly basis for actual output quantity however adjustment shall be made on an annual basis to confirm output quantity to account for any variation in output quantity.
  - Total payment for processing of 10,00,000 MT quantity shall be limited to the value of bid quoted in the tender (including the cost of power) amounting to Rupees Twenty Seven Crore Ninety three lacs only (Rs 27,93,00,000/-).
  - United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) shall submit on a monthly basis along-with the invoice proof of attendance for manpower deployed on site as well as proof of payment of PF, ESIC and other employment related compliance.

Drainage Department, Surat Municipal Corporation
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- **Regulatory Approvals:**
  - All legal permissions relating to the project shall be obtained by agency and shall be their responsibility. SMC shall help in providing adequate documentation for the purpose to expedite the process.

- **Project implementation schedule:**
  - As mentioned in the Tender, United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) shall commission the plant for processing of MSW within 03 months from the date of issue of work order. In case of delay in execution of work, the penalty at the rate of 0.2% of contract value per day subject to the maximum of 10% of the contract value, shall be payable by the United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) to the Surat Municipal Corporation towards compensation.

- **Operation and Maintenance Terms for Contract:**
  - United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) shall provide a detailed implementation plan for the quantity of MSW specified in the tender.
  - United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) shall provide an annual detailed shut down plan for the operations of the project. The maximum permissible period during which there is a total production loss shall not exceed 21 days as per the plan.
  - Minimum 48 hours of emergency breakdown recovery period shall be provided during which no penalty will be applied, for total breakdown or loss of production beyond this period SMC shall levy a penalty of Rs 10,000 per day for a maximum period of 60 days for total loss of production.
  - If United Facilities & Logistics Pvt. Ltd (J.V.Partner M/s Blackberry Overseas Pvt. Ltd) fails to treat/process the waste supplied by SMC for unacceptable reasons then competent authority of SMC will levy penalty up to Rs. 500 per metric ton of waste left untreated.
  - Moreover, if inert generated is more than 45% of the total quantum of waste provided, the same would not be lifted by SMC and penalty of Rs.500 per MT shall be levied on the contractor. This penalty shall be deducted from each running bill and this shall not be limited to max penalty limit.
  - If any FIRE incident take place in the premises and boundary of Plant then, Penalty as per prevailing Hon. NGT directions or as directed by competent authority of SMC will be levied. In addition to the penalty, the contractor shall be liable for any legal proceedings imposed by pollution control boards, NGT, Similar authority, etc.

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- If total loss of production exceeds this 60 day period, SMC shall have the right to terminate the contract forthwith by giving a minimum 30 day notice to United Facilities & Logistics Pvt. Ltd (J.V. Partner M/s Blackberry Overseas Pvt. Ltd) The termination clause shall not be applicable in case of force majeure event.

Pricing Annexure

Output Quantity derived from	**Final Rates**
Upto 10,00,000 MT of Input	Rs 399 per MT of output quantity or part thereof. This price is inclusive of electricity charges, all duties, taxes, etc.

Executive Engineer
Drainage Department
Surat Municipal Corporation

Annexure – 7

DETAILS OF WASTE RECEIVED AT KHAJOD DISPOSAL SITE							
SUMMARY SHEET FOR LAST ONE YEAR							
Month	**Waste Intake**	**Details of By Products Recovered / Disposed per Month.**					
		C&D	**Compost**	**Inert**	**RDF stored at site**	**Plastic**	**Recyclable**
Sep-21	15880.09	507	1038	2564	5041	274	312
Oct-21	14976.74	370	1126	2273	5183	241	306
Nov-21	52309.76	1506	3223	8034	18188	554	1170
Dec-21	72212.85	2309	4785	10608	24118	1169	1666
Jan-22	72371.95	2079	5389	11172	23058	1114	1356
Feb-22	40801.91	1223	3013	6137	13322	815	838
Mar-22	42554.16	1369	2948	6896	14388	938	749
Apr-22	40062.11	1109	2614	6272	13681	590	741
May-22	40448.68	1187	2557	6029	12760	717	814
Jun-22	40524.34	1252	2933	6238	13230	853	560
Jul-22	40250.15	1263	2502	6168	13875	593	705
Aug-22	40559.5	1190	2932	6350	13673	672	829
Total	**512952.24**	**15364**	**35060**	**78741**	**170517**	**8530**	**10046**

Gujarat Pollution Control Board
Regional Office-SURAT ISO-9001 & ISO-14001 Certified
Plot No.11-12/2,3, G.I.D.C., Pandesara, Dist.: Surat- 394221.
Phone: (0261) 2442696 Website : www.gpcb.gov.in
XGN website : http://gpcbxgn.gujarat.gov.in E-mail : ro-gpcb-sura@gujarat.gov.in

ક્રમાંક: ગુપ્રનિબોર્ડ/પ્રા.ક. સુરત/ટી – ૧૬૩/ 7829 /૨૦૨૨ તા. 14 JUL 2022

પ્રતિ,
કલેકટર શ્રી,
કલેકટર કચેરી,
જીલ્લા સેવા સદન – ૨,
અઠવાલાઈન્સ, સુરત.

વિષય : મોજે. ઉંબેર તા. ચોર્યાસી બ્લોક નં૧૯૭ ક્ષે.હે. ૧૨૬-૧૦-૦૮ ચો.મી. પૈકી ક્ષે.હે. ૩૦-૦૦-૦૦ ચો.મી. તથા બ્લોક નં ૧૯૯ ક્ષે.હે.૪-૦૪-૬૯ ચો.મી. મળી કુલ ક્ષે.હે. ૩૪-૦૪-૬૯ ચો.મી. જમીન સુરત મહાનગરપાલિકાને સોલીડ વેસ્ટ ડીસ્પોઝલ / લેન્ડ ફીલ સાઈટના હેતુ માટે ફાળવવા બાબત.

સંદર્ભ : કલેકટર કચેરીનો પત્રાંક નં એ/જમન/ઉંબેર-૧૯૭-૧૯૯/વશી ૧૧૩૭/૨૨, તા.૨૨-૦૩-૨૦૨૨

માનનીય સાહેબશ્રી,

ઉપરોક્ત વિષય અને સંદર્ભ અન્વયે જાણાવવાનું કે, સુરત મહાનગરપાલિકા દ્વારા મોજે. ઉંબેર તા. ચોર્યાસી બ્લોક નં૧૯૭ ક્ષે.હે. ૧૨૬-૧૦-૦૮ ચો.મી. પૈકી ક્ષે.હે. ૩૦-૦૦-૦૦ ચો.મી. તથા બ્લોક નં ૧૯૯ ક્ષે.હે.૪-૦૪-૬૯ ચો.મી. મળી કુલ ક્ષે.હે. ૩૪-૦૪-૬૯ ચો.મી. જમીન સોલીડ વેસ્ટ ડીસ્પોઝલ/લેન્ડ ફીલ સાઈટના હેતુ માટે ફાળવવા કલેકટર કચેરી ખાતે માંગણી કરેલ છે.

સદર અરજી અન્વયે કલેકટર કચેરી દ્વારા સંદર્ભિત પત્ર અન્વયે પ્રાદેશિક અધિકારી શ્રી, ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડ,સુરત અને સુરત મહાનગર પાલિકા દ્વારા " ઘન કચરા મેનેજમેન્ટ નિયમો – ૨૦૧૬" ના શીડ્યુલ – ૧ – સ્પેશીફીકેશન ફોર લેન્ડફીલ ના માપદંડો અંગેનો સયુંકત રીપોર્ટ મોકલવા સુચના આપેલ હતી.

જે અંતર્ગત સુરત મહાનગર પાલિકા અને પ્રાદેશિક કચેરી, ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડ,સુરત ના અધિકારીઓ દ્વારા ઉપરોક્ત દર્શાવેલ સ્થળ ની તા.૨૩-૦૫-૨૦૨૨ ના રોજ સયુંકત સ્થળ મુલાકાત લેવામાં આવેલ અને ત્યારબાદ ઉંબેર સાઈટનો શીડ્યુલ – ૧ સ્પેશીફીકેશન ફોર લેન્ડફીલ ના નિયત Criteria અંગેનો અહેવાલ (Reference: Google map, CRZ map of DOEF-GOG, SUDA Map) વગેરેની માહિતીના આધારે નો વિગતવાર અહેવાલ આ સાથે ઓરીજીનલ કોપીમાં બિડેલ છે.

વધુમાં, " ઘન કચરા મેનેજમેન્ટ નિયમો – ૨૦૧૬" ના શીડ્યુલ – ૧ – સ્પેશીફીકેશન ફોર લેન્ડફીલ ના નિયત Criteria અન્ય વિભાગોને પણ સ્પર્શતા હોઈ, સંલગ્ન વિભાગોનો આ અંગેનો અભિપ્રાય મેળવવો હિતાવહ રહે છે.

આભાર સહ,

ગુજરાત પ્રદૂષણ નિયંત્રણ બોર્ડના નામે અને વતી,

Jigar

(ડૉ. જે. ડી. ઓઝા)
પ્રાદેશિક અધિકારી, સુરત

બીડાણ: ઉપર મુજબ (મુલાકાત અહેવાલ ની ઓરીજીનલ કોપી)

નકલ રવાના :
૧) માનનીય કમિશ્નર શ્રી,સુરત મહાનગર પાલિકા, મુગલીસરા, સુરત (મુલાકાત અહેવાલ ની ઓરીજીનલ કોપી સાથે)
૨) યુનિટ હેડ, સુરત, વડી કચેરી, ગાંધીનગર.....જાણ સારૂં.
૩) યુનિટ હેડ, MSW શાખા, વડી કચેરી, ગાંધીનગર.....જાણ સારૂં.

Site Visit Report

Subject: Joint visit of proposed Surat Municipal Corporation (SMC) Solid waste Disposal Site -SLF at Block No. 197 (Area = Ha. 126-10-08 Sq. m.) paiki (Area = Ha. 30-00-00 Sq. m) and Block No. 199 (Area = Ha. 04-04-69 Sq. m.) – Total Area = Ha. 34-04-69 Sq. m of Village: Umber, Tal. Choryasi, Dist.:Surat

Reference: Collector office letter No.: A/JMN/Umber-197-199/vashi.1137/22 Date: 22/03/2022.

Observation Report:

Location	Proposed SMC Solid waste Disposal Site - SLF at Block No. 197 and Block No. 199 of Village: Umber, Tal. Choryasi, Dist.:Surat (Latitude: 21.055436,Longitude: 72.848087)
Date of Site Visit	23/05/2022
Visiting officer	SMC: Mr. Bhairav Desai , Executive Engineer Mr. Jwalant Naik, Environment Engineer GPCB, RO,Surat: Mr. R. N. Patel, Sr. Scientific Officer Mr. U. R. Shah, Asst. Environment Engineer
Present Status of Site	Sparse Vegetation observed on site. No any development activity is observed.(Photograph)
Reference Letter	According to Collector office letter, • SMC has made application to allot aforesaid land(Block No. 197 and Block No. 199 of Village: Umber, Tal. Choryasi) for developing secured landfill facility(SLF) for solid waste disposal. • Specification for landfill site laid down in Schedule-1 of Solid waste Rules,2016. Landfill site siting criteria is prescribed in Schedule-I-(A)(VII) of Solid waste Rules,2016 • Now SMC & GPCB shall jointly visit the site & submit report regarding proposed land is meeting with Siting criteria as laid down in Schedule-I-(A)(VII) of Solid waste Rules,2016
	SMC official has telephonically asked Regional officer, Surat to arrange site visit as per above referred letter & after discussion joint site visit is

decided on 23/05/2022. Accordingly SMC & GPCB officers have visited above referred site.

Observations:

During visit sparse vegetation is observed at proposed site (Photograph attached). No any activity observed at Site. Site is surrounded by Natural Drain & approach Road & Agricultural land/Open Land.

East: Natural Drain followed By Open Land
West: Open Land
South: Village Approach Road/Internal road
North: Open Land
(Source: Google Map)

Compliance Status of Criteria as per Schedule-I-(A)(VII) of Solid waste Rules,2016:

Criteria	Distance as per Google Map	Remarks
Site shall be 100 meter away from River	Mindhola River is approx 1.3 km away from Site	Source: Google map
Site shall be 200 meter from a pond	This detail should be obtained from concern office.	
Site shall be 200 meter from Highways	State highway No.:06 is approx. 3.0 km away site.	Source: Google map
Site shall be 200 meter Habitations	A) Site is approx 0.9 km (900 m) away from village Umber habitation. B) Site is approx 1.0 km away from village kansad habitation.	Source: Google map Note: The actual distance needs to be ascertained by concern officer as per Record.
Site shall be 200 meter from Public	No Public Park was observed surrounding of	Source: Google map

	Parks and water supply wells	site	Note: Details of nearby water supply well with distance needs to be obtained from concern office. .
	Site shall be 20 km away from Airports or Airbase. However in a special case, landfill site may be set up within a distance of 10 and 20 km away from the Airport/Airbase after obtaining no objection certificate from the civil aviation authority/ Air force as the case may be	Surat Air port approx. 13 km away from proposed site	Source: Google map Note: Permission shall be obtained from concerned authority as per provisions of rules.
	Site shall not be permitted within the flood plains as recorded for the last 100 years	This detail should be obtained from concern office.	
	Site shall not be permitted within zone of coastal regulation	Referring to approved CRZ map of GCZMA (Sheet No.:F 43 M 16/SW & Map No.: GJ 45) as per CRZ Notification-2011 published by Dept of Forest & Environment (http://www.gczma.org/page-41.aspx), Certain Portion	Note: Certain part of proposed site particularly Block no. 197 falls in CRZ area as per map. Competent authority as prescribed under

		of the proposed site particularly Block no. 197 falls within CRZ area.	CRZ notification shall be engage to know exact area under CRZ Notification.
	Site shall not be permitted within wetland	This detail should be obtained from concern office.	
	Site shall not be permitted within Critical habitat areas	This detail should be obtained from concern office.	
	Site shall not be permitted within sensitive eco-fragile areas	This detail should be obtained from concern office.	
Annexure (Enclosed)	I. Collector office letter II. Google Map of proposed site@ Umber, Ta:Choryashi (Satellite image) III. Photograph IV. SUDA Map V. CRZ Map of DoFE, GoG VI. Distance from proposed site on Google Earth		

RO,GPCB,Surat Officers:

(U. R. Shah)
Assistant Environment Engineer

(R. N. Patel)
Senior Scientific Officer

SMC Officers:

(Jwalant N. Naik)
Environment Engineer

(Bhairav Desai)
Executive Engineer

કલેકટર અને જિલ્લા મેજિસ્ટ્રેટની કચેરી, સુરત

ચીટનીશ શાખા(જમન), બી- બ્લોક, પાંચમો માળ, જિલ્લા સેવાસદન-૨, અડવાલાઇન્સ, સુરત
Phone NO.૦૨૬૧-૨૬૬૦૦૨૧, Fax No.૦૨૬૧-૨૬૫૫૩૫૩
Email Id : 31.chitnisjaman1@gmail.com collector-sur@gujarat.gov.in

નં.ચે/જમન/ઉબેર-૧૯૭-૧૯૯/વશી.૧૬૩૭/૨૨ | તા.૨૮/૦૩/૨૦૨૨

પ્રતિ,
કમિશ્નરશ્રી,
સુરત મહાનગરપાલિકા,
મુગલીસરા, સુરત.

વ્યવસ્થા કચેરી
06 APR 2022
ક્રમ નંબર ૦૧૬૫

MC/SMC
06/04/2022

વિષય: મોજે.ઉંબેર તા.ચોર્યાસી બ્લોક નં.૧૯૭ હે.હે.૧૨૬-૧૦-૦૮ ચો.મી. પૈકી હે.હે.૩૦-૦૦-૦૦ ચો.મી. તથા બ્લોક નં.૧૯૯ હે.હે.૪-૦૪-૬૯ ચો.મી. મળી કુલ હે.હે. ૩૪-૦૪-૬૯ ચો.મી. જમીન સુરત મહાનગરપાલિકાને સોલીડ વેસ્ટ ડિસ્પોઝલ/લેન્ડ ફીલ સાઇટના હેતુ માટે ફાળવવા બાબત

CE. Exe Engr (Env)

સવિનય ઉપરોક્ત વિષય અન્વયે નિવેદન કે, આપના તા.૧૩/૦૧/૨૦૨૨નાં પત્રથી મોજે.ઉંબેર તા.ચોર્યાસી બ્લોક નં.૧૯૭ હે.હે.૧૨૬-૧૦-૦૮ ચો.મી. પૈકી હે.હે.૩૦-૦૦-૦૦ ચો.મી. તથા બ્લોક નં.૧૯૯ હે.હે.૪-૦૪-૬૯ ચો.મી. મળી કુલ હે.હે. ૩૪-૦૪-૬૯ ચો.મી. જમીન સુરત મહાનગરપાલિકાને સોલીડ વેસ્ટ ડિસ્પોઝલ/લેન્ડ ફીલ સાઇટના હેતુ માટે ફાળવવા માંગણી કરેલ છે. સદરહુ ફાળવણી બાબતે પ્રાદેશિક અધિકારીશ્રી, ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડના પત્ર નં.ગુ.પ્ર.નિ.બોર્ડ/સુરત/ટી-૧૬૩/૬૮૯૦/૨૦૨૧, તા.૧૫/૧૨/૨૦૨૧ થી જણાવ્યા મુજબ ભારત સરકારના પર્યાવરણ, વન અને જળવાયુ પરિવર્તન મંત્રાલયના જાહેરનામાં "ઘન કચરા મેનેજમેન્ટ અધિનિયમ-૨૦૧૬"ના શીડ્યુલ્ડ-૧-સ્પેસીફીકેશન ફોર લેન્ડ ફિલ્સની નકલ મોકલી માપદંડને આધારે નિર્ણય કરવા જણાવેલ છે.

શિડ્યુલ-I (A) VII મુજબ ઘન કચરા માટેની સાઈટ કોસ્ટલ રેગુલેશન ઝોન, વેટલેન્ડ તથા છેલ્લા ૧૦૦ વર્ષના પુરગ્રસ્ત વિસ્તાર હેઠળ ન હોવી જોઈએ તેમ જણાવેલ છે. આમ, શિડ્યુલ-I (A) મુજબ ઘન કચરાની સાઈટ માટેના માપદંડો નક્કી કરવામાં આવેલા છે. માંગણી વાળી જમીન સદરહુ માપદંડો મુજબની છે કે કેમ ? તે અંગે માંગણીવાળી જમીનની પ્રાદેશિક અધિકારીશ્રી, ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડ સાથે રૂબરૂ સ્થળ મુલાકાત લઈ, જી.પી.સી.બી. માપદંડો મુજબની જગ્યાની સંયુક્ત ઓળખ કરી સંયુક્ત રિપોર્ટ મોકલી આપવા વિનંતી છે.

DNG/IN/No.૭૧/૦૬
Dt. ૦૮/૪/૨૦૨૨

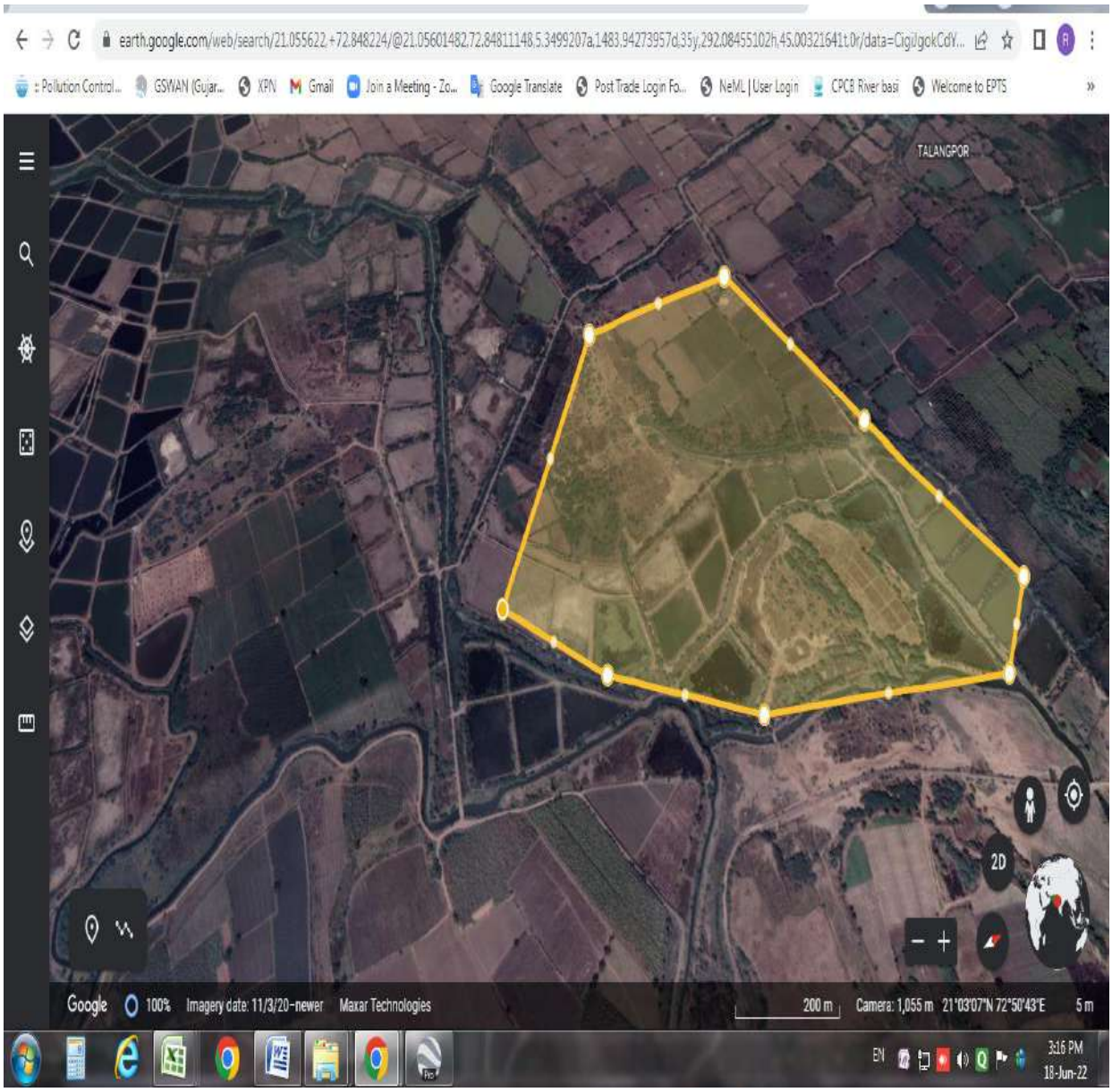
(કલેકટરશ્રીના આદેશાનુસાર)

કલેકટર સુરતવતી

નકલ રવાના: પ્રાદેશિક અધિકારીશ્રી, ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડ,
૩૩૮, બેલ્જીયમ સ્કવેર, ટાઈપીકલ ૧ લો માળ, લીનીયર બસ સ્ટેન્ડ સામે, રીંગરોડ, સુરત.

૨/- સુરત મહાનગરપાલિકાની માંગણીવાળી જમીનની રૂબરૂ સ્થળ મુલાકાત લાઈ ઉક્ત વિગતો સહ સંયુક્ત રીપોર્ટ / અહેવાલ મોકલી આપવા સારૂ.

Annexure-2 Satellite image of proposed landfill site @ Umbher, Ta:Choryashi
(Latitude: 21.055436,Longitude: 72.848087)



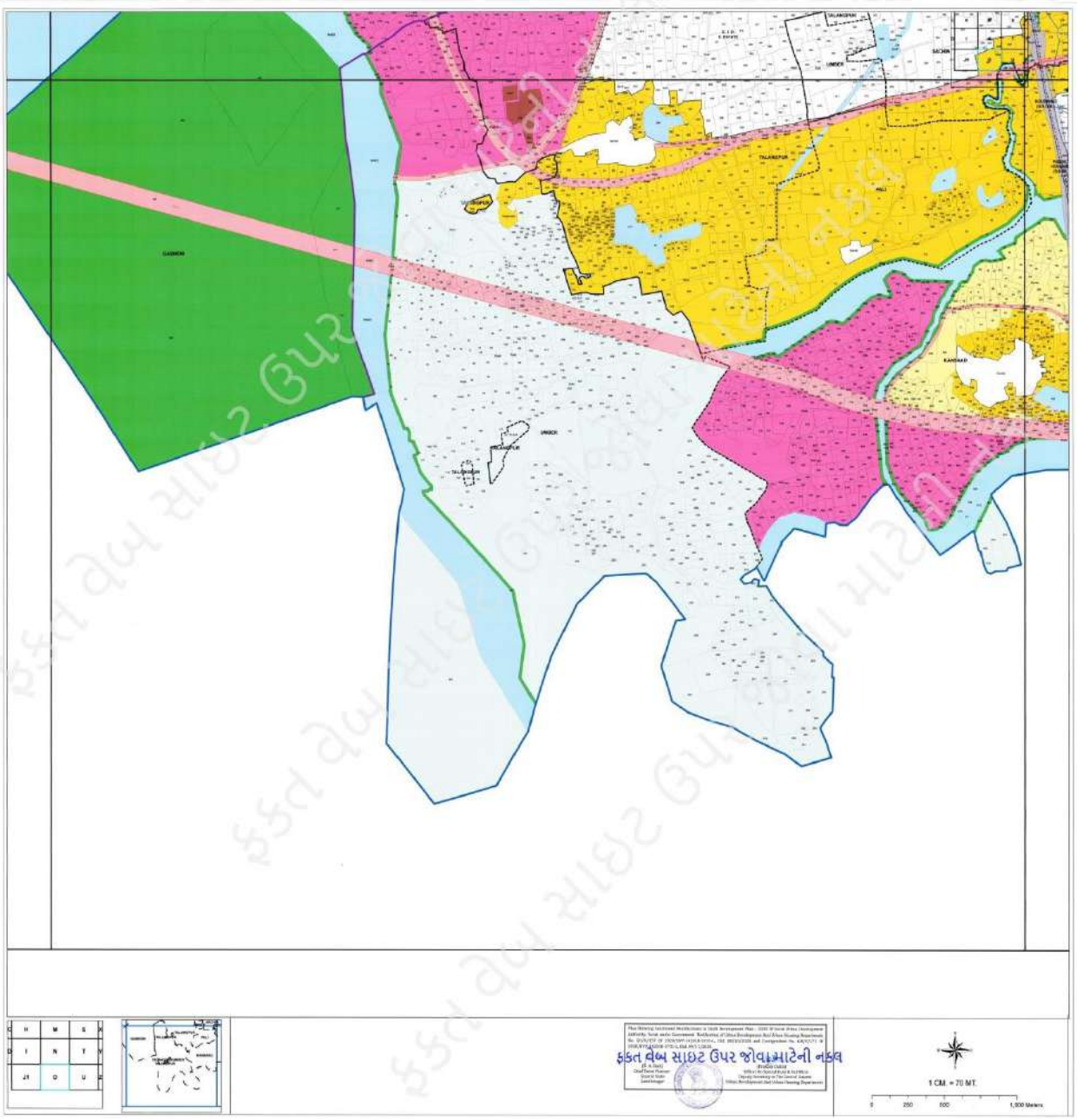
Landfill site approximate area highlighted based on SUDA map plotting

Joint Visit of SMC & GPCB official for proposed Solid waste landfill site @Umbher on Date:23/05/2022

Annexure-3 Photograph of Site

Joint Visit of SMC & GPCB official for proposed Solid waste landfill site @Umbher on Date:23/05/2022

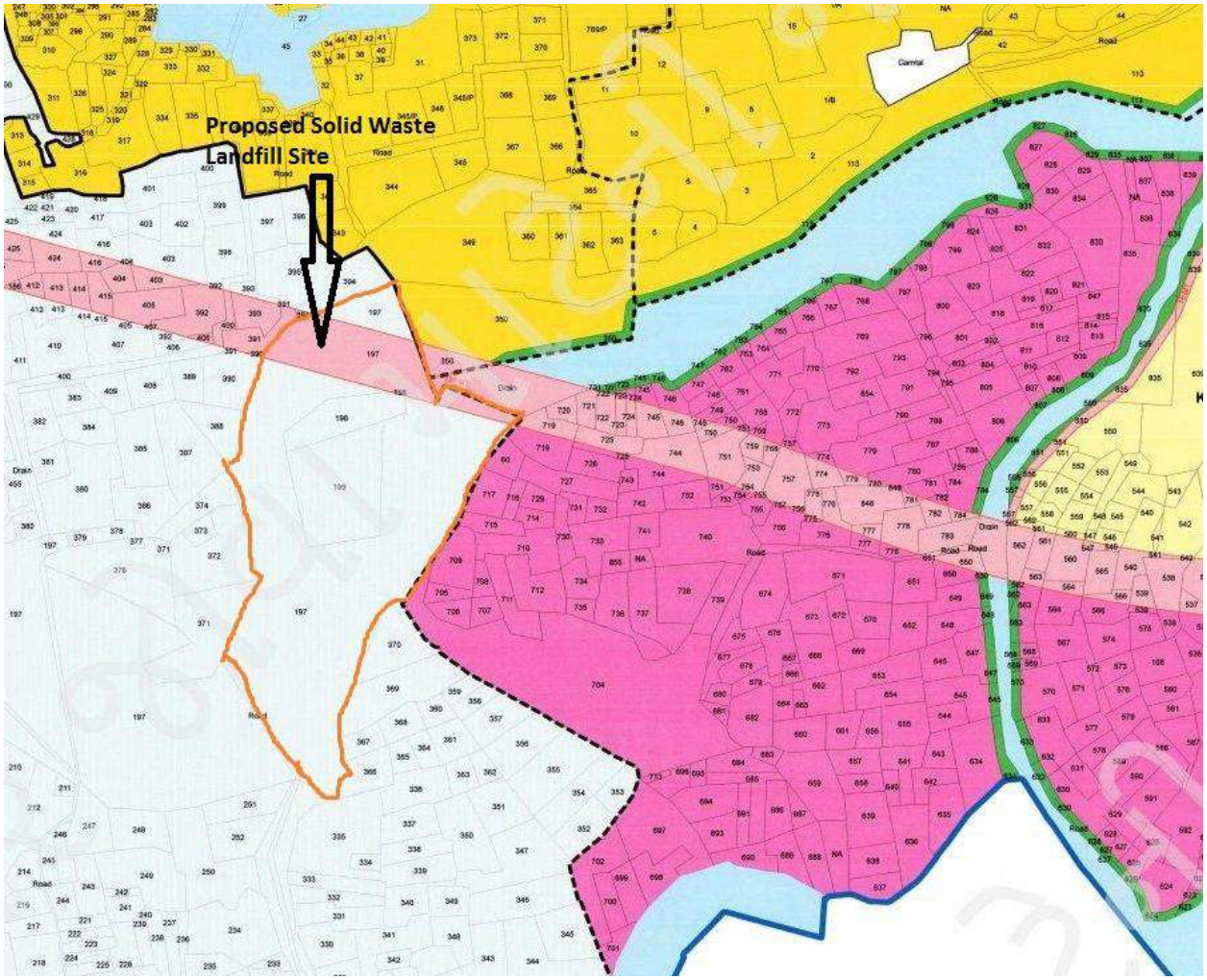
Annexure-4 SUDA Map



SUDA Development Plan 2035 **Map: O - Umber** (Notification No.: GH/V/157 of 2020/DVP-142018-5731-L Date-08/10/2020 & Corrigendum No. GH/V/173 of 2020/DVP-142018-5731-L Date – 09/11/2020) (Source: https://www.sudaonline.org/development-plans/dp-2035-sheet-dt-08-10-2020-corrigendum-9-11-2020/)

Joint Visit of SMC & GPCB official for proposed Solid waste landfill site @Umbher on Date: 23/05/2022

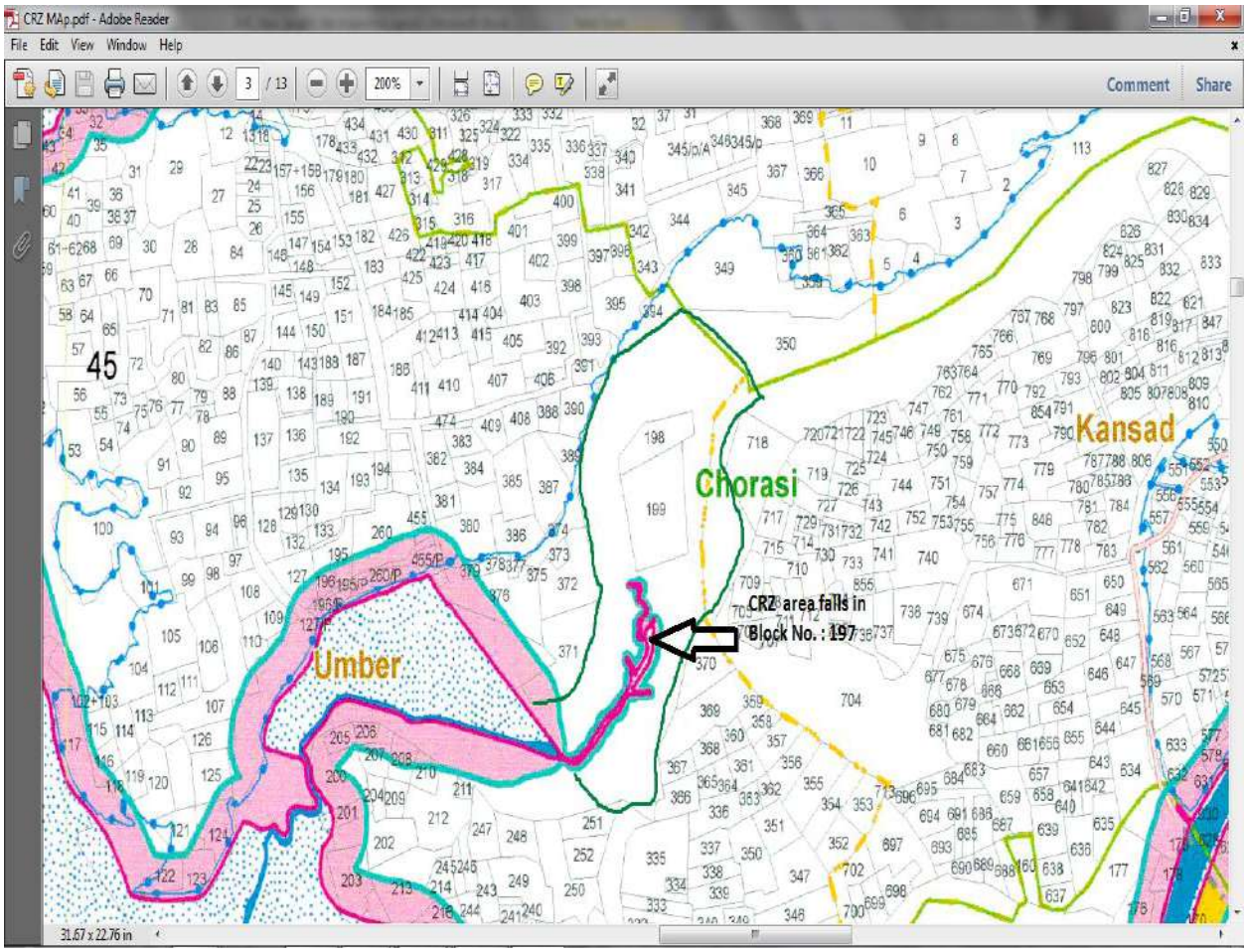
Annexure-4 SUDA Map



Enlarged SUDA Map:O (Highlighted proposed Site)

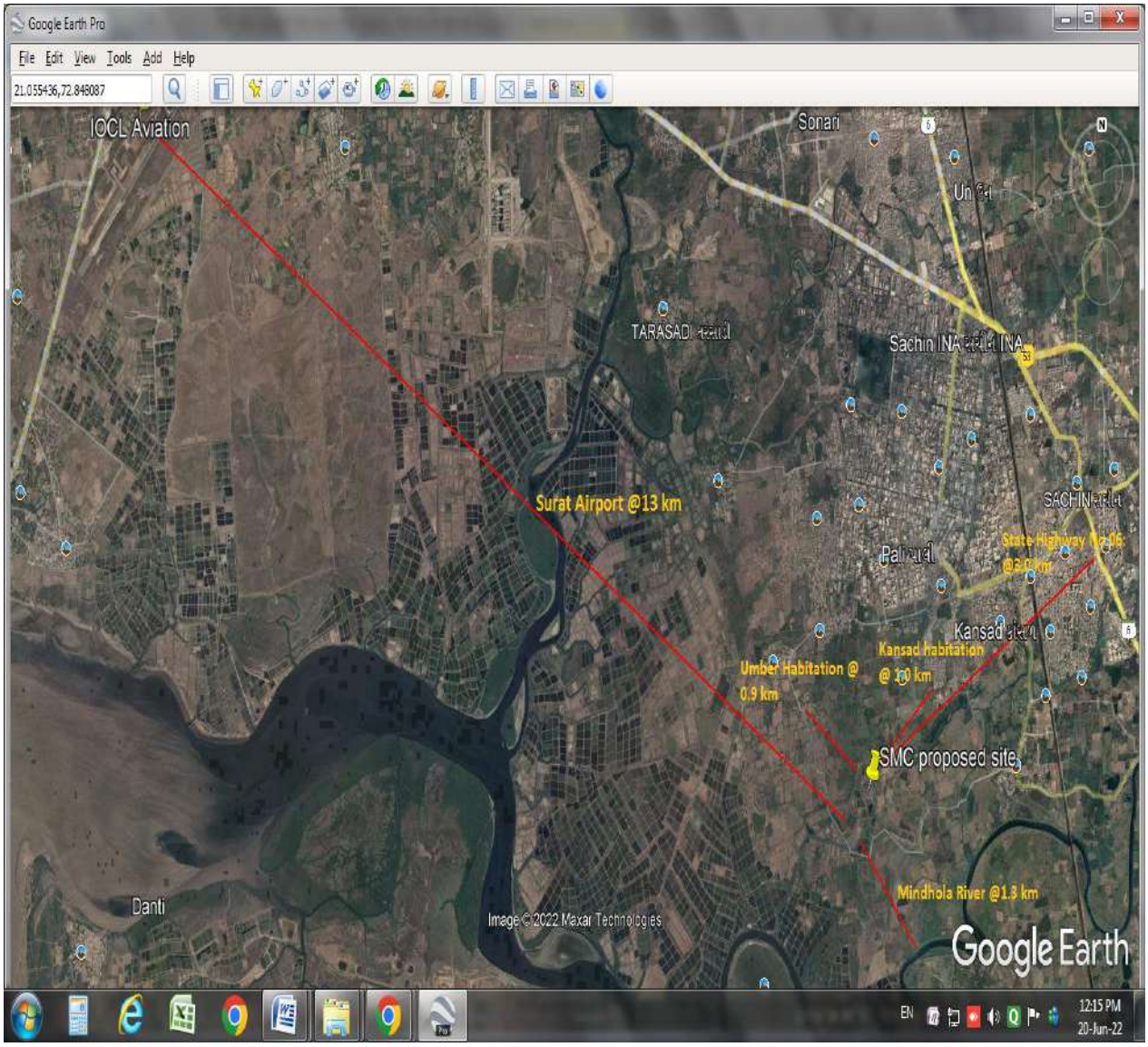
Joint Visit of SMC & GPCB official for proposed Solid waste landfill site @Umbher on Date: 23/05/2022

Annexure-5 CRZ Map of Proposed Site



CRZ Area as defined CRZ notification falls in proposed Plot No. 197 (Reference: Approved CRZ Map of Surat District available on GCZMA- Sheet No.:F 43 M 16/SW & Map No.: GJ 45) (Source: http://www.gczma.org/page-41.aspx)

Annexure-6 Google Earth Satellite image for Distance from proposed site



Surat Airport is Approx. @13 km away from proposed Site
Umber Village Habitation @ 09 km away from proposed site
Kansad Habitation @ 09 km away from proposed site
Mindhola River is @ 1.3 km away from site
State Highway No. 06 is approx. 3.0 km away from site

Annexure - 9

Dr. Hemant Desai
Dy. Commissioner (Health & Hospital)
Surat Municipal Corporation

Work Order

PHD/SWM/OUT/NO. WO/49
Date: 12/6/15

To,
Ecovision Environmental Resources LLP,
2nd floor, Shreeram Complex, above bank of India,
Nr. Kargil chowk, Piplod,
Surat-395007

Sub : Establishment of Plastic waste management centre in Surat city on PPP basis for 20 years

Ref : (1) Your Offer vide letter no. EEEPL/018/2014-15 dated 15/4/2014
(2) Standing Committee Resolution no. 87/2015 dated 20/1/2015
(3) Your Letter no. EEEEPL/137/2014-15 dated 20/2/2015

Gentleman,

In connection to the subject and references, referred to as above, this is to inform you that land admeasuring 2 acres area at part of Survey no.12,13 Moje: Bhatar, Surat city has been allotted for Plastic waste management centre (Land area map enclosed) subject to clearance from relevant department of Surat Municipal Corporation. So you are directed to start establishment of Project after obtaining due clearance from statutory authority.

Please note that other conditions will remain same as per the tender terms and subsequently correspondences made in this regards.

Thanking You,

11/6

Dy. Commissioner
Health & Hospital
Surat Municipal Corporation

Surat Municipal Corporation
Health Department
Muglisarai, Surat

(261) 278 0057 Ext.201
(261) 245 1935, 242 2110
hsdesai@yahoo.com
Visit us at www.suratmunicipal.gov.in

Annexure - 10

Gujarat Pollution Control Board

Regional Office-SURAT ISO-9001 & ISO-14001 Certified
Plot No.11-12/2,3, G.I.D.C., Pandesara, Dist.: Surat- 394221.
Phone: (0261) 2442696 Website : www.gpcb.gov.in
XGN website : http://gpcbxgn.gujarat.gov.in E-mail : ro-gpcb-sura@gujarat.gov.in

GPCB ID: 46995

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule of the Hazardous and Other Waste (Management and Trans boundary Movement) Rules-2016 framed under the Environment (Protection) Act-1986.

And whereas Board has received consolidated consent application Inward no.:**225442** dated: **13/04/2022** for the **Consolidated Consent and Authorization (CC&A)- Renewal** of this Board under the provisions/rules of the aforesaid acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:
(Under the provisions /rules of the aforesaid environmental acts)

To,
Ecovision Environmental Resources Llp(46995)
Plot No: 10,11,12,53,
Gamtal,Bhatar,Surat

1. **Consent Order No.: AWH-54119 Date of issue:05/05/2022**
2. The consent shall be valid up to **28/04/2023** for use of outlet for the discharge of trade effluent & emission due to operation of industrial plant for manufacture of the following items/products:

SR. NO.	PRODUCTS	QUANTITY
1	Extrusion and shredding of plastic Waste from industrial sources (decontaminated) containers, industrial plastic scrap waste etc)	6000 MT/Month
2.	Extrusion and shredding of plastic Waste(phase -1)	

SUBJECT TO THE FOLLOWING CONDITIONS:

1. Unit shall maintain zero generation & discharge of wastewater.
2. Industry shall manage Solid Waste generated from industrial activities as per Solid Waste Management Rules-2016 (Solid Waste as defined in Rule-3(46)).
3. Industry shall obtain NOC from CGWA as per order of Hon. National Green Tribunal for the Withdrawal of ground water.
4. Industry shall comply with plastic waste management Rules-2016.
5. Industry shall receive only decontaminated container plastic scrap/waste etc.
6. Applicant shall maintain complete record of plastic container/plastic scrap/waste received including name of supplier industry type of waste & its quantity etc.
7. Industry shall provide separate dedicated storage facility for plastic waste received from SMC & Industry.

3. CONDITIONS UNDER WATER ACT 1974:

1. Water Source: Local Body
2. The quantity of the water consumption for domestic purpose shall be **1.500 KL/Day**.
3. The quantity of the water consumption for industrial purpose shall be **50 KL/Day**.
4. The quantity of the industrial effluent to be generated and discharged from the manufacturing process and other ancillary industrial operations shall be **55 KL/Day**
5. **The effluent treatment plant consisting of the following units as proposed by you shall be installed.**
   - Collection Tank

- Oil & grease trap
- Equalization tank
- Mixing Channel
- Primary settling tank
- Intermediate tank
- Filter foundation
- Treated water tank
- Sludge Drying Bed.

6. The quantity of domestic waste water shall be **1.2 KL/Day**.
7. The applicant shall operate effluent treatment system efficiently so that treated effluent from the industrial unit shall conform to the norms mentioned below.

PARAMETERS	GPCB NORMS
pH	6.5 to 8.5
Temperature	40^0 C
Colour (pt.Co scale) in units	100 units
Suspended Solids	100 mg/L
Oil & Grease	10 mg/L
Total Dissolved Solids	2100 mg/L
Phenolic Compounds	1 mg/L
Sulphides	2.0 mg/L
Ammonical Nitrogen	50mg/L
Total Chromium	2 mg/L
Hexavalent Chromium	0.1 mg/L
BOD (5 days at 20^0 C)	30 mg/L
COD	100 mg/L
Chlorides	600 mg/L
Sulphate	1000 mg/L

8. The final treated effluent shall conform to the above standards, shall be, reused up to maximum extant & remaining shall be discharged into the Surat Municipal Corporation drain after conforming to GPCB norms.
9. Industry shall provide fixed pipeline with flow meter for the reuse of treated effluent and for disposal to SMC and maintain its records.
10. Domestic effluent shall be disposed of through septic tank/soak pit system.

CONDITIONS UNDER THE AIR ACT 1981:

1. The following shall be used as fuel in D.G.Sets.

Sr. No	Fuel	Quantity
1.	Diesel	5 Lit/Hr

2. The applicant shall install and operate air pollution control system in order to achieve norms prescribed below.
3. The flue gas emission through stack attached to Steam **Boiler, Thermo Pack And D.G.Sets** shall conform to the following standards.

Stack No.	Stack attached to	Stack height (m)	Air Pollution Control System	Parameter	Permissible Limit
1.	**D.G.Set (90 KVA) Stand by. Existing**	11	------	Particular matter SO_2 NO_x	150 mg/Nm³ 100 ppm 50 ppm

4. There shall be no process gas emission from the manufacturing process as well as any other ancillary process.
5. Ambient air quality within the premises of the industry shall conform to the following standards:

PARAMETERS	PERMISSIBLE LIMIT	
	Annual	24 Hrs Average
Particulate Matter-10 (PM 10)	60 Microgram/M^3	100 Microgram/M^3
Particulate Matter- 2.5 (PM 2.5)	40 Microgram/M^3	60 Microgram/M^3
SO2	50 Microgram/M^3	80 Microgram/M^3
NO_x	40 Microgram/M^3	80 Microgram/M^3

6. The Applicant shall provide port holes, Platform etc. At chimney(s) for monitoring the Air emission and the same be open for inspection to/and for use board's staff. The chimney vent attached to source of emission shall be designated by number such as S1. S2 etc. and these shall be painted/displayed to the facilitate identification.
7. The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75 dB (A) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6 a.m. and 10 p.m. and night times is reckoned between 10 p.m. and 6 a.m.

D.G. SETS CONDITIONS

The D.G. Set shall have acoustic enclosure and shall comply sith the standards specified at Sr. no. 95 of Schedule-I of the rule-3 of E.P. Rules -1986 and Noise pollution level as per the Air Act-1981.

D.G. Sets standards: -

The flue gas emission through stack attached to D.G. Sets shall conform to the following Standards:

1. The minimum height of stack to be provided with each of the generator set shall be H=h + 0.2 (KVA)$^{1/2}$, where H= Total stack height in meter, h= height of the building in meters where or by the side of which the generator set is installed.
2. Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
3. The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards. whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/ acoustic treatment. Under such circumstances the performance may be checked for noise reduction up to actual ambient noise level. preferably. in the night time). The measurement for insertion loss may be done at different points at 0.5 m from the acoustic enclosure/room, and the averaged.
4. The D.G. Set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).
5. All efforts shall be made to bring down the noise level due to the D.G.Set. outside the premises, within the ambient noise requirements by proper sitting and control measures.
6. Installation of a D.G. Sets must be strictly in compliance with the recommendations of the D.G.Set manufacturer.
7. A proper routine and preventive maintenance procedure for the D.G.Set should be set and followed in consultation with the DG Set manufacture which would help prevent noise levels of the DG Set from deteriorating with use.

5 AUTHORIZATION as per HAZARDOUS AND OTHER WASTE (MANAGEMENT AND TRANSBOUNDARY MOVEMENT) RULES, 2016 Form -2 [See rule 6(2)]

Form for grant of authorization for occupier or operator handling hazardous waste

5.1 Number of authorization: **AWH-54119** Date of issue: **05/05/2022.**

5.2 M/s. Ecovision Environmental Resources LIp is hereby granted an Authorization to operate facility for following Hazardous Waste on premises situated **Plot No: 10,11,12,53,Gamtal, Bhatar, Surat**

Sr. No.	Waste	Quantity/ Year	Schedule-1 Process no.	Facility
1	Chemical sludge from waste water treatment	4 MT/Yr	I-35.3	Collection. Storage. Transportation and disposal to TSDF Site.
2	Used or Spent Oil	0.6 MT/Yr	I- 5.1	Collection. Storage and disposal by selling to registered re- re refiners

5.3 The Authorization is granted for ultimate disposal by selling of Hazardous Waste to registered Re refiners /recyclers.

5.4 The Authorization shall be valid up to **Date: 28/04/2023**

5.5 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986 and Hazardous and Other Waste (Management and Trans boundary Movement) Rules-2016.

TERMS AND CONDITIONS OF AUTHORIZATION:

a) The applicant shall comply with the provisions of the Environment (Protection) Act – 1986 and the rules made there under.

b) The authorization shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.

c) The persons authorized shall not rent, lend, sell, and transfer of otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.

d) Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.

e) It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.

f) Application for the renewal of an authorization shall be made as laid down in rule -5 (6) (ii).

g) Industry shall have to manage waste oil, discarded containers etc. As per amended rules 2003.

h) Industry shall submit annual report within 15 days and subsequently by 30th June every year for the preceding period April to March.

6 **GENERAL CONDITIONS:**

6.1 Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.

6.2 Applicant shall also comply with the general conditions given in **Annexure I.**

6.3 If it is established by any competent authority that the damage is caused due to their industrialactivities to any person or his property in that case they are obliged to pay the compensation as determined by the competent authority.

7 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Supreme Court's order in W.P. No. : 657 of 1995 dated 14th October 2003.

8 Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions a and solid hazardous wastes generated within the factory premises.

9 Any amendment related to Environmental laws, its Notifications, Rules & Guidelines will be applicable.

For and on behalf of
Gujarat Pollution Control Board

(Dr.J.D.Oza)
Regional Officer

NO: GPCB/RO/SRT-O-3180/ID-46905/ /2022

Issued to:
Ecovision Environmental Resources Llp(46995)
Plot No: 10,11,12,53,
Gamtal,Bhatar,Surat

B. I. Dalal

Additional City Engineer (Civil)

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Annexure - II

Surat Municipal Corporation,
Mahanagar Seva Sadan
Muglisara, Surat - 395 003.
Phone : 2423751 – 56, 2422285-87 Ext.- 228
: : (O) 0261-2434339
Fax : (0261) 245 1935

Work order

DNG/OUT/No. 1067
Date: 4/6/16

To,
R.K. Bricks & Tiles,
11/B, River Palace,
Opp. Central Mall, Nr. Sai Temple,
Valentine Theater,
Surat-Dumas Road, Surat-395007

Sub: Work of C & D waste collection and processing in Surat city on PPP basis for 20 years

Ref:
1) Tender notice no. DCHH/SWM/13/2015-16 Date:07/10/2015
2) Std. Comm. Reso. No.592/2016 Date: 31/03/2016
3) DC(H&H)'s Office letter no. PHD/SWM/ O.N./109 Date: 07/04/2016
4) Your letter dated 12/05/2016

Gentleman,

With respect to the work cited under subject and various communications referred under reference above, kindly note that, as directed by Municipal Commissioner Shri,

1. As a trail run you have started the collection of C & D waste from the city and transferring it to the processing/ manufacturing facility available with you.
2. Above was an interim arrangement till the land allocated to you.

Now, you are herewith informed that, a piece of land ad-measuring 12140.55 Sq. Mt located at block no- H-29 at Kosad, which has been earmarked and allotted for your process plant facility development. Therefore, you are requested to take possession of the said land and complete the following formalities immediately within 15 days;

- Submit the draft agreement to be entered into with SMC.
- Remit Bank Guarantee of Rs. 30,00,000/- in favor of Municipal Commissioner, Surat Municipal Corporation having validity of 12 months to honor the construction period.
- Remit token annual rent of Rs. 12141 for land allocated as mentioned above.

This work order is issued to set up the C&D waste processing facility and it shall be completed and commissioned with 12 months of this date of work order.

Meanwhile, you are requested to regularized C&D waste collection system till the plant is setup. You are also requested to make all necessary arrangement to protect the land and create a storage facility accordingly.

Thanking You,

Yours faithfully,

04-06-2016

Addi. City Engineer (Civil)
(Drainage/Environment Cell)
Surat Municipal Corporation

O/C

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Annexure - 12

Gujarat Pollution Control Board,

Paryavaran Bhavan, Sector-10/A,Gandhinagar-382 010
Website: www.gpcb.gujarat.gov.in

17 FEB 2022

No: GPCB/MSW/C&D/SRT-2/ 623350

To,
Surat Green Precast Pvt. Ltd,
402-502, Maitri, Nr. Eiffel Tower,
Varachcha Bank,
L.H. Road, Surat.

Ref: Your application Dated 01/09/2021.

The Gujarat Pollution Control Board after examining the proposal here by authorizes Surat Green Precast Pvt. Ltd having their administrative office at 402-502, Maitri, Nr. Eiffel Tower, Varachcha Bank, LH Road, Surat to set up and operate construction and demolition waste processing facility at Plot no H-29, Kosad, Dist: Surat on the terms and conditions (including the standards to comply) attached to this authorization letter.

1. The validity of this authorization is till 31/08/2026. After expiry of the validity period, renewal of authorization is to be sought.

2. The Gujarat Pollution Control Board may, at any time, for justifiable reason, revoke any of the conditions applicable under the authorization and shall communicate the same in writing.

3. Any violation of the provision of the construction and demolition Waste Management Rules, 2016 shall attract the penal provision of the Environment (Protection) Act, 1986 (29 of 1986).

4. Recycling process shall be carried out in closed shed so as to avoid fugitive emission from the process.

(A. V. SHAH)
MEMBER SECRETARY

Enclosure: Terms and Conditions

COPY TO:
Regional Officer, GPCB,Surat.....For information & necessary action in accordance with Provision of Solid Waste Management Rules,2016.

Terms and Conditions

1. Construction and demolition waste shall be utilized in sanitary landfill for municipal solid waste of the city or region as mentioned at Schedule I of these rule. Residues from construction and demolition waste processing or recycling industries shall be land filled in the sanitary landfill for solid waste.
2. The processing or recycling shall be large enough to last for 20-25 years (project based on-site recycling facilities).
3. A buffer zone of no development shall be maintained around solid waste processing and disposal facility, exceeding five Tones per day of installed capacity. This will be maintained within the total area of the solid waste processing and disposal facility. The buffer zone shall be prescribed on case to case basis by the local authority in consultation with concerned State Pollution Control Board.
4. Processing or recycling site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.
5. The approach and or internal roads shall be concreted or paved so as to avoid generation of dust particles due to vehicular movement and shall be so designed to ensure free movement of vehicles and other machinery.
6. Provisions of weighbridge to measure quantity of waste brought at landfill site, fire protection equipment and other facilities as may be required shall be provided.
7. Utilities such as drinking water and sanitary facilities (preferably washing/bathing facilities for workers) and lighting arrangements for easy landfill operations during night hours shall be provided and Safety provisions including health inspections of workers at landfill sites shall be carried out made.
8. In order to prevent pollution from processing or recycling operations, the following provisions shall be made, namely:
   a. Provision of storm water drains to prevent stagnation of surface water;
   b. Provision of paved or concreted surface in selected areas in the processing or recycling facility for minimizing dust and damage to the site.
   c. Prevention of noise pollution from processing and recycling plant:
   d. Provision for treatment of effluent if any, to meet the discharge norms as per Environment (Protection) Rules, 1986.
9. Work Zone air quality at the Processing or Recycling site and ambient air quality at the vicinity shall be monitored.
10. The measurement of ambient noise shall be done at the interface of the facility with the surrounding area, i.e., at plant boundary.
11. A vegetative boundary shall be made around Processing or Recycling plant or site to strengthen the buffer zone.
12. The operator of the facility shall submit annual report to this board in Form-II on or before 30th June of every year.
13. Application of materials made from construction and demolition waste in operation of sanitary landfill shall be as per the criteria given in Schedule-II.

Annexure - 13

Dr. Hemant Desai
Dy. Commissioner (Health & Hospital)
Surat Municipal Corporation

Work Order

WO/
PHD/SWM/OUT/NO. 86
Date: 3/8/15

To,
Pruthvi E-Waste recycle Pvt. Ltd.
4- Bhartinagar, Kothariya Main Road,
B/h Nanda Hall, "Pandav Kutir"
Rajkot

Sub : Work of E waste collection and processing in Surat city on PPP basis for 15 years

Ref : (1) Your Offer dated 1/1/2015
(2) Your letter dated 29/4/2015.
(3) Standing Committee Resolution no. 1501/2015 dated 10/6/2015
(4) Your letter dated 24/7/2015

Gentleman,

In connection to the subject and references, referred to as above, this is to inform you that land admeasuring 1 acres area at part of Survey no.12,13 Moje: Bhatar, Surat city has been allotted for E waste collection and processing in Surat city on PPP basis for 15 years (Land area map enclosed) subject to clearance from relevant department of Surat Municipal Corporation. So you are directed to start establishment of Project after obtaining due clearance from statutory authority. you are also requested to submit draft concession agreement and Land lease agreement.

Please note that other conditions will remain same as per the tender terms and subsequently correspondences made in this regards,

Thanking You,

Dy. Commissioner
Health & Hospital
Surat Municipal Corporation

Surat Municipal Corporation
Health Department
Muglisarai, Surat

(261) 278 0057 Ext.201
(261) 245 1935, 242 2110
hsdesai@yahoo.com
Visit us at www.suratmunicipal.gov.in

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GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar**-382 010
Phone : (079) 23226295
Fax : (079) 23232156
Website : www.gpcb.gov.in

GPCB

By R.P.A.D

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 6(2) of the Hazardous And Other Waste (Management and Transboundary) Rules, 2016 framed under the Environmental (Protection) Act-1986. This Board is empowered to Grant CC&A.

And whereas Board has received consolidated consent application letter no. **186230 dated 08-12-2020** for the **Consolidated Consent and Authorization** (CC & A) of this Board under the provisions / rules of the aforesaid Acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:
(Under the provisions /rules of the aforesaid environmental acts)
To,
M/s. Pruthvi Ewaste Recycle Private Limited
TP Sacheme No-59, UNN,
Plot No: R-46, B/H SMC Pumping Station,
UNN Surat City-394210,
Surat.

1. **Consent Order No. AWH-111342 Date of issue: 03-02-2021.**

2. The consents shall be **valid upto 10-08-2024** for the use of outlet for the discharge of treated effluent and emission due to operation of industrial plant **for Dismantling of All kind of Electronic Equipment (E-Waste) about 3000 MTPA (level-1).**

Subject to specific condition:

1. Unit shall adopt and regularly use the online manifest system for procurement & disposal of hazardous waste.
2. The permission is issued for collection of orphan e-waste with Surat Municipal Corporation only and unit shall submit the notarized undertaking for the same.
3. Industry shall comply with Plastic Waste Management Rules-2016.
4. Industry shall comply with e-Waste (Management) Rules, 2016.
5. Unit shall comply with implementation guideline of E-Waste (Management) Rules, 2016.
6. Applicant shall not carry out any activity which attracts provisions of Environmental Clearance Notification 2006.
7. Application shall strictly adhere with the guidelines issued by the Central Pollution Control Board, New Delhi for "Environmentally Sound Management of E-Waste " time to time.
8. The unit shall not carry out any IMPORT or EXPORT of e-waste without obtaining prior permission of MOEF, New Delhi and other competent authority.
9. Industry shall follow the guidelines in "Implementation Guidelines for the E-Waste (Management) Rules, 2016.
10. Unit has to adopt BAT (Best Available Technology available in the country or elsewhere in the world.

11. Unit has obtain an authorization in accordance with the procedure under rule 9 as per Hazardous Waste Rules-2016 and provide details such as address, telephone numbers/Help line number, e mail etc.
12. Industry shall provide 5 meter buffer Zone towards the residential side.
13. Unit shall ensure that the waste collected by them is stored in a secured manner and dismantling process are as per the guideline provided by CPCB for "Environmentally Sound Management of E-Waste".
14. Unit shall ensure that no damage is caused to the environment during storage and transportation of e-waste.
15. Unit shall file annual return in Form 3 to the SPCB on or before 30th day of june following the financial year to which that return related and maintain records of the E-waste handled in Form 2 and make such records available for scrutiny by the SPCB.
16. Unit shall ensure that the dismantling process do not have any adverse effect on the health and the environment.
17. Unit shall ensure that non-recyclable/ Non-recoverable component are sent to authorized treatment storage and disposal facilities. (TSDF)
18. Dismantler operations shall not include fine grinding/ wet shredding/ wet grinding operations. Dismantling operations shall not be permitted for chemical leaching or heating process or melting the material. Dismantlers shall not shred segregated LCDs.
19. The premises for dismantling operation should fulfil the following requirements;
    a) Weather proof roofing and impermeable surface for appropriate areas with appropriate spillage collection facilities, decanters, degasser and degreasers.
    b) Appropriate storage for dissembled spare parts.
    c) Appropriate containers for storage of batteries, capacitors containing PCBs (Polychlorinated biphenyls) or PCTs (Polychlorinated terphenyls),
20. Manual shredding, cutting and segregation operations for CRTs should be carried out in vacuum chambers where the dust is extracted through cyclones, bag fitters, ID fan and a suitable chimney. The operators should use gloves fixed to the walls of the vacuum chamber while handling CRTs as per guideline.
21. Without availability of adequate equipments, unit shall not accept any refrigerators/Ozone depleting substance containing waste in the facility.
22. Unit shall not procure TV, CRT, Mercury contained products.
23. Unit shall abide to MOU dated 08/01/2018 and send E-Waste as per MOU for precious Metal recovery.
24. Industry shall manage Solid Wastes generated from industrial activities as per Solid Waste Management Rules-2016 (solid waste as defined in Rule-3(46)).
25. Industry shall obtain NOC from CGWA as per order of Hon. National Green Tribunal for the withdrawal of ground water.
26. Industry shall provide dedicated storage facility for fly ash.
27. Industry shall comply with fly ash notification 1999 as amended from time to time.

3. CONDITIONS UNDER THE WATER ACT:

3.1. Water Source: SMC.
3.2. There shall be no water consumption for industrial purpose.

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PARYAVARAN BHAVAN
Sector-10-A, Gandhinagar-382 010
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GPCB

3.3. The quantity of the water consumption for domestic purpose shall not exceed 1000 Lit/Day.
3.4. There shall be no generation of industrial effluent from the manufacture process & other ancillary industrial operations.
3.5. The quantity of the domestic waste water (Sewage) shall not exceed 450 Lit/Day.
3.6. Domestic waste water shall be disposed through septic tank/soak pit system.

4. CONDITIONS UNDER THE AIR ACT:

4.1 These shall be no any flue-gas emission from the manufacturing process as well as any other ancillary process.

4.2. The process emission through various stakes/vents of reactors, process vessel shall conform to the following standards.

Stack No.	Stack attached to	Stack height in Meter	Air Pollution Control System	Parameters	Permissible Limit
1	Shreddeing& CRTM/C	4	Bag filter + Multi Cyclone Seperator	Particulate Matter SO_2 NO_x	150 mg/NM^3 100 ppm 50 ppm

4.3. The concentration of the following parameters in the ambient air within the premises of the industry and a distance of 10meters from the source) other than the stack/vent) shall not exceed the following levels.

PARAMETERS	PERMISSIBLE LIMIT (Microgram/M^3)	
	Annual	24 Hrs Average
Particulate Matter-10 (PM_{10})	60	100
Particulate Matter- 2.5 ($PM_{2.5}$)	40	60
SO_2	50	80
NO_x	40	80

4.4. The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.

4.5. The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(A) during day time and70 dB (A) during night time. Daytime is reckoned in between 6a.m. and10 p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

5. **AUTHORIZATION as per HAZARDOUS AND OTHER WASTE (MANAGEMENT AND TRANSBOUNDARY) RULES, 2016 Form-2 [See rule 6 (2)]**

Form for grant of authorization for occupier or operator handling Hazardous waste

5.1 Authorization order No:- **AWH-111342** date of Issue: **03-02-2021.**

5.2 **M/s. Pruthvi Ewaste Recycle Private Limited.** is hereby granted an authorization to operate facility of below for following hazardous wastes on the premises situated at **TP Sacheme No-59, UNN, Plot No: R-46, B/H SMC Pumping Station, UNN Surat City-394210, Surat.**

Sr. No	Waste	Quantity	Schedule-I/ Category	Facility
1	Insulation from Cable	125 MT/year	---	Collection, Storage, Transportation and disposal at GPCB authorized TSDF Site.
2	Tube lights, CFL lamps & Cartridge Powder	100 MT/Year	---	Collection, Storage, Transportation and disposal at GPCB authorized TSDF Site.
3	Used Oil	20 Lit/Year	5.1	Collection, storage, transportation and disposal by selling to Registered re-refiners.

5.3 The authorization shall be valid up to **10-08-2024.**

5.4 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.

5.5 The authorization is granted to operate a facility for collection, storage within factory premises transportation and ultimate disposal of Hazardous wastes as per condition no.5.2 to the industry having valid CCA of this Board.

6. **TERMS AND CONDITIONS OF AUTHORISATION**

1. The applicant shall comply with the provisions of the Environment (Protection) Act-1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.
3. The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty"
7. It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.

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PARYAVARAN BHAVAN
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Website : www.gpcb.gov.in

10. The hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
11. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
12. An application for the renewal of an authorization shall be made as laid down in rules 6(2) under Hazardous Waste and Other Waste Rules, 2016.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. The waste generator shall be totally responsible for (i.e. collection, storage, transportation and ultimate disposal) the wastes generated.
15. Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form-4 by 30th day of June of every year for the preceding period April to March.
16. In case of any accident, details of the same shall be submitted on Form-11 to Gujarat Pollution Control Board.
17. As per "Public Liability Insurance Act-91" company shall get Insurance Policy, if applicable.
18. Empty drums and containers of toxic and hazard material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
19. In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State of Union Territory Administration where the facility exists.
20. Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Actions taken in this regard shall be submitted within three months and also along with Form-4.
21. Industry shall have to display the relevant information with regards to hazardous waste as indicated in the Hon. Supreme Court's Order in W.P. No.657 of 1995 dated 14th October, 2003.
22. Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous wastes generated within the factory premises.

7. **SPECIFIC CONDITIONS:-**

7.1. The authorized actual user of hazardous and other wastes shall maintain records of hazardous and other wastes purchased in a passbook issued by the State Pollution Control Board along with the authorization.

7.2. Handling over of the hazardous and other wastes to the authorized actual user shall be only after making the entry in the passbook of the actual user.

7.3. In case of renewal of authorization, a self-certified compliance report in respect of effluent, emission standards and the conditions specified in the authorization for hazardous and other wastes shall be submitted to SPCB.

7.4. The occupier of the facility shall comply Standard operating procedure/guidelines published by MOEF&CC or CPCB or GPCB from time to time.

7.5. Unit shall comply provisions of E-Waste Management Rules-2016.
7.6. The disposal of Hazardous Waste shall be carried out as per the waste Management hierarchy.
7.7. The occupiers of facilities shall not store the hazardous and other wastes for a period not exceeding **ninety days**. Prior permission of the Board shall be obtained for extension of the storage period.
7.8. The occupier shall maintain the records of generation, sale, storage, transport, recycling, co processing and disposal of hazardous waste and make available during the inspection.
7.9. The transportation of the hazardous waste shall be carried out in GPS mounted dedicated vehicles.

8. **GENERAL CONDITIONS: -**

8.1. Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
8.2. Applicant shall also comply with the general conditions given in annexure I.
8.3. Whenever due to accident or other unforeseen act or ever, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station, Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body.
8.4. In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.
8.5. The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.
8.6. The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.

For and on behalf of
Gujarat Pollution Control Board

(G.H.Trivedi)
Deputy Chief Environmental Engineer
Date:-

NO: GPCB/CCA-SRT-2294/ID_57128/
Issued to:
M/s. Pruthvi Ewaste Recycle Private Limited
TP Sacheme No-59, UNN, Plot No: R-46,
B/H SMC Pumping Station,
UNN Surat City-394210, Surat.

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Annexure - 15

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar** 382 010
Phone : (079) 23222425
(079) 23232152
Fax : (079) 23232156
Website : www.gpcb.gov.in

BY R.P.A.D.

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 3(c) & 5(5) of the Hazardous and other Waste (Management, Trans boundary Movement) Rules'2016 framed under the Environment (Protection) Act-1986.

And whereas Board has received consolidated consent application Inward No **130520** dated **06/01/2018** of Re Apply Consolidated Consent and Authorization (CC & A) of this Board under the provisions/rules of the aforesaid acts. Consents & Authorization are hereby granted as under:

CONSENTS AND AUTHORISATION:

(Under the provisions /rules of the aforesaid environmental acts)

M/S. PRUTHVI E RECYCLE PRIVATE LIMITED (52986),
SURVEY NO. 160/1, PLOT NO. 12,
TIRUPATI ESTATE, LOTHADA, RAJKOT, GUJARAT, INDIA,
LOTHADA – 360002,
TAL & DIST: RAJKOT.

1. **Consent Order No.: AWH-92462 date of Issue: 17/04/2018.**
2. The consents shall be valid up to **05/01/2023** for use of outlet for the discharge of trade effluent & emission due to operation of industrial plant for manufacture of the following items/products:

Sr. No.	Product	Quantity MT/Month
1	Recycle Cables	225 MT/Month
2	Recycle e-waste	549 MT/Month

Specific condition:-

- **Applicant has comply with the guideline for E waste.**
- **Applicant has to be provide APCM attached to CRT crushing machine.**
- **Applicant has to provide magnetic separator prior to obtain CTE.**
- **Applicant has to submit NOU with 3rd level recycler prier to apply for CTO.**

3. **CONDITIONS UNDER WATER ACT 1974:**

4.1. Source of water: -Tanker.
4.2. There shall be no water consumption for industrial purpose.
4.3. The quantity of the fresh water consumption for domestic purpose shall not exceed 500 Lit/Day
4.4. There shall be no discharge of industrial effluent from the manufacture process & other ancillary industrial operations.
4.5. The quantity of the domestic waste water (sewage) shall not exceed 300 Lit/Day.
4.6. Sewage shall be disposed of through Septic tank/soak pit system

4. **CONDITIONS UNDER AIR ACT 1981:**

4.1 There shall be no use of fuel hence there shall be no flue gases emission.
4.2 The process gas emission through stack attached to Shredding section and CRT crusher shall conform to the following standards:

Stack No.	Stack attached to	Stack height in Meter	APC Measure	Parameter	Permissible Limit
1.	Shredding section and CRT crusher	12 (Common stack)	Bag house	Particulate matter	150 mg/NM^3

4.3 The concentration of the following parameters in the ambient air within the premises of the industry shall not exceed the limits specified hereunder.

PARAMETERS	PERMISSIBLE LIMIT (Microgram/M^3)	
	Annual	24 Hrs Average
Particulate Matter-10 (PM_{10})	60	100
Particulate Matter- 2.5 ($PM_{2.5}$)	40	60
SO_2	50	80
NO_x	40	80

4.4 The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.

4.5. The industry shall take adequate measures for control of noise levels from its Own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75 dB (A) during day time and70dB (A) during night time. Daytime is reckoned in between 6a.m. and10p.m. and nighttime is reckoned between 10 p.m. and 6 a.m.

5. AUTHORISATION FOR THE MANAGEMENT & HANDLING OF HAZARDOUS WASTES FORM-2 (SEE RULE 5 (4))

Form for grant of authorization for occupier or operator handling hazardous waste.

5.1 **M/s PRUTHVI E RECYCLE PRIVATE LIMITED (52986)** products is here granted authorization to operate facility for following hazardous wastes on the premises situated **SURVEY NO. 160/1, PLOT NO. 12, TIRUPATI ESTATE, LOTHADA, RAJKOT, GUJARAT, INDIA, LOTHADA – 360002, TAL & DIST: RAJKOT.**

Sr. No	Waste	Quantity MT/Year	Schedule I	Facility
1	Process Residue and wastes	2	I-31.1	Collection, Storage, Transportation and disposal into TSDF site.

5.2 The authorization shall be valid up to **05/01/2023.**

5.3 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.

5.4 The authorization is granted to operate a facility for collection, storage within factory premises transportation and ultimate disposal of Hazardous wastes as per condition No.5.1 to the TSDF site having valid authorization of this Board.

5.5 TERMS AND CONDITIONS OF AUTHORISATION

1. The applicant shall comply with the provisions of the Environment (Protection) Act-1986 and the rules made there under.
2. The authorization or its renewal shall be produced for inspection at the request of an officer authorized by the Gujarat Pollution Control Board.
3. The persons authorized shall not rent, lend, sell, and transfer or otherwise transport the hazardous wastes without obtaining prior permission of the Gujarat Pollution Control Board.
4. Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a beach of this authorization.
5. The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Wastes and Penalty"
7. It is the duty of the authorized person to take prior permission of the Gujarat Pollution Control Board to close down the facility.
8. An application for the renewal of an authorization shall be made as laid down in rules 6(2) under Hazardous Waste and Other Waste Rules, 2016.
9. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
10. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
11. The hazardous and other wastes which gets generated during recycling or reuse or recovery or pre-processing or utilization of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorization.
12. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. The waste generator shall be totally responsible for (i.e. collection, storage, transportation and ultimate disposal) the wastes generated.
15. Records of waste generation, its management and annual return shall be submitted to Gujarat Pollution Control Board in Form-4 by 30th day of June of every year for the preceding period April to March.
16. In case of any accident, details of the same shall be submitted on Form-11 to Gujarat Pollution Control Board.
17. As per "Public Liability Insurance Act-91" company shall get Insurance Policy, if applicable.

GPCB

GUJARAT POLLUTION CONTROL BOARD
PARYAVARAN BHAVAN
Sector-10-A, **Gandhinagar** 382 010
Phone : (079) 23222425
(079) 23232152
Fax : (079) 23232156
Website : www.gpcb.gov.in

18. Empty drums and containers of toxic and hazard material shall be treated as per guideline published for "Management & Handling of discarded containers". Records of the same shall be maintained and forwarded to Gujarat Pollution Control Board regularly.
19. In case of transport of hazardous wastes to a facility for (i.e. treatment, storage and disposal) existing in a State other than the State where hazardous wastes are generated, the occupier shall obtain 'No Objection Certificate' from the State Pollution Control Board or Committee of the concerned State of Union Territory Administration where the facility exists.
20. Unit shall take all concrete measures to show tangible results in waste generation, reduction, avoidance, reuse and recycle. Actions taken in this regard shall be submitted within three months and also along with Form-4.
21. Industry shall have to display the relevant information with regards to hazardous waste as indicated in the Hon. Supreme Court's Order in W.P. No.657 of 1995 dated 14th October, 2003.
22. Industry shall have to display on-line data outside the main factory gate with regard to quantity and nature of hazardous chemicals being handled in the plant, including wastewater and air emissions and solid hazardous wastes generated within the factory premises.
23.

6. **GENERAL CONDITIONS: -**

6.1. Any change in personnel, equipment or working conditions as mentioned in the consents form/order should immediately be intimated to this Board.
6.2. Applicant shall also comply with the general conditions given in annexure I.
6.3. Whenever due to accident or other unforeseen act or ever, such emissions occur or is apprehended to occur in excess of standards laid down such information shall be forthwith reported to Board, concerned Police Station, Office of Directorate of Health Service, Department of Explosives, Inspectorate of Factories and local body.
6.4. In case of failure of pollution control equipments, the production process connected to it shall be stopped. Remedial actions/measures shall be implemented immediately to bring entire situation normal.
6.5. The Environmental Management Unit/Cell shall be setup to ensure implementation on and monitoring of environmental safeguards and other conditions stipulated by statutory authorities. The Environmental Management Cell/Unit shall directly report to the Chief Executive of the organization and shall work as a focal point for internalizing environmental issues. These cells/units also coordinate the exercise of environmental audit and preparation of environmental statements.
6.6. The Environmental audit shall be carried out yearly and the environmental statements pertaining to the previous year shall be submitting to this State Board latest by 30th September every year.
6.7. The Board reserves the right to review and/or revoke the consent and/or make variations in the conditions, which the Board deems, fit in accordance with Section 27 of the Act.
6.8. In case of change of ownership/management the name and address of the new owners/ partners/ directors/proprietor should immediately be intimated to the Board.
6.10 Industry shall have to display the relevant information with regard to hazardous waste as indicated in the Hon. Supreme order in w.p. no. 657 of 1995 dated 14th October 2003.

This document is digitally signed by.

(N.M. Tabhani)
Senior Environmental Engineer

NO: PC/ CCA/RJ-2947/ID-52986/ **DT:-**

Issued to:-
M/S PRUTHVI E RECYCLE PRIVATE LIMITED (52986),
SURVEY NO. 160/1, PLOT NO. 12,
TIRUPATI ESTATE, LOTHADA, RAJKOT, GUJARAT, INDIA,
LOTHADA – 360002,
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