Executive Summary

1. Introduction of the Project

As per the EIA Notification, 2006, this report presents the Environmental Impact Assessment (EIA) for the proposed Integrated Solid Waste Management (ISWM) project for Thane Municipal Corporation. The population for the year 2023 **is 23,60,777** generating approximately **1,298 TPD** of solid waste. By **2042**, the projected population is expected to reach **34,98,442**, increasing the waste generation accordingly. Over the next **20 years**, the total solid waste to be managed is estimated at **2,319 TPD**, necessitating a well-planned **waste collection, processing, and disposal system** to ensure efficient and sustainable waste management. A total land area of **35 ha.** has been allocated for the project.

At this facility, waste will be weighed, segregated, and processed through material recovery and treatment methods. The remaining residual waste will be **scientifically disposed of in a designated Sanitary Landfill (SLF)**, ensuring environmentally sustainable waste management.

This project aims to enhance solid waste management efficiency, minimize environmental impact, and align with national and state-level waste management regulations.

2. Project Description

2.1. Type of Project

The proposed project falls under Item 7 (i) (Common Municipal Solid Waste Management Facilities) and is a designated project under Schedule and falls under category B due to of the Environment Impact Assessment (EIA) Notification dated September 14th September, 2006 and requires clearance from State Environment Impact Assessment Authority.

The total geographical area of the district is 934 thousand hectares which is 3.11% of the total geographical area of the State. There are 13 talukas i.e. Thane, Vasai, Palghar, Dahanu, Talasari, Jawhar, Mokhada, Wada, Bhiwandi, Shahapur, Murbad, Kalyan and Ulhasnagar in the district.

2.2. Waste Quantity

Waste generation in the year 2042 will be 2,319 TPD. The quantities as well as its composition (biodegradable, recyclables etc.) are required to arrive at proper technology (lies) for waste processing, viz. composting, Bio-methanation (BM), Processing plant and Waste to Energy (WtE) etc.

This increase in waste generation necessitates an efficient **Integrated Solid Waste Management (ISWM) system**, incorporating waste collection, segregation, processing, and scientific disposal at a designated **Sanitary Landfill (SLF)** to minimize environmental impact.

3. Site Setting

The Integrated solid waste management project at Atkoli village, Thane Maharashtra. The site is well connected with Kalyan-sape Road -1.37 km (W), which is further connected to NH-160. The Khadavali Railway Station is 4.63 Km in E direction.

Table 1. Satellite view of the Project Site

Figure 1. Environmental Setting

Sr. No.	Criteria	Criteria distance	Distance and Direction from proposed SLF
1.	Nearest River	100 m	Nearest river is Ulhas River coming from south and passing through east of Project site at a distance of 1310 meters or 1.31 km.
2.	Nearest Pond	200 m	No pond within the 10 km radius of study area.
3.	Nearest Highway	200 m	Nearest highway is NH 160 at a distance of 2830 meters or 2.83 km distance passing from the North of project site.
4.	Nearest Habitation	200 m	Nearest habitation is in Atkoli village at a distance of 390 meters or 0.39 km.
5.	Nearest Public Parks	200 m	None within 10 km radius study area
6.	Nearest Water Supply Wells	200 m	None within 10 km radius study area.

Sr. No.	Criteria	Criteria distance	Distance and Direction from proposed SLF
7.	Nearest Airports/ Airbase	20 km	The nearest Airport is Chhatrapati Shivaji Maharaj International Airport, Mumbai, at a distance of 50 km in SSW direction.

4. Environment Setting in area

4.1. Land requirement

The Proposed landfill site is located in village Atkoli, Thane Maharashtra. Thane Municipal Corporation has allotted land in Thane to set up integrated solid waste management facility. The total area is 35 Hectares. This location has been selected considering the location advantage, proximity to the city limits, connectivity to nearby city, water availability and manpower availability.

4.2. Baseline Environmental Conditions

The field studies carried out during February 2025–April 2025 for the Environmental Impact Assessment (EIA) study to provide the baseline data for the present environmental scenario within 10 km radius of the proposed site. Data collection survey for the study, which included, geology, hydrology, meteorology, ambient air quality, water quality and soil characteristics, noise level, flora and fauna, land use pattern, demography, amenities and infrastructure was undertaken by the field team of experts and analysis work.

4.2.1. Topography

The project site at Atkoli village, situated within the administrative limits of Thane Municipal Corporation, lies at an average elevation of approximately **26 meters above mean sea level (MSL)**. The topography of the area is characterized by a **gently undulating terrain**, with slight variations in ground levels across the site. Natural surface gradients support the flow of runoff toward adjacent low-lying zones, which helps in effective stormwater management. There are **no steep slopes, escarpments, or major geomorphological constraints**, and the site is not located within a floodplain, waterlogged zone, or any designated ecologically sensitive area. These topographical conditions are considered favourable for infrastructure development, requiring only minimal site grading and filling in certain depressions to achieve a uniform formation level.

4.2.2. Geology

The **geology** of Atkoli village, located in the Thane district of Maharashtra, is primarily influenced by the broader geological framework of the **Deccan Plateau**. The region is underlain predominantly by **Deccan Traps**, which are extensive **basaltic lava flows** of late Cretaceous to early Eocene age. These basalt formations are typically hard, dense, and finely grained, often occurring in multiple horizontal layers separated by thin parting beds of weathered material or red bole.

The basalt in this region generally occurs in two forms:

- **Massive basalt**, which is compact and impermeable, and
- **Vesicular or amygdaloidal basalt**, which contains small cavities that may be filled with secondary minerals like quartz, zeolite, or calcite.

The weathered mantle over the basalt rock, often comprising **lateritic soil or murum**, provides moderate support for civil construction and acts as an aquifer in some areas. Groundwater occurs mostly in weathered and fractured zones of the basalt, and the region is classified under a **moderate groundwater potential zone**.

Overall, the geological conditions of the site are stable and suitable for infrastructure development, with good bearing capacity and low seismic risk, falling under **Seismic Zone III** as per IS 1893:2016 classification.

4.2.3. Geo-hydrology

The **geo-hydrology** of Atkoli village in Thane district is governed by the basaltic geology of the **Deccan Trap formations**, which significantly influences groundwater occurrence, movement, and recharge characteristics.

Groundwater in the area is primarily stored and transmitted through **weathered, fractured, and jointed zones of the basalt rock**. The top weathered layer, typically composed of **murum or lateritic soil**, serves as the unconfined aquifer and supports shallow wells, especially during and immediately after the monsoon season. Below this layer, groundwater occurs in **semi-confined to confined conditions** within deeper fractured and vesicular basalt zones.

Recharge of groundwater takes place mainly through **direct rainfall infiltration**, surface runoff percolation, and in some areas, through man-made structures such as **percolation tanks, check dams, and recharge wells**. The area experiences **moderate groundwater potential**, with the yield of bore wells generally ranging between **1 to 5 liters per second**, depending on the depth and fracture characteristics.

The **depth to water table** typically ranges between **5 to 20 meters below ground level (mbgl)** during pre-monsoon and improves during post-monsoon due to seasonal recharge. The **quality of groundwater** is generally suitable for domestic and agricultural use, though localized variations in hardness and iron content may be observed.

Overall, the geo-hydrological conditions in Atkoli village are considered **moderately favorable** for groundwater development, and sustainable extraction should be guided by site-specific hydrogeological assessments to avoid over-exploitation.

4.2.4. Soil

The soil analysis results are presented in the table above. The results obtained are compared with the standard soil classification as given in Agriculture handbook. Samples collected from the identified locations indicate that the pH value ranges between 5.31 to 7.36 which shows that the soils are neutral in nature. Water Retention Capacity of the soil samples collected were found to be ranging from 40.89 to 44.11% Total Potassium value ranges from 245.2 to 479.35 kg/ha & Total Phosphorous various from 15.23 to 306.88 kg/ha

4.2.5. Ground Water

The ground water analysis of results indicates that:

- pH value ranges from 7.71 to 8.92, which is well within the prescribed standards.
- The TDS ranges between 73 to 771.
- The chlorides were found to be in the range of 27.2 to 225.3 mg/l.
- The sulphates were found to be within the range of 14.4 to 145.8 mg/l

4.2.6. Surface Water

The Surface water analysis of results indicates that:

- pH value ranges from 7.86 to 8.61, which is well within the prescribed standards.
- The TDS ranges between 100 to 1176.
- The chlorides were found to be in the range of 29.8 to 452 mg/l.
- The sulphates were found to be within the range of 15.4 to 285 mg/l

4.2.7. Ambient Air Quality Monitoring

The concentration of PM10 and PM2.5 for all the 10 AAQM stations ranges between 52.3 µg/m^3 to 85.2 µg/m^3 and 22.4 µg/m^3 to 56.2 µg/m^3 respectively. Both PM10 and PM2.5 values are under the prescribed range. As far as the gaseous pollutants SO2 and NO2 are concerned, the SO2 concentrations are in the range of 10.3 µg/m^3 to 22.9 µg/m3, the NO2 concentration in the range of 16.7 µg/m^3 to 28.9 µg/m^3 and the CO concentration in the range of 0.12 µg/m3 to 0.93 µg/m^3 for all the 10 AAQM stations. Hence, the concentration of SO2, NO2 and CO at all 10 AAQM stations are found to be well within the prescribe standards.

4.2.8. Noise Environment

During the baseline study it was seen that in day time noise level varies from 50.2 to 58.3 Leq. dB (A) in day time and in night time 38.0 to 49.5 Leq. dB (A).

4.2.9. Biological Environment

The survey conducted within a ten km radius of the project site revealed findings regarding the Avian, Insect, and Mammalia community in the surveyed area. The survey of plants was limited to the core region due to the rapid assessment and time limitations.

There is no Biosphere Reserve, National Parks, Wildlife Sanctuary, Tiger Reserve and Elephant -Reserve within 10 km radius of the project site.

4.2.10. Socio–Economic Profile of The Area

Based on the interpretation made above, primary survey (interaction with stakeholders, FGD, community consultation and discussion with an influential person of the study area) and secondary sources, the significant observations and gap in the study area poor sanitation and improper drainage system, sanitation, employment and medical facilities are substantial problems seen in the study area.

The Livelihood of most people in the study area depends on labor work, Agriculture, cattle rearing and jobs. Tap water, tube well, hand pump and wells are the sources of drinking water in the study area. The study area also has been reported in general cases of cough and fever.

The people have a mixed opinion about the expansion of a new proposed project. People want employment for local people in the industry. CER activities carried out in village development through the industry. According to villagers, the industry will take proper action to air, water, and noise and land pollution.

The socio-economic study revealed that the youth in the project area is devoid of employment opportunities. They can be a potential source of workers with minimum handholding and vocational education skills, hence Youth empowerment programs through awareness creation about various government schemes, providing

appropriate opportunities with relevance to their qualification and skills, conducting skills inculcating programs etc.

5. Environmental Impact Assessment

5.1. Construction Phase

5.1.1. Water Quality:

The Ulhas River, is the nearest major water body, which is located approximately 1.3 km from the site. During the **construction phase** of the **Integrated Solid Waste Management (ISWM) system**, potential impacts on **water quality** would arise due to **earthwork activities such as excavation, leveling, and site preparation**. These activities would lead to **soil erosion and sediment runoff**, affecting nearby **surface water sources like small streams and springs** that contribute to the local water supply. However, given the **significant distance of 1.3 km**, direct impact on the **Ulhas River** is unlikely.

5.1.2. Quarry Pit Utilization and Landfill Management

The proposed waste management facility is planned at the Atkoli Quarry site, which inherently provides a pit for waste disposal. The quarry will be scientifically converted into an engineered sanitary landfill through development of lined monofill or MSW landfill cells within the pit. Bench terracing of quarry walls will be undertaken to anchor liners and ensure slope stability. The design shall incorporate composite lining systems (compacted clay liner and HDPE geomembrane), leachate collection and treatment facilities, as well as gas extraction and control systems to prevent environmental contamination. Groundwater interception and hydrogeological safeguards will be implemented to mitigate any risk of leachate percolation. Thus, the existing quarry pit will be effectively utilized and scientifically managed as a secure engineered landfill cell in compliance with CPCB/MPCB guidelines.

5.1.2.1. Mitigation Measures

- The quarry pit shall be provided with a composite liner system (compacted clay + HDPE geomembrane) to prevent leachate percolation into the ground.
- Benching of quarry walls shall be carried out to anchor liners and ensure slope stability.
- A leachate collection network with perforated HDPE pipes and sumps shall be installed, and all collected leachate will be treated in an on-site treatment facility.
- Groundwater monitoring wells shall be installed upstream and downstream of the quarry to monitor any potential contamination.
- Landfill gas vents and extraction wells shall be provided to safely collect and flare or utilize methane gas generated from waste decomposition.
- Only stabilized and pre-tested non-hazardous waste shall be disposed in the quarry to minimize risk of odour and leachate contamination.
- Daily soil cover or alternative approved cover material shall be applied over disposed waste to control odour, vectors, and littering.

- Storm water diversion drains shall be constructed around the quarry pit to avoid entry of surface runoff into the landfill area.
- Final capping with multilayer system and vegetative cover shall be provided after closure of each cell to minimize infiltration and enhance site aesthetics.

5.1.3. Air Quality:

During the **construction phase** of the **Integrated Solid Waste Management (ISWM) system** in **Thane Municipal Corporation**, potential impacts on **air quality** would arise due to various site development activities. **Excavation, land clearing, material handling, and vehicular movement** would generate **dust (particulate matter – PM_{10} and $PM_{2.5}$)**, which could temporarily degrade air quality in the immediate vicinity. The movement of **construction vehicles and equipment** would also contribute to **vehicular emissions** such as **carbon monoxide (CO), nitrogen oxides (NO_x), and sulfur dioxide (SO_2)**, though the impact would be minimal due to the small-scale nature of the project.

5.1.4. Noise:

During the **construction phase** of the **Thane Sanitary Landfill Project**, noise pollution will arise from activities such as excavation, material transportation, and heavy machinery operation. Increased noise levels may impact nearby settlements, workers, and local wildlife. To mitigate this, **low-noise equipment** will be used, and machinery will be **regularly maintained**. Construction work will be **restricted to daytime hours (8 AM – 6 PM)** to minimize disturbances, and **temporary noise barriers or green buffers** will be installed in sensitive areas. Workers will be provided with **earplugs and earmuffs**, and **regular noise monitoring** will ensure compliance with CPCB standards, reducing environmental and health impacts.

5.1.5. Labour Camp Issues:

Potential impacts from the workforce and the work camps in all construction areas, will be in terms of additional pressure on land and natural resources. There will be generation of solid and liquid wastes. Additionally, the spontaneous development near the construction camps could create public health risks.

Wastewater from the work camps could cause water quality problems in the adjacent water body. Inappropriate solid waste disposal could lead to the contamination of the soil and surface water body, and the spread of communicable diseases. There shall be proper plan for managing work camps and labour force.

5.1.6. Damage to Physical cultural and archaeological resources:

There is no physical cultural resource within the site and hence this issue is not significant.

5.1.7. Traffic related Impact:

During the **construction phase** of the **Thane Sanitary Landfill Project**, increased movement of **trucks, dumpers, and construction vehicles** may lead to **traffic congestion, road wear, dust emissions, and safety risks** for local commuters. To mitigate this, **route optimization** will be implemented to avoid peak traffic hours, and **designated entry/exit points** will be established to streamline vehicle movement. Regular **watering of roads** will help control dust emissions, and **speed limits** will be enforced to enhance safety. Additionally, proper **signage and traffic management plans** will be in place to minimize disruptions to local roads and communities.

5.2. Operation Phase

As per SWM Rules 2016, only inert material is supposed to be disposed off, however looking to the current situation, the landfill gas generation has been considered. Environmental and social impacts during operation phase of the project are mainly divided into six categories: (1) Impacts from Compost ;(2) impacts from landfill gas emissions ;(3) emissions form the operation of DG set (4) Handling and storage of oil/chemicals and fuels;(5) Handling and disposal of domestic liquid and solid waste;(6) Impact from landfill leachate. These impacts are discussed in detail in following sections.

5.2.1. Impacts from landfill gas

During the **operation phase** of the **Thane Sanitary Landfill Project**, landfill gas emissions, primarily **methane (CH_4), carbon dioxide (CO_2), and trace volatile organic compounds (VOCs)**, may contribute to **air pollution, greenhouse gas effects, and odor nuisances**. Uncontrolled gas accumulation poses **fire and explosion hazards**, while VOCs can impact **air quality and human health**. To mitigate these risks, a **landfill gas collection and flaring system** will be installed to safely capture and burn methane. Additionally, **gas-to-energy recovery systems** will be explored to utilize methane as a renewable energy source. Regular **gas monitoring and venting systems** will ensure compliance with environmental standards and minimize atmospheric pollution.

5.2.2. Spillage and leakage of oil/chemicals:

During the **operation phase** of the **Thane Sanitary Landfill Project**, spillage and leakage of **oil, chemicals, or leachate** from waste processing equipment, vehicles, and storage areas may contaminate **soil and groundwater**. To mitigate this, **designated storage areas with secondary containment**, regular **maintenance of machinery**, and proper **handling protocols** will be implemented. **Spill control kits** will be provided on-site, and workers will be trained in **emergency spill response procedures**. Additionally, **leachate collection and treatment systems** will be maintained to prevent groundwater contamination, ensuring compliance with environmental safety standards.

5.2.3. Discharge of domestic liquid & solid waste

During the **operation phase** of the **Thane Sanitary Landfill Project**, the discharge of **domestic liquid and solid waste** from worker facilities, administrative offices, and on-site activities may lead to **soil and water contamination** if not managed properly. To mitigate this, **septic tanks and soak pits** will be installed for domestic wastewater treatment, and proper **waste segregation and disposal systems** will be implemented for solid waste. Regular **sanitation and waste collection** will be ensured, and biodegradable waste will be composted where feasible. Compliance with **environmental norms** will be maintained to prevent pollution and ensure hygiene at the site.

5.2.4. Leachate from landfill:

During the **operation phase** of the **Thane Sanitary Landfill Project**, **leachate generation** from decomposing waste poses a risk of **groundwater contamination and surface water pollution** if not properly managed. To mitigate this, a **leachate collection and treatment system** will be implemented, including **impermeable landfill liners, drainage layers, and collection sumps**. The collected leachate will be treated through **physico-chemical**

and biological processes before safe disposal or reuse. Regular **monitoring of groundwater quality** and **preventive maintenance** of the leachate management system will ensure compliance with environmental standards and prevent pollution.

5.3. Closure and post closure phase activities

After the landfill reaches its **design capacity**, proper **closure and post-closure** activities would be undertaken to ensure **long-term environmental safety** and prevent contamination.

5.3.1. Closure Phase Activities:

- **Final Capping:** The landfill would be covered with **an impermeable liner, clay, and topsoil** to prevent water infiltration and gas escape.
- **Landscaping & Vegetation:** Native **grass and plants** would be grown to prevent **soil erosion and improve aesthetics**.
- **Leachate & Gas Management:** Existing **leachate collection** and **landfill gas vents** would remain operational to prevent **groundwater contamination and gas buildup**.

5.3.2. Post-Closure Phase Activities:

- **Environmental Monitoring: Groundwater, surface water, and landfill gas emissions** would be regularly monitored for any potential pollution.
- **Maintenance of Capping & Drainage System:** Any **erosion, cracks, or drainage issues** would be inspected and repaired.
- **Restricted Land Use:** The closed landfill would not be used for **construction or deep excavation**, but could be repurposed for **green spaces, solar farms, or recreational use**.
- These measures would ensure **long-term environmental protection** and compliance with **regulatory standards**.

5.4. Community Issues

5.4.1. Breeding of mosquitoes, vectors and flies

This will be an adverse impact, as landfill site will cause risk of breeding.

5.4.2. Littering of waste in residential and commercial area

Littering of waste from the waste transport vehicles may cause nuisance to local public whose houses and shops may be located on the sides to road for transport of garbage vehicles.

5.4.3. Unauthorized entry in landfill

Operation of the landfill site may cause unauthorized entry which may lead to accidents and health impact of intruders.

5.4.4. Increase in disease occurrence rate in local community

Currently there is no significant settlement around the site, however, it may increase after the landfill site is operational. In that case, there will be chances of disease in local people from the impact of landfill. A buffer zone must be developed around siteto prevent local settlement around site.

5.4.5. Social conflict among construction workers and labour camps

Migrated workers may create law and order problems with local community in the area. However, this is not anticipated to be severe issue because there not much settlements at and around site.

5.4.6. Health impact from landfill gas

Unauthorised persons in the landfill site may be exposed to the health impact from landfill gas.

5.4.7. Health and safety of scavengers

Scavenging activity if done in uncontrolled manner without PPEs (Personal Protective Equipment) will cause health and safety concerns for scavengers.

6. Environmental Management Plan

6.1. Environmental Management Plans

Sound environmental management plans will be prepared and implemented tomitigate potential adverse impacts and enhance positive impacts. The EMPs have been developed for the following stages of the plant activities at the site.

- Project preparation stage
- Project construction stage
- Project operation stage
- Plant closure and post closure stage

To support implementation of EMPs, regular monitoring of environment quality(ambient air, Ground water, noise and waste water) will be undertaken by the project developer during construction as well as operation of the plant.

6.2. Institutional Framework for Implementation & Monitoring of Mitigation Measures

Environment Management Plans will be incorporated as key points of discussion in the tender document. Prospective construction contractors will be asked to submit, in their proposal, the implementation response to various requirements of EMPs and health and safety plan along with budget allocation for the same. Selection of the contractor will be influenced by their response to the EMPs and proposed budget. The contractor will be required to implement EMPs as defined in their proposal and approved by project developer.

All the necessary components of EMP and Health and Safety Plan will be operational before starting pre-construction work.

ESMP and Health and Safety Plan for operational stage of the project will largely be taken care of during design and siting of the landfill plant. A few residual plans related to the process like waste handling, handling and storage of fuels, etc. will be implemented under routine activities within operational activities. In order to streamline environmental activities, project will implement environmental management system compatible with ISO-14001 standard. The system will have number of processes monitoring steps vis-à-vis safe and environment friendly operation of the plant.

6.3. Corporate Environment Responsibility (CER)

Under CER notification dated 1st May 2018 the company shall spend Rs. 300 Lakhs. this will fulfil public demand and bring about the overall improvement of the locality and shall be spent for overall development of the locality

and local people. Some of the community developments plans can be considered by the project Developer as part of corporate social responsibility.

7. Conclusion

The **Thane Sanitary Landfill Project** is designed to ensure **scientific waste management** while minimizing environmental impacts. Potential concerns such as **landfill gas emissions, leachate generation, noise, traffic, and spillage risks** will be addressed through **efficient engineering controls, monitoring systems, and mitigation measures**. The project will incorporate **leachate treatment, gas collection, noise barriers, and waste segregation** to ensure compliance with environmental regulations. With proper **operation, monitoring, and mitigation strategies**, the landfill will function as a **sustainable waste management facility**, reducing pollution risks and supporting environmental conservation.