ZIGMA

Landfill Mining

Because we truly believe what we do
is the rent we pay to Mother Earth

About ZIGMA

Since its inception, Zigma has come a long way by evolving and pioneering Landfill Mining across various Urban and Local Bodies in India.

This approach has firmly positioned the organization as one of the leading Landfill Mining companies of India and continues to further improve its reach and acceptance across represented geographies.

Zigma is headquartered in Erode, Tamilnadu where it manages its all research, development and administration. The company operates twenty plants across in India.

Do You Know

The total MSW generated in Urban India today is

68.8 million

tons per year or

1,88,500 tons

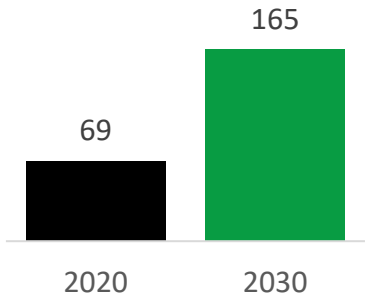
per day

50%

increase from 2007.

Waste Generation

Million tons per year



Urban Waste Generation

75%

Waste Collected

25% Waste is Processed

75% Dumped untreated in unsecure landfill sites

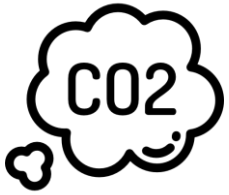
What Is Wrong With Landfills

Most of the MSW is dumped into landfills that are not regulated by Urban and Local Bodies, raises serious concerns of continuous

Water Pollution

Soil Contamination

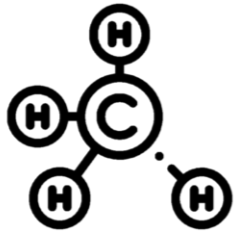
Air Pollution



The open burning of solid wastes & landfill fires emit

22,000 tons

of air pollutants per year in Mumbai alone.



Non-regulated landfills generate methane that is

23 times

more harmful than CO2.

Why Landfill Mining

Due to rapid urbanization, landfill sites that were situated in fringe parts of the cities and towns are now surrounded by highly populated localities creating a huge threat to public health.

Urban and local Bodies require land to setup infrastructure to handle the daily generated waste.

There is a "Not in my Backyard" syndrome when ULB's look for new land for setting up infrastructure.

Capping vs Mining

Capping is like a grenade who's pin has been removed, eventually it has to blast.

Calls for huge **maintenance cost** including leachate and methane generation

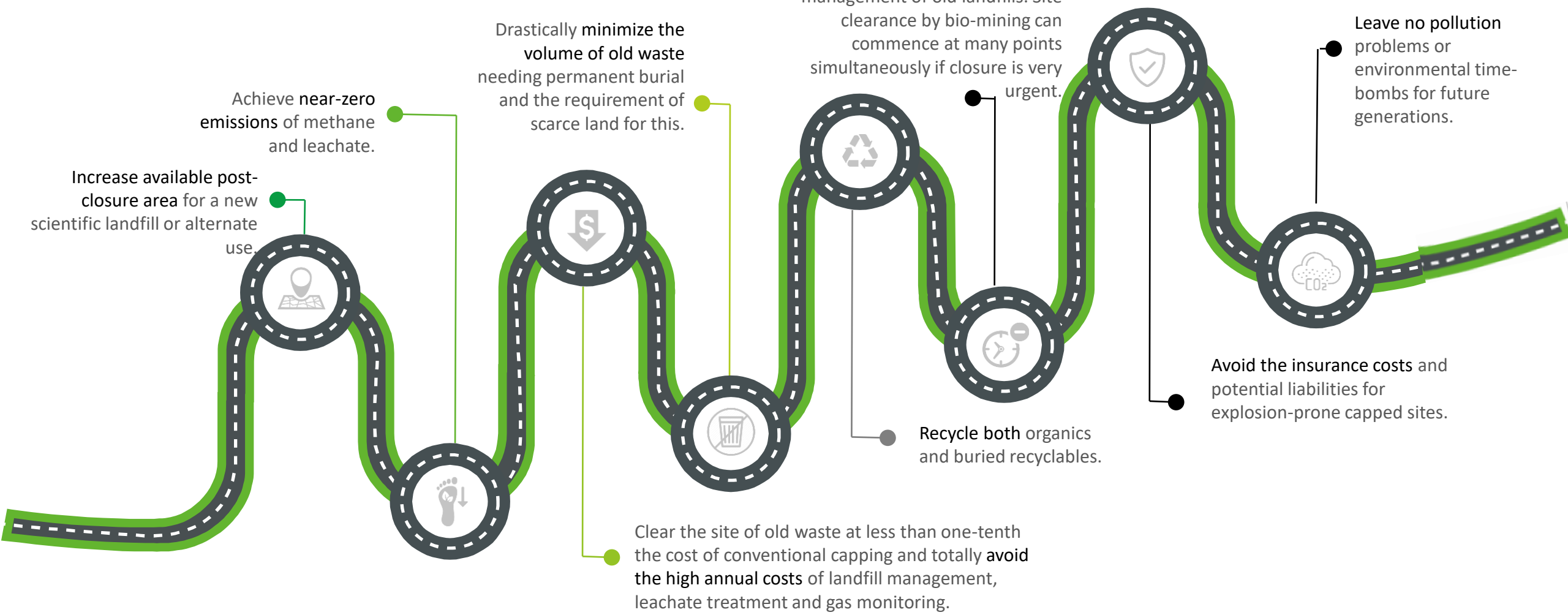
Required huge **insurance cost**

Capping gives no option to **reclaim the land**

Seldom possible where land is not available

Integrated Landfill Mining

New approach to address the alarming need to treat legacy waste lying in landfills.



Increase available post-closure area for a new scientific landfill or alternate use.

Achieve near-zero emissions of methane and leachate.

Drastically minimize the volume of old waste needing permanent burial and the requirement of scarce land for this.

Clear the site of old waste at less than one-tenth the cost of conventional capping and totally avoid the high annual costs of landfill management, leachate treatment and gas monitoring.

Achieve all this in one year or less, compared to 30-year closure management of old landfills. Site clearance by bio-mining can commence at many points simultaneously if closure is very urgent.

Recycle both organics and buried recyclables.

Avoid the insurance costs and potential liabilities for explosion-prone capped sites.

Leave no pollution problems or environmental time-bombs for future generations.

Landfill Mining - The process

1

Pre-assessment and Analysis of the dumpsite

2

Pre-stabilization of waste

3

Processing and Segregation

4

Responsible disposal of aggregates

1. Pre-assessment & Analysis Of The Dumpsite

a. Baseline study of the dumpsite

b. Analysis of the in-situ waste

c. Contour survey using drones

a. Baseline study of the dumpsite

Set a soil, air and ground water quality baseline record.

- Top Soil
- Middle Soil
- Bottom Soil

Tests record as per

IS2720

1. pH value
2. Total Nitrogen
3. Total Phosphate
4. Total Potassium
4. C/N ratio
5. Total Organic Carbon
6. Arsenic
7. Mercury
8. Lead
9. Cadmium
10. Chromium
11. Copper
12. Zinc
13. Nickel
14. TCLP
15. Biodegradability

- Ground Water
- Underground Water
- Surface Water

Test records as per

IS10500

1. pH value
2. Phenolic compounds
3. Chlorides
4. Dissolved Solids
5. Arsenic
6. Mercury
7. Lead
8. Cadmium
9. Chromium
10. Copper
11. Cyanide
12. Zinc
13. Sulphate
14. Nickel
15. Nitrate
16. Iron
17. Total Hardness

This data will be available to compare and evaluate post mining and remediation.

b. Analysis of the in-situ waste

1. pH value
2. Suspended Solids
3. TDS
4. Ammonical Nitrogen
5. Total Kjeldahl nitrogen
6. BOD
7. Conductivity
8. COD
9. Arsenic
10. Mercury
11. Lead
12. Cadmium
13. Chromium
14. Copper
15. Zinc
16. Fluoride
17. Nickel
18. Coliform
19. E-coli

c. Contour Survey Using Drones

General Contour Survey

Ascertains volume of waste

To understand

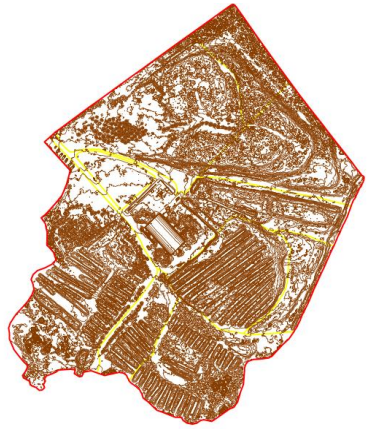
- The location of the dumpsite
- Topography
- To understand rainwater flow
- Volume of the waste
- Prepare leachate collection system

Digital Contour Survey

Ascertains Land Area

To understand

- Extent of land with accuracy to millimeters
- Conversion of dumpsite into various zones



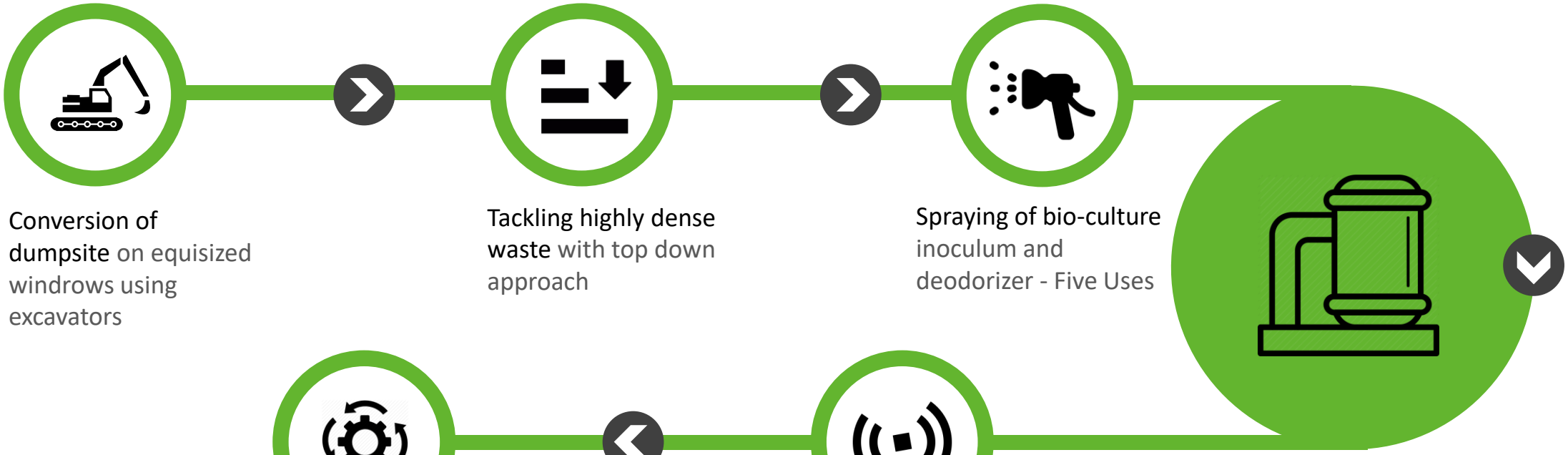
Orthomosaic Survey

Ascertains density of waste

Orthomosaic survey
To understand

- Density of waste
- To arrive at excavation plan
- To arrive at pre-stabilization plan

2. Pre-stabilization Of Waste



Conversion of **dumpsite** on equisized windrows using excavators

Tackling highly dense **waste** with top down approach

Spraying of bio-culture inoculum and deodorizer - Five Uses

Continuous turning of waste using excavators to **achieve complete stabilization** - Test to check stabilization levels

Leachate collection, management & treatment

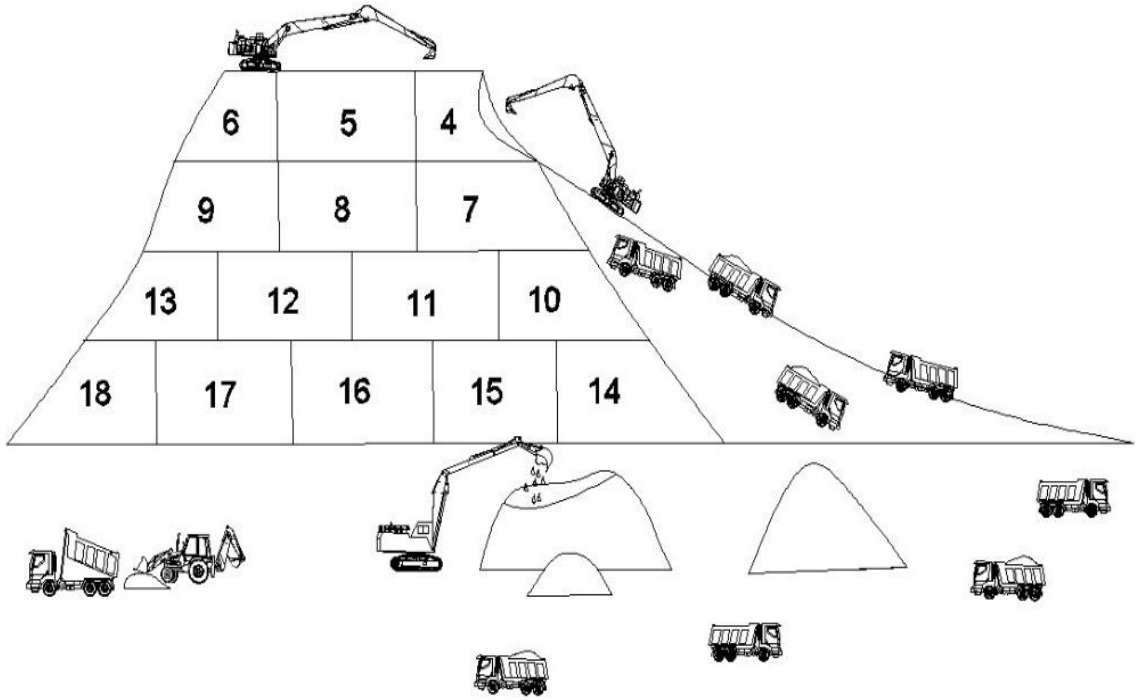
- Temporary leachate collection pits
- Leachate storage ponds
- Leachate treatment

1

Conversion of dumpsite on equisized windrows using excavators

2

Tackling highly dense waste
with top down approach



3

Spraying of bio-culture inoculum and deodorizer – It will ensure..

The odor generated from the waste is controlled.

Any pathogenic activity is subdued.

Any partly degraded organic matter is completely degraded.

Further leachate generation is stopped.

Scavenging birds and animals stop feeding on the waste.

Fly menace is controlled.

4

Continuous turning of waste using excavators to achieve complete stabilization - Test to check stabilization levels

Germination tests are conducted

Soil retrieved from the stabilized heaps are germinated with mustard/wheat seeds.

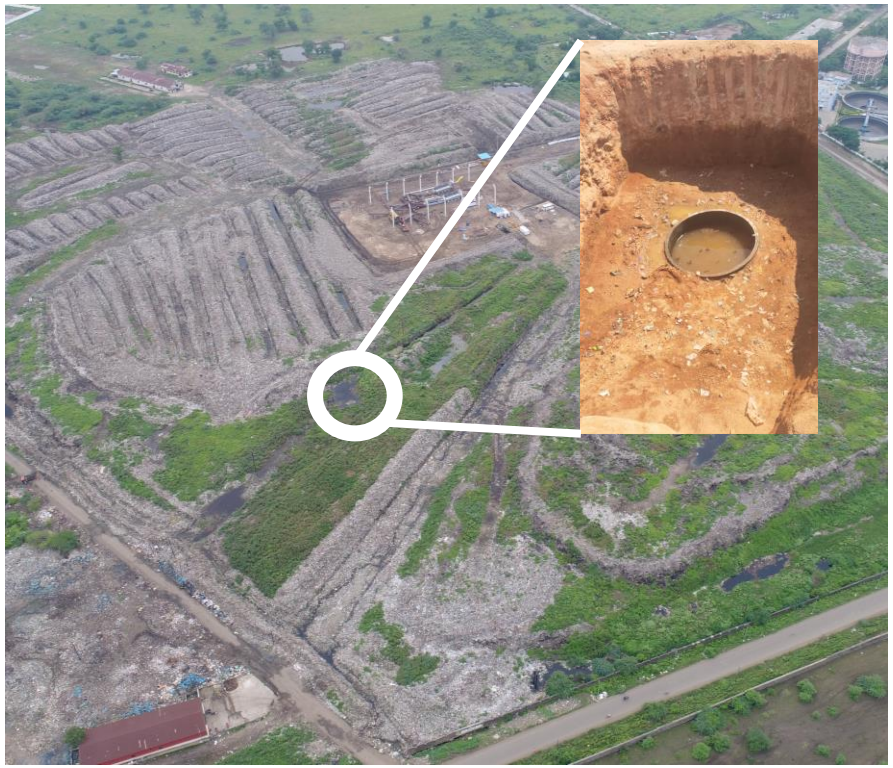
Soil with minimum 75% germination is declared stabilized and ready for segregation.

5

Leachate collection, management & treatment

1. Leachate collection

Temporary leachate collection pits- these will be placed all across the dumpsites where there is a possibility of natural flow of leachate



2. Leachate management

Leachate storage ponds- leachate from pits will be pumped and stored in the lined temporary storage ponds for further treatment.

5

Leachate collection, management & treatment

3. Leachate Treatment

Small quantity generation

- Re-circulation into windrows for stabilization
- Natural evaporation

Large quantity generation

- Transfer to nearest Sewage Treatment plant
- Leachate Treatment plant

3. Processing & Segregation

Using state of the art machineries to segregate the stabilized waste.

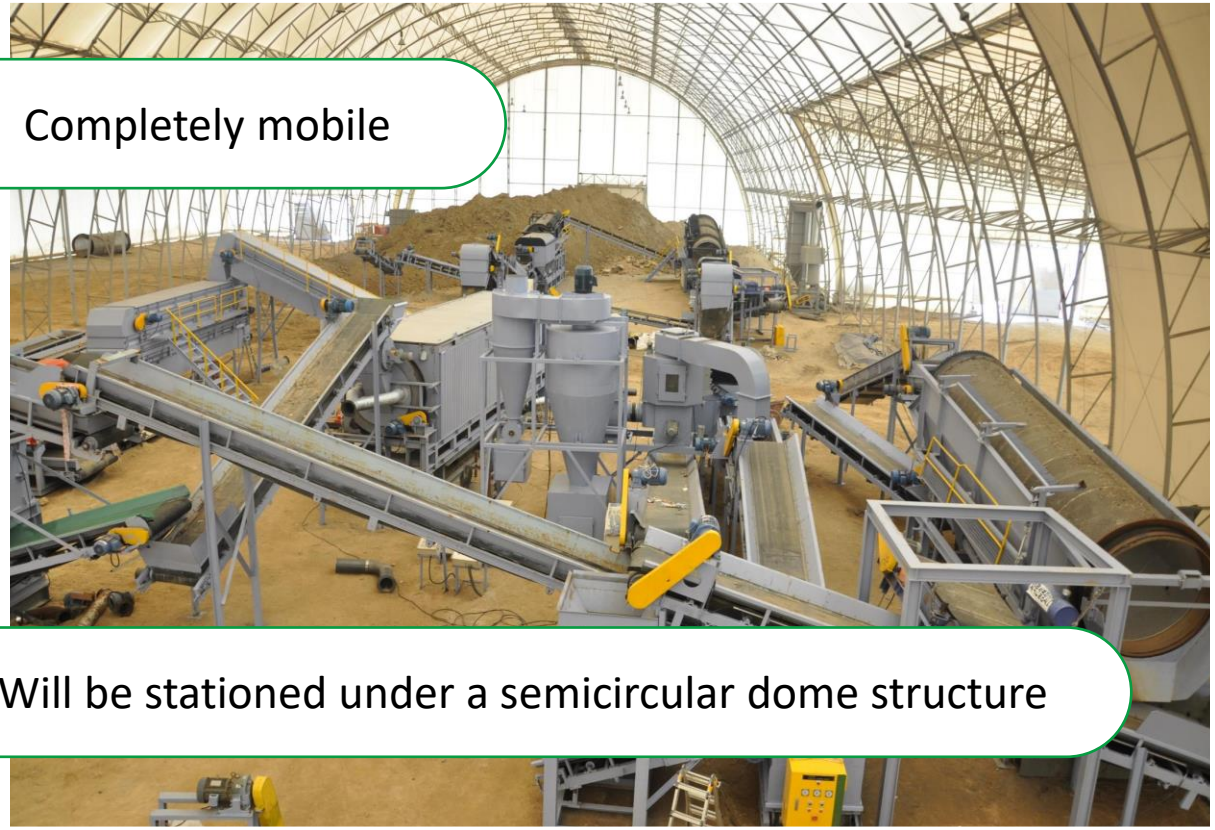
- Completely mobile
- Semicircular dome structure
- High capacity
- Scalable with multiple sets of machinery
- 24 patents for machines

Waste is segregated into

- Combustible fractions
- Recyclable fractions- glass & ferrous
- Fine soil- Bio earth
- Coarse Soil and Stones

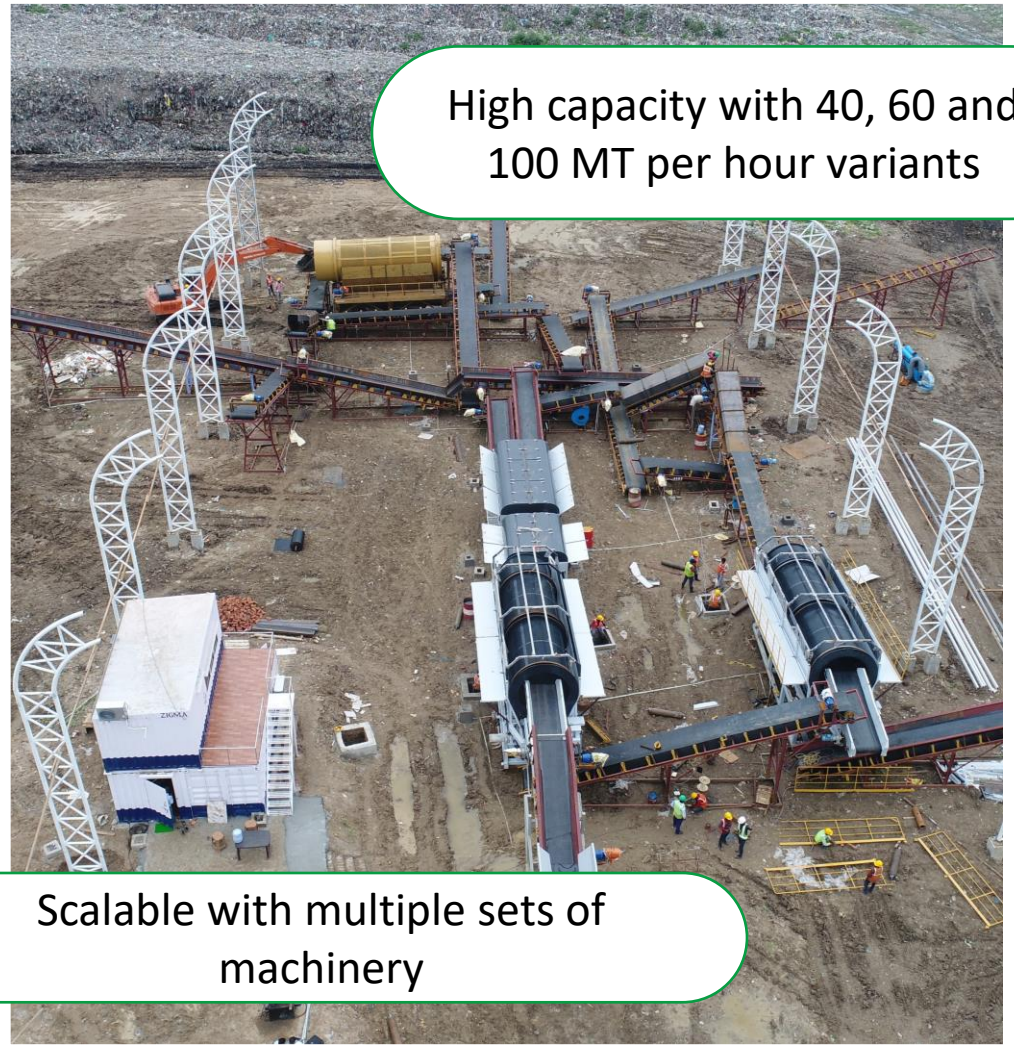
Salient Features

Completely mobile



Will be stationed under a semicircular dome structure

High capacity with 40, 60 and 100 MT per hour variants



Scalable with multiple sets of machinery

24 Patents For Machines

- Air density separators
- Combustible separators
- Tornado separators
- Soil Precision Separators
- Suction devices
- Inclined hopper
- Twin-shaft shredders







4. Responsible Disposal Of Aggregates

Combustible

Shredded and graded into Refuse Derived Fuel to be supplied to Cement companies and Waste to Energy plants.

Fine soil- Bioearth

Used for landscaping, afforestation.

Coarse Soil

Stones

Used for filling up low lying areas.

Iron Scrap

Glass Scrap

Supplied to state registered recyclers.

Adherence of Purity Levels Of Each Fraction

Tests are conducted both internally and externally for all waste streams

Internally

Inert

- % of foreign material by weight
- Electrical Conductivity
- Salinity
- TDS
- Ph

RDF

- Ash content
- Size
- Moisture
- Calorific Value

Externally

Inert

1. pH value
2. Total Nitrogen
3. Total Phosphate
4. Total Potassium
4. C/N ratio
5. Total Organic Carbon
6. Arsenic
7. Mercury
8. Lead
9. Cadmium
10. Chromium
11. Copper
12. Zinc
13. Nickel
14. TCLP
15. Biodegradability

Other Tests

1. Air quality
2. Odor
3. Noise

Various Measures Undertaken

by the company on Transparency, Environment Health and Safety parameters adherence.

01 ERP System

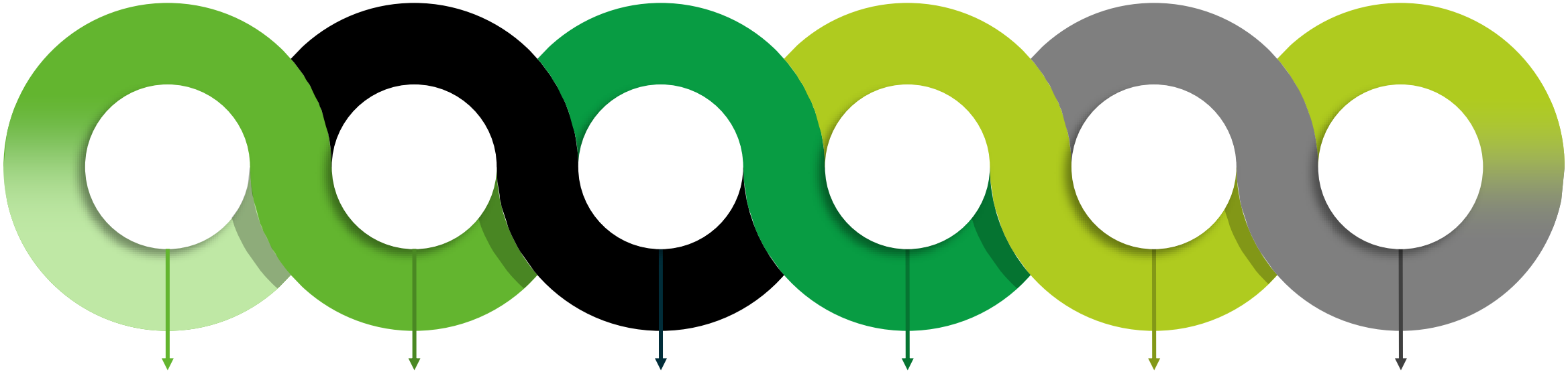
02 Leachate collection and management

03 Dust control

04 Complete Fire Management system and protocol

05 Health and Safety of Employees

ERP System



Completely automatic weigh bridge system

Weighment data entry directly being captured in the ERP System

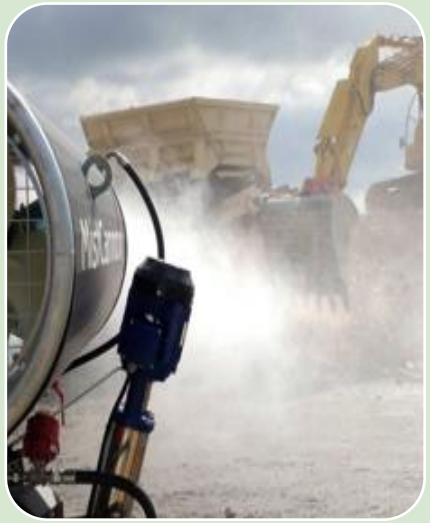
Separate user id and password being provided to the ULB to monitor live data.

RFID tagging and GPS tracking of all vehicles excavating and bringing waste inside

Parallel CCTV and PTZ camera monitoring system with complete backup for project period.

Complete SCADA and PLC system for remote management of operations

Dust Control



Water cannons inside the premises

De-odourant guns during excavation

Spraying of water on pathways

Dome shed

Suction blowers within the system

Complete Fire Management System And Protocol

Fire Management

- Complete Fire management protocol
- Fire extinguishers
- Training for earthmover operators
- Fire accident Incident report
- Fire hydrants

Health and Safety of Employees

Personal Protective Equipment for employees

Safety training

Tool kit discussions

Signages within the plants

Quarterly health checkup for all employees

ZIGMA

http://www.zigma.in/