KFW Assisted SMIF -TN III Program

Reclamation of Kodungaiyur Dumping Ground for Greater Chennai Corporation - Environmental and Social Impact Assessment Report

Volume-1

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ACRONYMS

BOD	Biological Oxygen Demand
BC	Backward Class
CMDA.	Chennai Metropolitan Development Authority
COD	Chemical Oxygen Demand
CO	Carbon Monoxide
CPCB	Central Pollution Control Board
CRZ	Coastal Regulation Zone
C&D Waste	Construction and Demolition Waste
DG	Diesel Generator
DFR	Detailed Feasibility Report
DMP	Disaster Management Plan
EA	Environment Assessment
EC	Environment Clearance
ECSMF	Environmental Climate Change Social Management Framework
EHS	Environment Health & Safety
EIA	Environment Impact Assessment
EPA	Environment Protection Agency
EPC	Engineering Procurement and Construction
ERF	Environment Relief Fund
ESMF	Environmental and Social Management Framework
ESMP	Environment Social Management Plan
GCC	Greater Chennai Corporation
GOI	Government of India
HDPE	High Density Polyethylene
KDG	Kodungaiyur Dumping Ground
KLD	Kiloliters per day
LFG	Landfill Gas
LTRIP	Long Term Ragpickers Integration Program
MoEFCC	Ministry of Environment and Forests and Climate Change
MSL	Mean Sea Level
MSW	Municipal Solid Waste
MT	Metric Tons
NABL	National Accreditation Board for Testing and Calibration Laboratories
NAAQS	National Ambient Air Quality Standards
NGOs	National Governmental Organisation
NGT	National Green Tribunal
NOC	No Objection Certificate

NULM	National Urban Livelihood Mission
PIOP	Project Implementation and Operational Plan
PM10	Particulate Matter
PPE	Personal Protective Equipment
PUC	Pollution under Control Certificate
RDF	Refuse Derived Fuel
RSPM	Respirable Suspended Particulate Matter
SBC	Safe Bearing Capacity
SC	Scheduled Caste
SEIAA	State Environment Impact Assessment Authority
SPCB	State Pollution Control Board
SPM	Suspended Particulate Matter
ST	Scheduled Tribe
SPT	Standard Penetration Test
STP	Standard Temperature Pressure
SWM	Solid Waste Management
TANGEDCO	Tamil Nadu Generation & Distribution Corporation Limited
TDS	Total Dissolved Solids
TNPCB	Tamil Nadu Pollution Control Board
TNSUDP	Tamil Nadu Sustainable Urban Development Project
TNUDF	Tamil Nadu Urban Development Fund
TNUIFSL	Tamil Nadu Urban Infrastructure Financial Services
TOR	Terms of Reference
TPD	Tons Per Day
TSDF	Treatment Stabilization and Disposal Facility
ULB	Urban Local Body
UNESCO	United Nations Educational, Scientific and Cultural Organization
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Carbon
WHO	World Health Organization
WTE	Waste to Energy
C&T	Collection & Transportation
CBOs	Community Based Organisation
CSO	Central Statistics Organisation
CSR	Corporate Social Responsibility
DAY - NULM	Deendayal Antyodaya Yojana-National Urban Livelihoods Mission
ECR	East Coast Road
EWS	Economic Weaker Section
HH’s	Households
HIG	High Income Groups
IEC	Information Education & Communication

ISWA	International Solid Waste Association
ITC	Indian Tobacco Corporation
LIG	Low Income Groups
MIG	Middle Income Groups
MIS	Management Information System
NGOs	Non-Government Organisation
PAP	Project Affected Person
PAF	Project Affected Family
RECs	Regional Engagement Committees
RWA	Resident Welfare Association
SDGs	Sustainable Development Goals
SHG	Self Help Groups
TNSCB	Tamil Nadu Slum Clearance Board
TNSUDP	Tamil Nadu Sustainable Urban Development Project
WASH	Water, Sanitation & Hygiene
WECs	Ward Engagement Committees
ZECs	Zonal Engagement Committees
MoHFW	Ministry of Health and Family Welfare, Government of India
WHO	World Health Organization

Table of Content

1 Introduction and Background 12
1.1 Project Location 12
1.2 Kodungaiyur Site At a Glance 12
1.1 Chennai Geographical setting 14
1.2 Chennai Topography 14
1.3 Temperature and Humidity 15
1.4 Rainfall 16
1.5 Soil and Ground Water Table 16
1.6 Drainage pattern of the site 17
1.7 Review of Earlier studies 17
1.8 Need For The Project 18
2 Project Description 19
2.1 Proposed Project 19
2.2 Biomining- various technologies 20
2.2.1 Biomining Process: 21
3 Legal and Regulatory Framework 23
4 Base Line Study: Environmental & Social 35
4.1 Air Monitoring 36
4.2 Surface Water 39
4.3 Ground Water 44
4.4 Leachate Sampling and Analysis 49
4.5 Odour Monitoring 50
4.6 Noise Monitoring 51
4.7 Landfill Gas Sampling and analysis 53
4.8 Conclusion of Environmental Monitoring 53
4.9 Social Impact Assessment 54
4.10 Baseline Socio-economic Survey of Ragpickers 56
4.11 Social Impact & Mitigation Measures 61
5 Impact Assessment and Mitigation measures 64
5.1 Air Environment: 66

5.1.1 Impact on air quality during construction: 66
5.1.2 Impact on Air Quality during operation Phase 66
5.1.3 Mitigation Measures 66
5.2 Noise Environment 67
5.2.1 Impact on Noise Environment during construction phase 67
5.2.2 Impact on Noise Environment during Operation phase 67
5.2.3 Mitigation Measures 67
5.3 Water Environment (Ground and Surface Water) 68
5.3.1 Impacts on water during construction phase 68
5.3.2 Impacts on water during operation phase 68
5.3.3 Mitigation Measures 68
5.4 Ecology 68
5.5 Traffic and Transport 68
5.5.1 Impact during Construction phase 68
5.5.2 Impact during Operation phase 68
5.5.3 Mitigation Measures 69
5.6 Social Impact & Mitigation Measures 69
5.7 Climate resilience for the Project: 71
5.8 Climate Resilience to the Project 72
6 Analysis of Alternatives 75
6.1 Analysis of Alternatives for the Proposed Project: 75
6.1.1 Biomining (Landfill Mining) with Land Reclamation 75
6.1.2 Bio-Reactor Landfill 76
6.1.3 Landfill capping with active gas flaring/extraction system 79
6.2 Analysis of three options 80
6.3 Conclusion on Analysis of Three options 82
7 Environmental AND Social Management Plan 84
7.1 Environmental and Social Management Plan for the proposed Project 85
7.2 Environmental Monitoring Plan for the Proposed Project 113
7.2.1 Baseline Environmental Monitoring 113
7.2.2 Environmental Monitoring during Construction and Operation Phase 114

7.3 DISASTER MANAGEMENT PLAN: 116
7.3.1 Emergency Preparedness Plan 117
7.3.2 Emergency Response 117
7.3.3 Response to injuries 118
7.3.4 Emergency communication 119
7.3.5 Early Warning / Alarm System 119
7.3.6 Emergency Facilities 119
7.4 Cost Estimates for Environmental Monitoring Plan 120
7.5 Environmental & Social Cost of the Project 120
8 Implementation Arrangement and Institutional Mechanism 123
8.1 Implementation and Institutional Arrangements 123
8.2 Monitoring and Evaluation 123
8.3 Grievance Redressal Mechanism 123
9 Stakeholder Engagement Plan 126
9.1 Public disclosure 126
9.2 Public consultation 126
9.3 Grievance Redress Mechanism (GRM) 127
9.4 Stakeholder Engagement Plan 128
9.5 Stakeholders Consultations held During Preparation Stage 131
9.6 Key Findings of Stakeholder Consultations 131

List of Tables

Table 1 Kodungaiyur Site at a glance 13
Table 2: Existing Facilities at Site 19
Table 3: Kodungaiyur Biomining Project Proposed Packages 20
Table 4: National and State Regulations on Environmental, Climate Change and Social 23
Table 5: Other Applicable Permits 34
Table 6: Ambient Air Quality Monitoring at Kodungaiyur site (within site premises) 37
Table 7: Ambient Air Quality Monitoring at Kodungaiyur site (outside site premises) 37
Table 8: Surface water characteristics at Kodungaiyur 39
Table 9: Ground Water characteristics inside Kodungaiyur site 45
Table 10: Ground Water characteristics outside Kodungaiyur site 47
Table 11: Leachate Characteristics at Kodungaiyur site 49

Table 12: Odour Monitoring inside site 51
Table 13: Odour Monitoring outside site 51
Table 14: Noise Monitoring inside and outside Kodungaiyur Site 51
Table 15: Landfill gas Monitoring locations within site 53
Table 16: Summary of Baseline Socio-economic Survey of Ragpickers 62
Table 17: Impact on Environmental setting 64
Table 18:Potential E&S impacts 64
Table 19: Eligible Entitlement & Budget Estimate 69
Table 20: Analysis of various option for Kodungaiyur 80
Table 21: Environmental and Social Management Plan for Biomining 85
Table 22 Cost of Environmental Monitoring per Package 120
Table 23 Environmental Costs that are already included in the Biomining fee 121
Table 24 Total Environmental cost of the Project 121
Table 25: Timeline of Stakeholders Consultations 131

List of Figures

Figure 1: Kodungaiyur Project Area Map 12
Figure 2: KDG nearby Surrounding Area Map 14
Figure 3: Temperature of Chennai City 16
Figure 4: Rainfall Data of Chennai City 16
Figure 5: Hydrology around the dumpsite 17
Figure 6: Kodungaiyur Biomining Project Proposed Biomining Packages 19
Figure 7: Process Flow Chart of Biomining Operations 21
Figure 8: Process Flow Chart of Biomining as per CPCB guidelines 22
Figure 9: Environmental Monitoring Locations within Kodungaiyur site and Outside KDG site 36
Figure 10: Process Flow Chart of Biomining Operations 75
Figure 11: Aerobic Bioreactor Landfill 78
Figure 12: Anaerobic Bioreactor Landfill 78
Figure 13: Aerobic-Anaerobic Bioreactor 79
Figure 14: Typical Capped Activity 79
Figure 15: Sectional diagram of Top cover system 80

List of Annexures

Annexure 1: Environmental and Social Screening Format

Annexure 2: Stakeholders Consultations

Annexure 3: Land use Map

Annexure 4: Proposed Project Layout

Annexure 5: Traffic Management Plan

Annexure 6: List of Ragpickers

Annexure 7: Frequency and Intensity of Tropical Storms in Chennai and Flood Hot Spots

Annexure 8: Analysis of Ambient Air Quality at Kodungaiyur Site

Annexure 9: Analysis of Surface Water Quality at Kodungaiyur Site

Annexure 10: Analysis of Ground Water Quality at Kodungaiyur Site

Annexure 11: Analysis of Leachate Quality at Kodungaiyur site

Annexure 12: Analysis of Noise Quality at Kodungaiyur Site

Annexure 13: Analysis of Odour at Kodungaiyur site

Annexure 14: Old/Legacy Waste Physical and Chemical Analysis Report

Annexure 15: Geo Technical Analysis & SBC Report of Kodungaiyur site

Annexure 16: Quotation for Environmental Monitoring of the Project.

Annexure 17: Quotation for Leachate Treatment Plant

Annexure 18: Heavy Metal Analysis report

Annexure 19: Labour Management Plan Template

Annexure 20: Indicative LTRIP Structure

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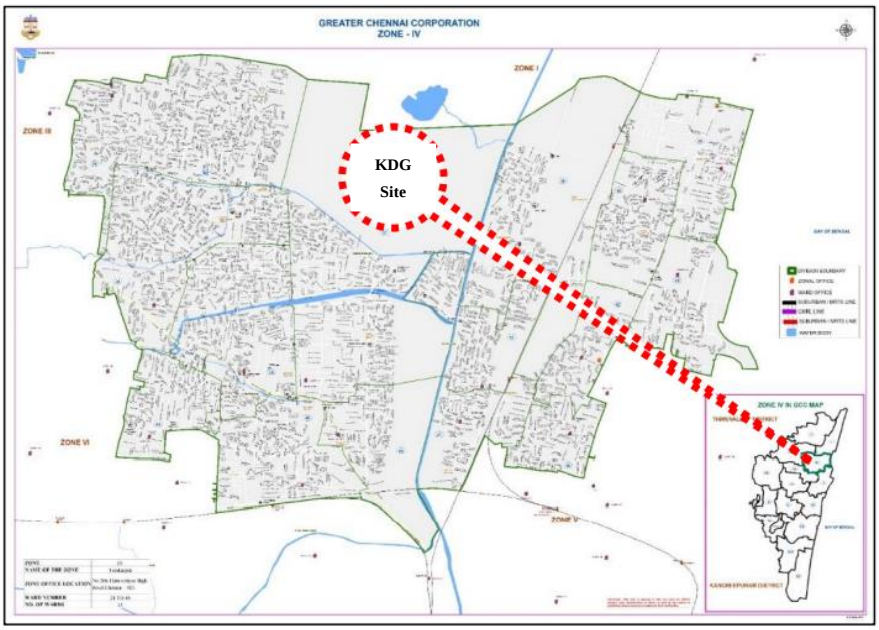
1 INTRODUCTION AND BACKGROUND

1.1 PROJECT LOCATION

The Project Location is Kodungaiyur Dumping Ground (KDG) which is a controlled waste dumping ground. KDG is located at the Northern part of Chennai city and this dumping ground is in operation since early 1980. The site is spread over an area of 342.91 acres.

Figure 1: Kodungaiyur Project Area Map



1.2 KODUNGAIYUR SITE AT A GLANCE

a) The Kodungaiyur dumping Ground is located in Zone-4, Ward No:37 of the Greater Chennai Corporation (GCC) Jurisdiction area.

b) The Kodungaiyur Site is low lying area having average of 3-4 metres height from MSL.

c) The site has all weather concrete roads for all weather access of vehicles and site has adequate infrastructure to ensure round the clock and all-weather operation.

d) Because of urbanization, population growth and expansion of Chennai Corporation limits has led to increase in waste generation and subsequent increase of waste quantity being deposited at the dumping ground.

e) The constraints in availability of waste processing facility has led to more dumping of unprocessed waste in at Kodungaiyur dumpsite.

f) The dumping of daily incoming mixed solid waste at Kodungaiyur dump site, involves spreading and levelling of waste followed by covering fresh waste through an inert layer of C&D waste. There is separate designated dumping place for waste from each zone inside the site premises.

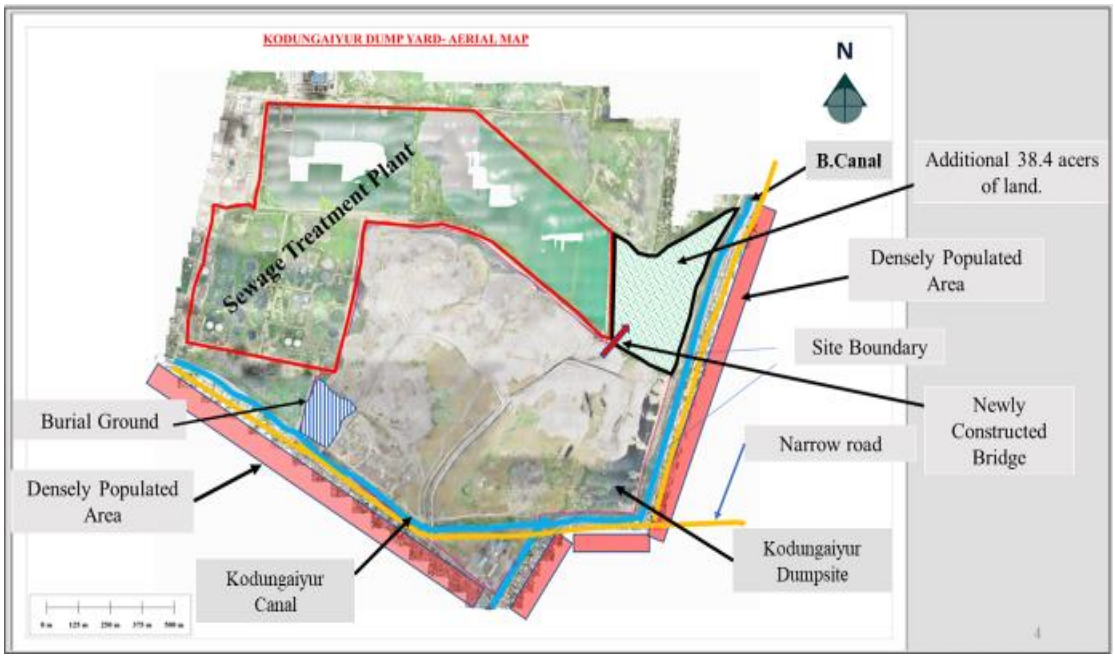
g) For managing the dumping operation, there are seven excavators and four dozers. Out of seven excavators five are owned by GCC and two are owned by private entity. Out of four dozers two are owned by GCC and two by private entity. Due to aging vehicles requires frequent maintenance.

Table 1 Kodungaiyur Site at a glance

S.No.	Particulars	Description
1	Location	Kodungaiyur, Zone-4, Ward No:37
2	Co-ordinates	13° 08'10.36" N; 80°16'06.29" E
3	Elevation	Average of 3-4 from MSL
4	Land use	Industrial cum mixed residential
5	Area (in acres)	342.91
6	Year of Site Start receiving waste	Early 1980
7	Number of years in use	More than 40 years
8	Neighbourhood	Within 100 meters.
9	Daily Waste disposed (MT)	2000 – 2200
10	General site surrounding	Kodungaiyur Canal is situated inside the site measuring 1.07 km. Kodungaiyur STP is situated adjacent to the site on the western side. Additional area of 38.35 acres is situated on the north eastern side of site. Ezhil Nagar is situated at distance of 40m from eastern side waste boundary. Susila Nagar at distance of 30 m from southern side. Tondiarpet highroad is the main road leading to dumpsite is on the southern side of the site. Buckingham canal runs parallel to site on eastern side.
11	Physical Infrastructure (Site has adequate physical infrastructure to meet present operational requirement of waste dumping)	1. High Mast Light: 07 nos 2. Watch Tower: 05 nos 3. Weigh Bridge: 2 nos 4. CC road: around 3 km 5. Mud Road: around 2 km 6. Under construction road: around 0.6 km 7. Compound Wall: 4.15 km 8. HT lines column inside site: 09 nos 9. Site Admin Office: 01 nos
12	Other Facilites at site	1. 400 TPD Construction and Demolition Waste Plant Processing Area: 15.00 acres 2. 80 TPD Garden Waste Processing plant Area: 1.4 acres 3. 50 TPD Incineration Plant Area: 3.16 acres 4. Proposed Crematorium Area: 9.00 acres 5. E-Rickshaw Charging Station: 0.17 acres 6. Site Office Building: 0.035 acres
13	Manpower at Site	1. Assistant Executive Engineer-01 2. Assistant Engineer-01 3. Conservancy Supervisor: 03

S.No.	Particulars	Description
		4. Conservancy Inspector: 04 5. Conservancy Maistry: 02 6. Permanent Conservancy workers: 28 7. NULM conservancy workers: 27 8. Security: 21 9. Rag Pickers: 327
14	Volume of waste to be till 2 m below road level	73,91,672.98 cubic meter

Figure 2: KDG nearby Surrounding Area Map



1.1 CHENNAI GEOGRAPHICAL SETTING

Chennai, the capital of Tamil Nadu, is located on the Coromandel Coast on the Northern end of the State of Tamil Nadu at 13°5′N 80°16′E. The Greater Chennai Corporation which is the oldest Municipal Corporation in India was established on 29th September 1688, administer the Chennai City. The city stretches along the Coromandel Coast and extends inland. Chennai is the biggest cultural, economic and educational hub in Southern India. The city is well connected by road, air, railway and seaports (Chennai Port is one of the largest artificial ports in India) to major cities as well as many other smaller towns across India.

1.2 CHENNAI TOPOGRAPHY

Chennai is a flat terrain; it rises slightly as the distance from the seashore but the average elevation of the city is not more than 6-7 meters above mean sea-level. Most of the coastal localities are just

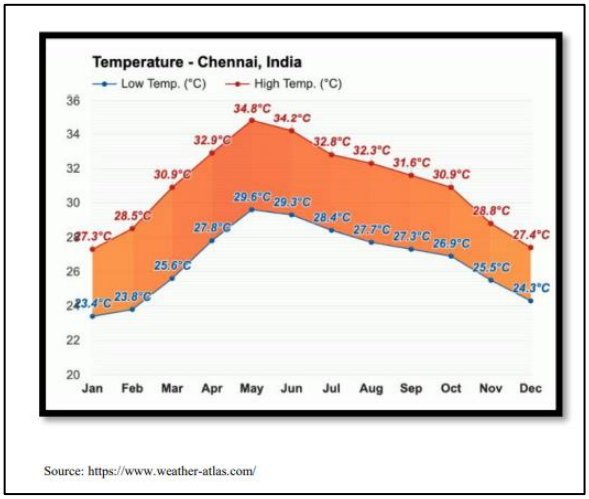
above the sea-level and drainage in such areas remain a serious problem. The even topography of the land throughout the city makes topographical sub-division difficult.

The city is intersected by two streams, viz. Coovam River and the Adyar River. The Coovam River runs through the central part of the city and meets the sea near State Secretariat whereas Adyar River runs through the southern part of the city and enters the sea. The Buckingham canal which runs through the states of Tamil Nadu and Andhra Pradesh is a navigation canal and it almost runs parallel to sea connecting hinterland of state of Tamil Nadu and Andhra Pradesh.

1.3 TEMPERATURE AND HUMIDITY

Chennai has a tropical wet and dry climate. The city lies on eastern coastal line of India and for most of the year, the weather is hot and humid. The hottest part of the year is late May and early June with maximum temperatures hovering around 32-34.8 °C. The coolest part of the year is January, with minimum temperatures around 23-24 °C. The average annual temperature in Chennai is 28.8 °C. The humidity is usually in the range of 65 to 84% and sea breeze in the evening hours is boon to combat the high temperature and humidity during summer months.

Figure 3: Temperature of Chennai City



1.4 RAINFALL

The Northeast monsoon during the months of October, November and December predominantly contributes to rainfall for the city. Most of the precipitation occurs during the cyclones caused due to depressions in Bay of Bengal. The southwest monsoon rainfall is inconsistent and summer rains are negligible.

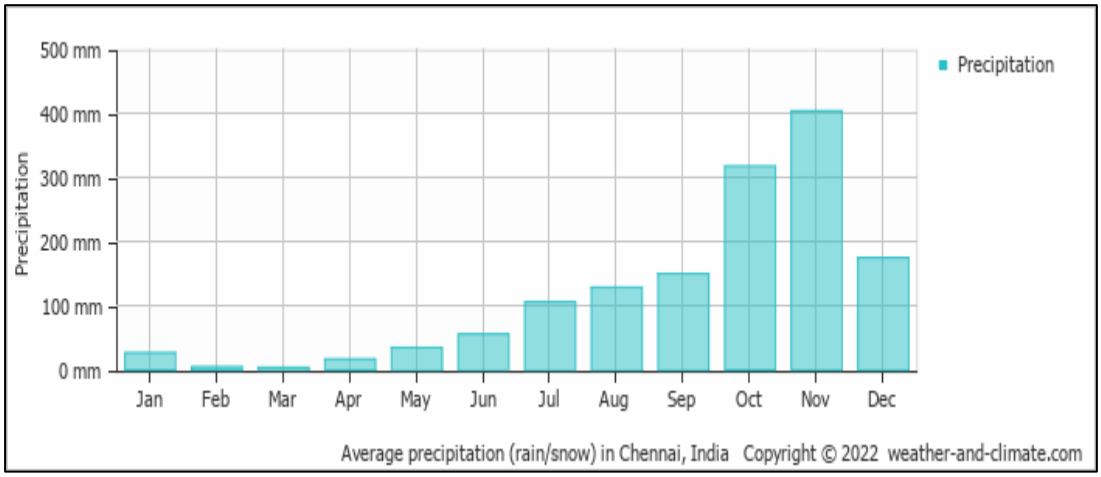


Figure 4: Rainfall Data of Chennai City

1.5 SOIL AND GROUND WATER TABLE

Chennai's soil is mostly clay, shale, and sandstone. Clay underlies most of the city mainly in Manali, Kolathur, Maduravoyal, K. K. Nagar, Semmencherry, Alapakkam, Vyasarpadi and Anna Nagar. Sandy soil areas are found along the river bank and coasts, and include areas such as Tiruvottiyur, George Town, Madhavaram, New Washermanpet, Chepauk, Mylapore, Porur, Adyar, Besant Nagar and Uthandi. In sandy soil areas, rainwater runoff percolates quickly through the soil. Areas having hard rock surface include Guindy, Nanganallur, Pallikaranai, Alandur, Jaladampet, Velachery, Adambakkam and a part of Saidapet and Perungudi. The ground water table in Chennai is at 4-5m

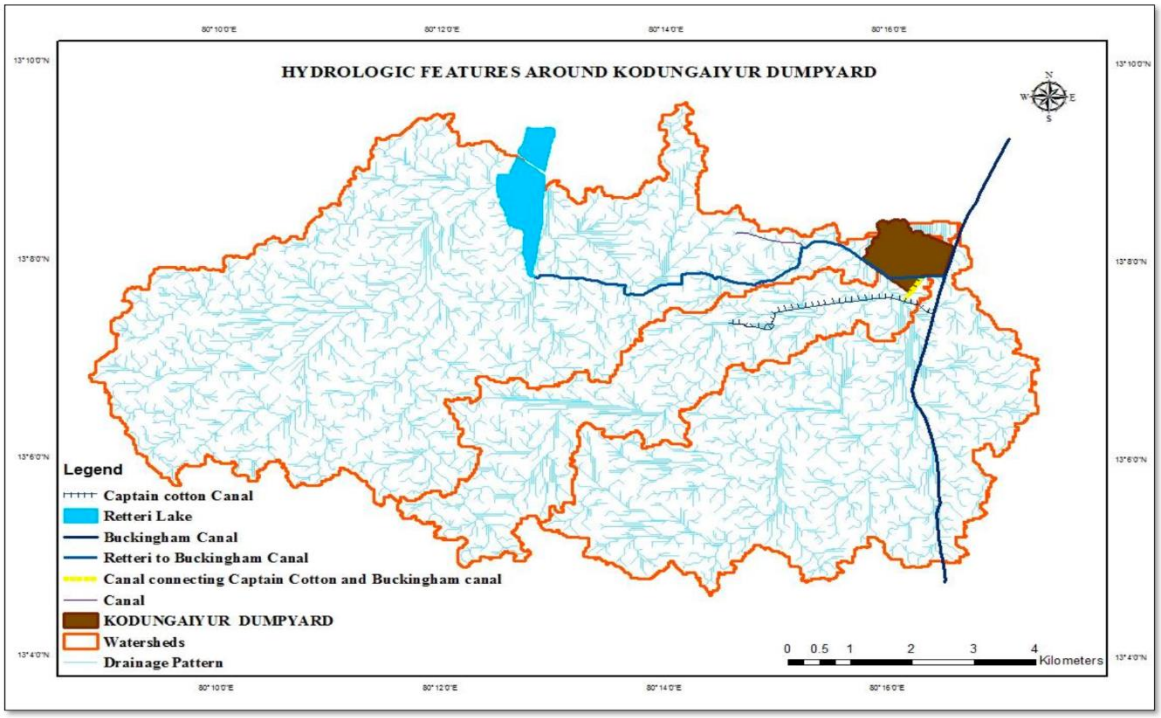
below ground, which has considerably improved, and this ground water level is being maintained through the mandatory rainwater harvesting system.

1.6 DRAINAGE PATTERN OF THE SITE

Kodungaiyur dump yard is surrounded by 2 major canals along with a connective canal and also receives inflow from Retteri Lake.

The Hydrological features associated with Kodungaiyur Dumpsite were identified as Retteri Lake, Buckingham canal, Captain Cotton canal and other connecting canals. Retteri Lake having 127 ha of water spread is in the upstream of Kodungaiyur dumpsite and it is 5.4 Km away from it. The canal connecting Retteri Lake and Buckingham canal is of length 7.87 km flows inside the dump. Another canal with a length of 1.16km was identified which connects both captain cotton and Retteri – Buckingham canal. Captain Cotton canal of length 3.74 km runs on the southern part of dumpsite and mixes with the Buckingham canal. Canal connecting Retteri Lake, Buckingham canal and Captain Cotton canal are interlinked before mixing with Buckingham canal and it is 0.5 km away from it. Watershed delineation gives around 8550 ha the area of land that drains into Buckingham canal near to the dumpsite. Following figure shows the hydrologic features around the dumpsite.

Figure 5: Hydrology around the dumpsite



Source: TNUIFSL – IIT Madras Report

1.7 REVIEW OF EARLIER STUDIES

During 2016, GCC through TNUIFSL appointed Consultant to prepare DFR and Providing transaction advisory services for development of Integrated Processing Facilites at Kodungaiyur. As part of Integrated Waste Processing facilities Waste to Energy Power Plant, Sanitary Landfill and Piggy Back Engineering Landfill were proposed. The project got approval from Government of

Tamil Nadu during 2019 but the project was shelved because GCC at that time proposed to treat and dispose all the waste in a decentralized manner. Due to this the project didn't come through. Prior to 2016, GCC has also tried to two to three times but the projects didn't succeed.

1.8 NEED FOR THE PROJECT

Greater Chennai Corporation (GCC) generates around 5500 TPD of solid waste, which is being dumped at two sites located at Perungudi & Kodungaiyur. These two sites have been operational for last 30 years and above. Even though GCC has established large number of decentralized processing units for processing of waste, only certain portion of waste is diverted to these units and majority of waste is dumped in Kodungaiyur and Perungudi. In order to process the remaining waste GCC doesn't not have any additional land for development of centralized processing facility. So, GCC decided to reclaim the already existing dump sites at Kodungaiyur and Perungudi to establish processing facilities.

Out of two dump sites, the Land reclamation at Perungudi dump site has already commenced in the year 2021 and the entire site will be reclaimed by the year 2023 after which the reclaimed land will be used for establishment of processing facilities and development of allied social infrastructure facilities. Similarly GCC decided to redevelop the land at Kodungaiyur dump site by biomining and create the processing facilities to process fresh incoming waste.

As per the SWM Rule 2016, [Clause 15, Proviso ZJ] GCC is required to do the bio-mining or bioremediation of the existing dump site. It is worth mentioning that the biomining or bioremediation was slated to be completed by year 2021 but the reclamation process got delayed by two years due to Covid-19. Hence the project needs urgent implementation. Also on the reclaimed land GCC intends to establish an Integrated Processing Facility to process the fresh incoming waste for 20 years of project horizon at Kodungaiyur site.

2 PROJECT DESCRIPTION

2.1 PROPOSED PROJECT

(a) The project site at Kodungaiyur is located on Zone-4 Ward No: 37 of the GCC administered area. The total extent of land is 342.91 acres.

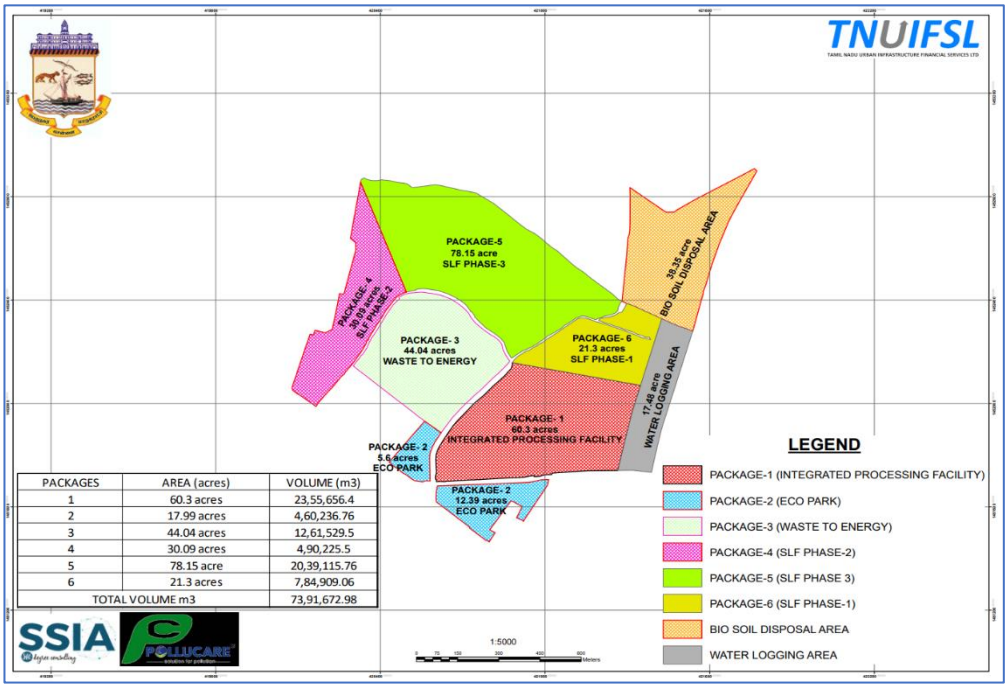


Figure 6: Kodungaiyur Biomining Project Proposed Biomining Packages

Table 2: Existing Facilities at Site

S.no	Type of Facility	Area (in acres)
1	Biomining Packages Area	251.90
2	Bio Soil Storage Area	38.25
3	Existing C&D waste Processing plant	15.34
4	Existing Garden waste processing plant	1.44
5	Existing Incinerator Plant	3.16
6	Other infra like Site office, weighbridge, e-rickshaw charging station	0.5
7	Internal Roads within site	14.23
8	Low lying area	18.09
	Total	**342.91**

(b) The proposed project involves the reclamation of land through biomining upto 2 meters below the road surface level. Post biomining the land will developed into processing facilities for processing and disposal of fresh waste.

(c) It is proposed to implement this project under EPC basis. And The proposed project is divided into 6 packages. The Proposed project Packages along with area, quantity to be biomined are provided in the table below

Table 3: Kodungaiyur Biomining Project Proposed Packages

S. No.	Proposed Packages at Kodungaiyur Dump Site	Waste Volume (cubic metres)	Waste Quantity (MT) @ density of 900 kg/cubic meter	Area (Acres)	Land belongs to
1	Package 1	23,55,656.40	21,20,090.76	60.31	GCC
2	Package 2	4,60,236.76	4,14,213.08	17.99	GCC
3	Package 3	12,61,529.50	11,35,376.55	44.04	GCC
4	Package 4	4,90,225.50	4,41,202.95	30.09	GCC
5	Package 5	20,39,115.76	18,35,204.18	78.15	GCC
6	Package 6	7,84,909.06	7,06,418.15	21.32	GCC
	Total	**73,91,672.98**	**66,52,505.68**	**251.90**	GCC

(d) Even though the biomining project is divided into six packages, the location of all the six packages are at only one site/single location which is Kodungaiyur Dump site. Out of the total 342.91 acres, around 252.00 acres will be reclaimed by Biomining. The remaining area consists of Bio-soil storage area, existing C&D waste processing plant, garden waste processing plants, road etc. The entire land statement of KDG site is given below

(e) As this project is being implemented under Turnkey (EPC) mode , the components will vary according to the contractors design, however the following are the generic components of the project and each of the packages will have a minimum 3 sets of

(i) Trommel

(ii) Electro- mechanical installations

(iii) Windrow Area

(iv) Leachate Management system with 100% scientific disposal in compliance with relevant rules and regulations

(v) Movable Equipment & Vehicles (Excavators & Loaders)

2.2 BIOMINING- VARIOUS TECHNOLOGIES

Biomining is the most common method followed in India for Land Reclamation. The Main reason for Indian Cities opting for Biomining is that most of the cities are devoid of new land for development of processing facilities for fresh waste and for future generated waste. Hence the option of Biomining is used most commonly in India. After the completion of Biomining, the Indian cities are able to reclaim maximum of 70-80% of land which can be used for creation of processing facilities for future generated waste.

2.2.1 BIOMINING PROCESS:

(a) Biomining typically consists of three basic operations: excavating & stabilization of waste, processing/sieving the excavated material, and managing/recycling/selling/reuse/co-processing the excavated or processed material/output. Waste is first excavated using equipment commonly employed in surface mining operations such as a backhoe or a hydraulic excavator. The excavated waste can be sieved to meet several objectives, including separating bulky materials, sorting hazardous material and other unidentified waste, screening soils from waste, and sorting materials for recycling or use as fuel. Several common mechanical processes (such as magnets for ferrous metal and eddy current separators for aluminium) can be used to separate recyclable materials.

(b) The landfill/dumpsite is converted into equisized windrows and applied with bio-culture and deodorizer. The windrows are then turned continuously ensuring equal exposure of bio culture and the waste is completely stabilized. The stabilized waste shall then be excavated and fed into the trommel and conveyor segregation system. The segregation system using its various processes segregates the material into (a) Combustible Fractions (b) Non-combustible fine fraction (c) Non-combustible coarse fraction (d) Glass scrap (e) Metal scraps. The aggregates/products are responsibly disposed in compliance to SWM Rules 2016, CPHEEO Guidelines 2016 for MSWM and CPCB Guidelines for Legacy Waste Management 2019.

Figure 7: Process Flow Chart of Biomining Operations

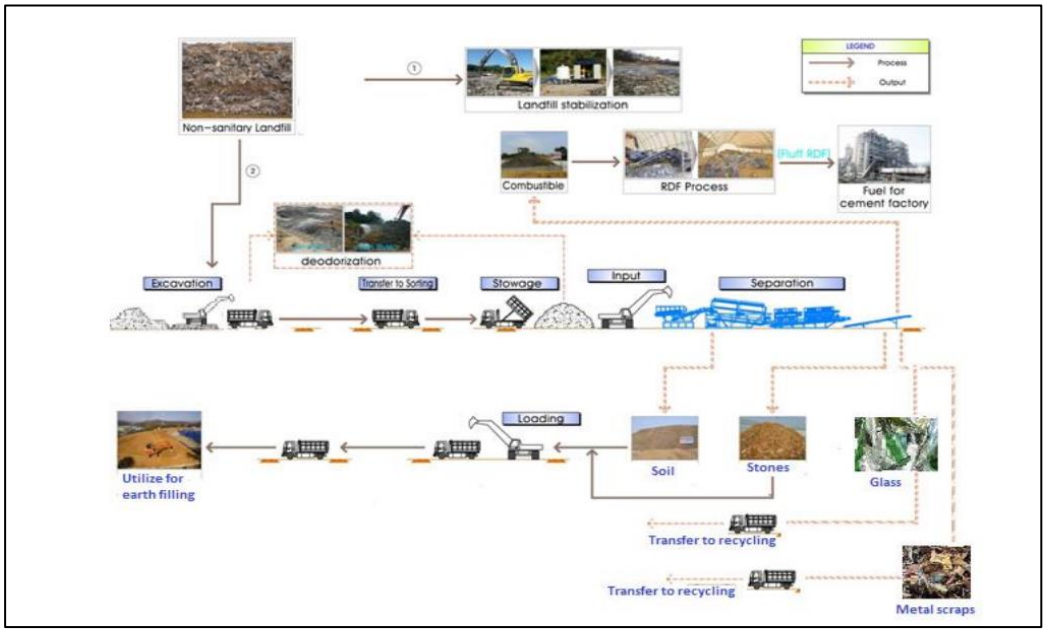
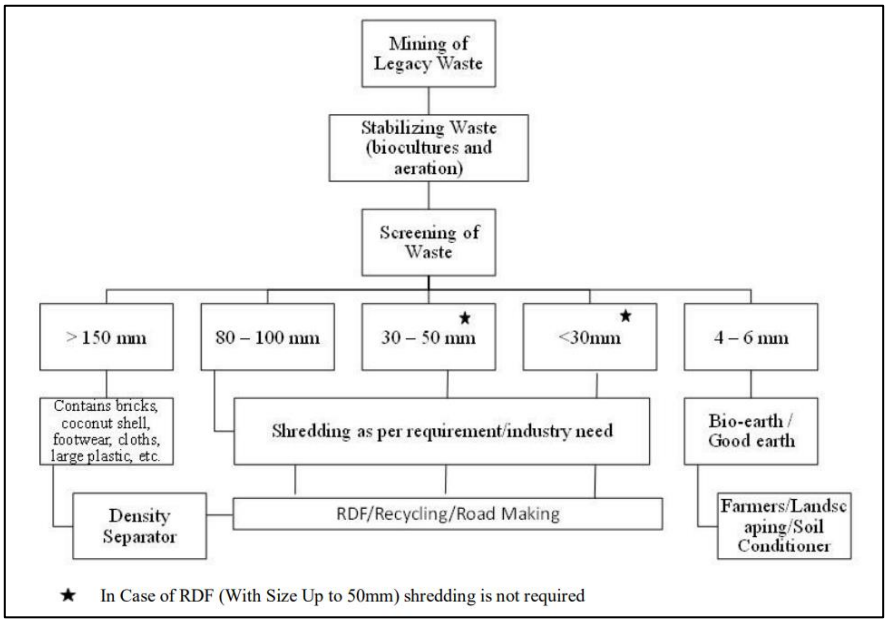


Figure 8: Process Flow Chart of Biomining as per CPCB guidelines



(c) In addition, bio-mining can be used as a measure to remediate poorly designed or improperly operated landfills and to upgrade landfills that do not meet environmental and public health specifications. Material recovery operations associated with Bio-Mining activities undertaken to-date have primarily comprised of soil and metal removal, and, on occasion, the preparation of a refused derived fuel and the replacement and compaction of residual materials back into the landfill.

3 LEGAL AND REGULATORY FRAMEWORK

(a) The objective of the reviewing the legal and regulatory provision is to bring out the legal & policy issues to be addressed in the project at various stages of project development such as project planning, project design, project implementation and project operation. It includes operational policies / directives of the World Bank, sector-specific Environmental Policies & Regulations of the Government of India and Government of Tamil Nadu.

(b) The policy objective is that all the environmental issues and project impacts are mitigated adequately in compliance to applicable legislations and regulations. The clearances /applicable laws required at every stage of project activities has been further discussed below table. Some of the important environmental legislations & safeguard requirements for the different categories applicable to the proposed project packages are discussed below:

Table 4: National and State Regulations on Environmental, Climate Change and Social

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
1	Wildlife Protection Act, 1972	This Act seeks to protect wildlife, by creating protected areas and controlling trade in wildlife products. Project activities that cross over into protected area regimes then requisite permission must be obtained.	Not Applicable for this Project
2	Water (Prevention And Control of Pollution) Act, 1974 and Tamil Nadu Water (Prevention And Control of Pollution) Rules, 1974	These laws seek to control pollution of water and enhance the quality of water. Under this law, it is mandatory to obtain consent for discharge of effluents and pay consent fees to Tamil Nadu State Pollution Control Board (TNPCB) for any municipal projects causing water pollution.	Applicable for this project
3	The Water (Prevention And Control of Pollution) Cess Act, 1977	This Act provides for levy and collection of a cess by local authorities on water consumed by persons or industries to augment resources for Pollution Control Boards.	Applicable for this project
4	Forest (Conservation) Act, 1980	Forest (Conservation) Act, 1980 was enacted to halt rapid deforestation and governments cannot de-reserve forest land or direct that it be used for non-forest purposes.	Not Applicable for this Project
5	Air (Prevention and Control of Pollution) Act 1981 and Tamil Nadu Air (Prevention of	These laws address the prevention and control of air pollution. Under section 21 of this Act, it is mandatory to obtain consent from Pollution Control Board to establish or operate any industrial operation.	Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
	Control of Pollution) Rules 1983		
6	Environment (Protection) Act, 1986	Popularly known as EP Act, it is an umbrella legislation that supplements existing environmental regulations. This law essentially links pollution and natural resource issues.	Applicable for this Project.
7	Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 (MSIHC Rules, 1989)	These rules aim at providing control for the generation, storage and Import of hazardous chemicals. According to these rules, the user of hazardous chemicals has to follow procedures as stipulated in the rules to prevent and control hazards from such chemicals and to ensure safety and permission has to be obtained from the authority concerned for such activity. The list of chemicals and threshold limits of handling falling under the purview of these rules is provided in the schedule to the rules.	Applicable for this Project
8	Hazardous and Other Wastes Management Rules, 2016	This law addresses handling of hazardous and other wastes that fall under specified schedules and necessitates authorisation for such facilities from State Pollution Control Board. Projects attracting these rules will have to follow the guidelines for handling and disposal of hazardous wastes. Measures include storage on a paved surface in a designated area with adequate secondary containment, with adequate labelling and before it is disposed to TNPCB approved vendor.	Applicable for this Project
9	Public Liability Insurance Act, 1991	This act provides for providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith.	Applicable for this project.
10	Bio Medical Waste Management Rules, 2016	This notification by MoEF&CC lays down the method of collection of hospital waste, its transportation and disposal based on scientific methods.	Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
11	Fly Ash Notification, 2021	This notification necessitates use of fly ash for various construction activities like road laying, road and flyover embankments, shoreline protection structures in coastal districts, building construction projects etc within 300 kms from the lignite or coal based thermal power plants.	Not Applicable for this Project.
12	Solid waste Management Rules 2016	This notification by Ministry of Environment and Forest lays down the methods of handling Municipal Solid Waste and its scientific disposal. Establishing a facility for disposal requires authorisation from State Pollution Control Board.	Applicable for this Project.
13	The Noise Pollution (Regulation and Control) Rules, 2000	The ambient air quality standards in respect of noise for different areas/zones namely industrial, commercial, residential or silence areas/zones are specified in the Schedule of these rules. An area comprising not less than 100 metres around hospitals, educational institutions and courts may be declared as silence area/zone as per these rules.	Applicable for this Project.
14	EIA Notification, dt 2006 (S.O.1533(E), dt.14/09/2006) and subsequent amendments	The notification specifies that prior environmental clearance is required for the projects listed in the schedule of the notification before any construction work, or preparation of land by the project management except for securing the land, is started on the project or activity. The Schedule of the notification lists eight broad categories of projects that require prior environmental clearance.	Not Applicable for this Project.
15	Wetlands (Conservation and Management) Rules, 2017	The rules list the wetlands that needs to be protected like those covered under Ramsar Convention, those in UNESCO heritage site, those which are ecologically sensitive etc.	Not Applicable for this Project.
16	The National Green Tribunal Act, 2010	This act provides for establishment of National Green Tribunal for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other	Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
		natural resources including enforcement of any legal right to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental. The National Green Tribunal established under this act is a specialized body equipped with the necessary expertise to handle environmental disputes involving multi-disciplinary issues. The Tribunal shall not be bound by the procedure laid down under the Code of Civil Procedure, 1908, but shall be guided by principles of natural justice.	
17	E-Waste (Management and Handling) Rules, 2016	The rules prescribe procedures for manufacture, collection, dismantling, recycling, and disposal of electronic wastes and requires authorisation of the State Pollution Control Board for the same.	Applicable for this Project.
18	Coastal Regulation Zone (CRZ) Notification, 2019	This notification under Environment (Protection) Act, 1986 supplements the law on site clearance by declaring certain zones as CRZ and regulates activities in these zones. Projects attracting this notification shall obtain CRZ clearance for implementation from the authority as required.	Not applicable for this Project.
19	Plastic waste (Management & handling) Rules 2016	This rules provides for collection, segregation, processing, treatment and disposal of the plastic waste in an environmentally sound manner, restriction on thickness of plastic sheet or like, prohibition on identified use, extended producer responsibility, marking and labelling requirement, registration of manufacturer, producer, importer, brand owner and plastic waste processor, reducing the plastic waste generation.	Applicable for this project.
20	Prohibition of Employment as Manual Scavengers ‘and their Rehabilitation Bill 2012	This act prohibits construction of insanitary latrines and employment or engaging of manual scavenger for the purpose of manual scavenging. No person, local authority or any agency shall, from such date as notified by the State	Not Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
		Government (which shall not be later than one year from the date of commencement of this Act), engage or employ, either directly or indirectly, any person for hazardous cleaning of a sewer or a septic tank.	
20.	National Action Plan on Climate Change	India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change.	Applicable for this Project.
21.	Energy Conservation Act, 2001	Aims to reduce specific energy consumption in different sectors and sets up a specialized Bureau of Energy Efficiency to institutionalize energy efficiency measures, monitoring, and measurement at plant and macro-levels.	Applicable for this Project.
22.	Energy Conservation Building Code (ECBC)	The Energy Conservation Act 2001 that was passed by the Indian Parliament empowered the Central Government to prescribe an Energy Conservation Building Code (ECBC). This code applies to new commercial buildings with a connected load of 100 kW & more or contract demand of 120 kVA or more; Introduces passive design features such as daylight requirements and shading provisions; Introduces provisions of installing Renewable Energy Systems; Sets minimum energy efficiency standards for design and construction; Encourages energy efficient design or retrofit of buildings .	Not Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
21.	The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010	The Rules designate areas within a radius of 100 m and 200 m from the "protected property/ monument/ area" as "prohibited area" and "regulated area" respectively. Hence, no permission for construction of any public projects or any other nature shall be granted in the prohibited areas of the protected monument and protected area In respect of regulated area, the competent authority may grant permission for construction, reconstruction, repair and renovation based on recommendation of the National Monument Authority duly taking note of heritage bye-laws, which shall be prepared in respect of each protected monument and protected areas.	Not relevant. However, in case of chance finds, provisions are applicable.
22.	The Right to Fair Compensation and transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR)	The Act provides for enhanced compensation and assistances measures and adopts a more consultative and participatory approach in dealing with the Project Affected Persons. This act came into effect on 1 January 2014 and the Land Acquisition Act, 1894 stands repealed. The Act lays down procedures for estimating fair compensation of the affected families (and not just the titleholders) due to land acquisition, rehabilitation and resettlement. The Act is notified by the GoTN on 21 September 2017 (G.O. Ms. No. 298, Revenue & Disaster Management (LA-I(1), 20th September 2017).	Not Applicable for this Project.
23.	The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	It grants legal recognition to the rights of traditional forest dwelling communities.	Not Applicable for this Project.
24.	The Child Labour (Prohibition and Regulation) Amendment Act, 2016.	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in	Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
	The Child Labour (Prohibition and Regulation) Act,1986	any workshop wherein any of the processes set forth in Part B of the Schedule. Child can help his family or family enterprise, which is other than any hazardous occupations or processes set forth in the Schedule, after his school hours or during vacations.	
25.	The Occupational Safety, Health And Working Conditions Code, 2020	This code consolidates and amends the laws regulating the Occupational safety and health and working conditions of the persons employed in an establishment. The Act replaces 13 old central labour laws like The Factories Act, 1948, The Building and other Construction Workers Act, 1996, The Mines Act, 1952, The Inter-State Migrant Workmen Act, 1979, etc	Applicable. Stipulations of the code are to be complied with during construction.
26.	Code on Wages, 2019	The Code on Wages seeks to regulate wages & bonus payments in all employments. The code subsumes four existing acts namely, The Equal Remuneration Act, 1976, The Minimum Wages Act, 1948, The Payment of Bonus Act, 1965, The Payment of Wages Act, 1936.	Applicable. Stipulations of the code are to be complied with during construction.
27.	Workmen Compensation Act, 1923.	The Act provides for compensation by the employer to their workmen in case of injury by accident arising out of and during employment.	Applicable.
State Regulations			
28.	Chennai Metropolitan Area Ground water (Regulation) Amendment Act, 2002	This amendment to the original act was made to impose provision of rainwater harvesting in every building either private or government to augment ground water storage in such manner as may be prescribed. The act also mentions that water bodies, including ponds, lakes, tanks and the like, whether public or private should be used only for the purpose of storage of water and not for any other purposes. These provisions are also included in the Panchayats Act and the Municipal Act.	Not Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
29.	The Tamil Nadu Preservation of Private Forest Act, 1949	Guidelines for extraction of trees from non-forest area stipulates that permission for tree cutting shall be taken from State Forest department	Not Applicable for this Project.
30.	The Tamil Nadu Hill Areas (Preservation of Trees) Act, 1955	This Act regulates the cutting of trees and cultivation of land in hill areas of Tamil Nadu, (Coonoor, Kodaikanal, Kotagiri, Ootacamund, Yercaud). Any tree cutting in these areas requires permission from the Committee under this Act.	Not Applicable for this Project.
31.	The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014 and Rules[c] 2015 notified by GOTN.	The Street Vendors Act came into force on March 5, 2014, and seeks to protect the livelihoods of street vendors while regulating street vending. The Act recognizes street vendors of different types including mobile (moving) vendors, stationary (vending from a particular place), natural markets (spaces where buyers and sellers traditionally congregate), vendors with temporary built-up structures, hawkers, peddlers and squatters. It provides for regulation of street vendors, defines the rights and duties of street vendors and requires definition of designated vending zones, issue of certificates of vending and identity cards to street vendors, and proposes vending fees and maintenance charges. Under the Act, each state government is required to define the public purpose for which a street vendor may be evicted and the manner of relocation, manner of giving notice, and provides for a dispute resolution mechanism. As per the Act, planning and regulation of street vending is to be undertaken at town level by the Town Vending Committee. The Act also provides for social audit of the activities of the Town Vending Committee. This act that specifically aims to protect the rights of urban street vendors and to regulate street vending activities. It provides for Survey	Not Applicable for this Project.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
		of street vendors and protection from eviction or relocation; issuance of certificate for vending; provides for rights and obligations of street vendors; development of street vending plans; organizing of capacity building programmes to enable the street vendors to exercise the rights contemplated under this Act; undertake research, education and training programmes to advance knowledge and understanding of the role of the informal sector in the economy, in general and the street vendors, in particular and to raise awareness.	
32.	State Green Committee/District Green Committee	To consider the cutting of trees in public places and public offices. Ref G.O.(Ms).no.38 dated 02.07.2021 of the Environmental Climate Change and Forest (FR.13)Department, Government of Tamil Nadu	Not Applicable for this Project.
33.	Occupational, Safety, Health and Working Conditions (Tamil Nadu) Rules 2022.	This draft rules notified on 11.04.2022	Applicable. Stipulations of the code are to be complied with during construction.
34.	Code on Wages (Tamil Nadu) Rules, 2022	This draft rules notified on 11.04.2022	Applicable. Stipulations of the code are to be complied with during construction.
CLIMATE CHANGE			

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
35.	**NATIONAL ACTION PLAN ON CLIMATE CHANGE (30.06.2008)** **TNSAPCC, 31.03.2015**	India is faced with the challenge of sustaining its rapid economic growth while dealing with the global threat of climate change. India, in 2008, has set up National Action plan on climate change (NAPCC) which outlined policies aimed at sustainable growth and dealing with climate change concerns effectively. NAPCC outlines eight national missions to address various adaptation and mitigation measures pertaining to Solar Energy, Enhanced Energy Efficiency, Sustainable Habitat, Water, Sustaining Himalayan Ecosystem, Green India, Sustaining Agriculture, Strategic Knowledge on Climate Change.	Provisions are applicable.
36.	**ENERGY CONSERVATION ACT, 2001**	Aims to reduce specific energy consumption in different sectors, and sets up a specialized Bureau of Energy Efficiency to institutionalize energy efficiency measures, monitoring, and measurement at plant and macro-levels.	Provisions applicable.
37.	**ENERGY CONSERVATION BUILDING CODE:**	The Energy Conservation Act 2001 that was passed by the Indian Parliament, empowered the Central Government to prescribe an Energy Conservation Building Code (ECBC). ECBC was launched in 2007 on a voluntary basis by the Bureau of Energy Efficiency (BEE and was revised in 2017. ECBC sets minimum energy efficiency standards for design and construction encouraging energy efficient design or retrofit of buildings without constraining the building function, comfort, health, or the productivity of the occupants and appropriate regard for economic considerations.	Not Applicable.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
		Mandatory Scope Covers commercial Buildings having their Connected Load of 100kW and above or contract demand 120kVA and above and is ECBC is recommended for all new buildings and additions to existing buildings with the total load exceeding 200KW or 120kVA.	
Safeguard Policies - Multilateral Funding Agencies			
38.	The World Bank's ESF, 2018	The World Bank's Environmental and Social Framework (ESF) sets the World Bank's commitment to sustainable development through a Bank policy and a set of Environmental and Social standards that are designed to support borrowers' projects, with the aim of ending extreme poverty and promoting shared prosperity. The ESF is the key E&S risk management tool which guides the borrowers to identify, assess, mitigate and report on project E&S risks, impacts and mitigation measures ant the effectiveness of their implementation. As per the guiding principles of the ESF, all projects funded by the World Bank require the borrowers to – (a) achieve compliance with all applicable federal/national, state and local laws and regulations related to environmental and social matters;(b) General and relevant sector-specific IFC EHS guidelines (e.g. EHS Guideline for Waste Management facilities) are applicable as well and (c) meet the requirements of the Environmental and Social Standards (ESS) outlined in the World Bank's Environmental and Social Framework (ESF).	Applicable to the project. Accordingly, the project is evaluated against the E&S Standards and National Government Regulations are followed. This ESIA & ESMP with SEP and GRM has been prepared.
39.	KFW's Sustainability Guideline (SG) Assessment and Management of	The SG of KfW describes principles and procedures to assess the environmental, social and climate impacts during the preparation of FC measures financed by KfW. Objective of the	Applicable for the sub-project and compliance to be ensured during implementation.

S.no	Acts/ Rules/ Regulations	Description	Relevance to sub-project
	Environmental, Social and Climate Aspects: Principles and Procedures, February 2022	guidelines is to define a common binding framework to incorporate environmental, social and climate standards into the planning, appraisal, implementation, and monitoring of FC measures and to enhance transparency, predictability and accountability in the decision-making processes of the internal environmental and social due diligence (ESDD) and climate mainstreaming. According to SG,WB ESS & ILO standards are applicable and are to be complied with; relevant sector-specific WB Group EHS Guidelines (e.g. Waste Management)	

(c) List of Other Applicable permits: Following table captures the list of other applicable permits required for the project

Table 5: Other Applicable Permits

Sl. No.	PERMIT	Responsibility
1	TNPCB Clearance for the Project (Authorization letter)	Greater Chennai Corporation
2	Electricity Connection during construction and operation of Biomining Project.	Greater Chennai Corporation
3	Permanent driving license for vehicles	Contractor
4	Vehicle Registration	Contractor
5	Fitness Certificate	Contractor
6	Pollution Under Control (PUC) Certificates	Contractor
7	Labour Compliances/Licenses	Contractor
8	Medical Examination	Contractor
9	Fire safety equipment	Contractor
10	Insurance of Vehicles	Contractor
11	Industrial Set-up Approval	Contractor

4 BASE LINE STUDY: ENVIRONMENTAL & SOCIAL

Base Line Environmental Monitoring was done in order to study the impacts caused by Kodungaiyur dump yard to the environmental parameter like air, water (ground and surface), noise, leachate both within site and outside side premises.

The details of baseline Environmental Monitoring carried out for Kodungaiyur are as below:

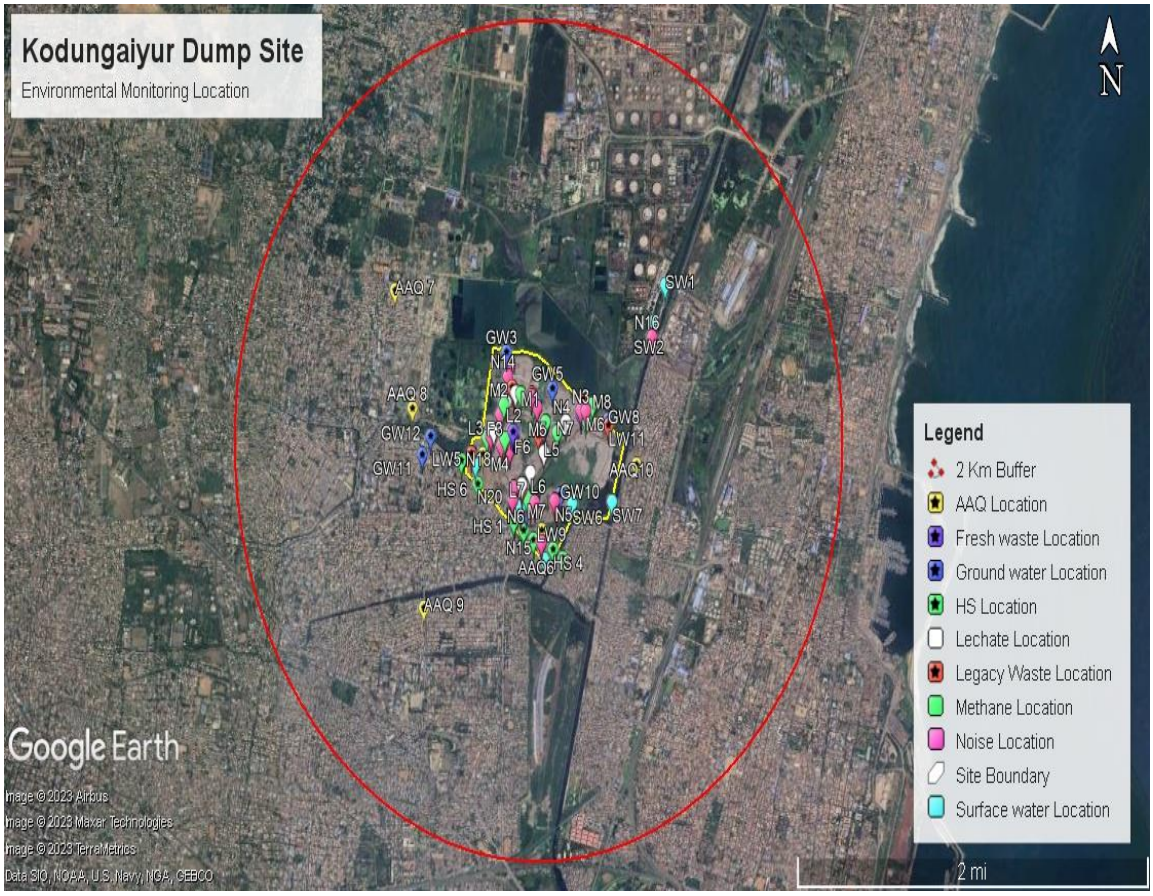
S.no	Type of Monitoring	Inside Site	Outside Site	Total Locations
1	Ambient Air Quality (AAQ)	04	07	11
2	Ground Water	10	05	15
3	Surface Water	02	05	07
4	Noise	17	05	22
5	Leachate	07	nil	07
6	Odour	10	07	17
7	Landfill Gas	10	nil	10

The overall monitoring locations inside and outside site are indicated in the Figure 9

Environmental Monitoring was performed during the month of March, April and May 2022 to assess the baseline.

Sampling was done as per guidelines provided by CPCB and timing, frequency and methodologies were finalized in consultation with GCC and TNUIFSL. Results of various environmental parameters is discussed in the subsequent sections.

Figure 9: Environmental Monitoring Locations within Kodungaiyur site and Outside KDG site



4.1 AIR MONITORING

(a) Ambient Air Quality Monitoring was done both within dumpsite and outside dumpsite. For outside monitoring the samples were taken within 1 km radius. Within site the AAQ was done at four locations with site and outside site the sampling was done at seven locations. For all the AAQ monitoring locations the sampling waste done for 24 hours. Post sampling the results obtained were compared with National Ambient Air Quality Standards (NAAQS) for Industrial, Residential, Rural and Other Area and also with WHO norms for Air Quality Standards.

(b) Results indicate that Particulate Matter Size Less than 10 µm and 2.5 are found to be on the higher side at all the locations within the site on comparison with WHO norms. The main reason for the higher value is due to frequent vehicles movement within the dump site on mud roads and damaged roads which emits larger quantity of dust into the atmosphere thereby increasing the concentration of PM 10 and 2.5 . Another reason for increased value can be attributed to dumping of C&D waste which is used as a covering layer on fresh incoming MSW and also due to functioning of C&D waste processing plant. The rest other parameters were found to be well within the prescribed limits. Since this site was used as dumpsite for many years the PM 10 and 2.5 are on the higher side. Once the land is reclaimed through biomining there will significant reduction in PM 10 and further 2.5 will also reduce once the processing facilities

starts operational in the reclaimed land. Monitoring locations were set up outside the site premises to predict the impact of dump site on surrounding environment. Results indicate that P.M 10 & 2.5 are exceeding the WHO limits which is due to frequent vehicle movement outside site premises (commercial and public movement in vehicles). Rest of parameters are within the limits.

Table 6: Ambient Air Quality Monitoring at Kodungaiyur site (within site premises)

S.no	Parameters	unit	Near site office (cross wind)	Incinerator Plant (downwind)	C&D plant (upwind)	Near weigh bridge (downwind)	NAAQS standards for Industrial, Residential, Rural and Other Area	Air Quality Guidelines as per WHO
1	Sulphur dioxide (as SO_2)	µg/m3	11.9	9.74	11.2	10.6	**80 for 24 hrs**	**40 for 24 hrs**
2	Oxides of Nitrogen (as No_x)	µg/m3	21.4	20.1	18.9	19.8	**80 for 24 hrs**	**25 for 24 hrs**
3	Respirable Particulate Matter (PM_{10})	µg/m3	**102**	**117**	**127**	**91.7**	**100 for 24 hrs**	**45 for 24 hrs**
4	Respirable Particule Matter ($PM_{2.5}$)	µg/m3	51.4	53.9	59.2	49.1	**60 for 24 hrs**	**15 for 24 hrs**
5	Ozone (as O_3)	µg/m3	17.6	16.8	17.2	16.8	**100 for 8 hrs**	**100 for 8 hrs**
6	Lead (as Pb)	µg/m3	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	**1.0 for 24 hrs**	-
7	Carbon Monoxide (as CO)	mg/m3	BDL (DL:1.14)	BDL (DL:1.14)	BDL (DL:1.14)	BDL (DL:1.14)	**2 for 8 hrs**	**4 for 24 hrs**
8	Ammonia (as NH_3)	µg/m3	9.81	9.26	10.2	9.26	**400 for 24 hrs**	-
9	Benzene (as C_6H_6)	µg/m3	BDL(DL: 1.0)	BDL(DL:1. 0)	BDL(DL:1. 0)	BDL(DL:1.0)	**5 (annual)**	-
10	Benzo (a)Pyrene (BaP)	ng/m3	BDL(DL: 1.0)	BDL(DL:1. 0)	BDL(DL:1. 0)	BDL(DL:1.0)	**1 (annual)**	-
11	Arsenic (as As)	ng/m3	BDL(DL: 2.0)	BDL(DL:2. 0)	BDL(DL:2. 0)	BDL(DL:2.0)	**6 (annual)**	-
12	Nickel (as Ni)	ng/m3	BDL(DL: 10)	BDL(DL:10)	BDL(DL:10)	BDL(DL:10)	**20 (annual)**	-

Table 7: Ambient Air Quality Monitoring at Kodungaiyur site (outside site premises)

S.no	Parameters	unit	Thiruthangal Nadar college (upwind)	MKB Nagar Bus Depot (cross wind)	Near CMWSSB STP (upwind)	Near IOCL Factory (cross wind)	NAAQS standards for Industrial, Residential, Rural and Other Area	Air Quality Guidelines as per WHO
1	Sulphur dioxide (as SO_2)	µg/m3	12.4	12.9	13.2	13.5	**80 for 24 hrs**	**40 for 24 hrs**
2	Oxides of Nitrogen (as No_x)	µg/m3	25.6	25.3	23.7	24.9	**80 for 24 hrs**	**25 for 24 hrs**
3	Respirable Particulate	µg/m3	71.9	77.2	73.4	71.5	**100 for 24 hrs**	**45 for 24 hrs**

	Matter (PM_{10})							
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m3	36.0	38.1	35.8	32.7	**60 for 24 hrs**	**15 for 24 hrs**
5	Ozone (as O_3)	µg/m3	13.6	12.7	13.1	13.9	**100 for 8 hrs**	**100 for 8 hrs**
6	Lead (as Pb)	µg/m3	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	**1.0 for 24 hrs**	-
7	Carbon Monoxide (as CO)	mg/m3	BDL (DL:1.14)	BDL (DL:1.14)	BDL (DL:1.14)	BDL (DL:1.14)	**2 for 8 hrs**	**4 for 24 hrs**
8	Ammonia (as NH_3)	µg/m3	6.47	6.33	5.39	7.04	**400 for 24 hrs**	-
9	Benzene (as C_6H_6)	µg/m3	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	**5 (annual)**	-
10	Benzo (a)Pyrene (BaP)	ng/m3	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	**1 (annual)**	-
11	Arsenic (as As)	ng/m3	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	**6 (annual)**	-
12	Nickel (as Ni)	ng/m3	BDL(DL:10)	BDL(DL:10)	BDL(DL:10)	BDL(DL:10)	**20 (annual)**	-

S.no	**Parameters**	**unit**	**Near landfill site (downwind)**	**Ezhil Nagar (downwind)**	**KKD Nagar (downwind)**	**NAAQS standards for Industrial, Residential, Rural and Other Area**	**Air Quality Guidelines as per WHO**
1	Sulphur dioxide (as SO_2)	µg/m3	14.2	14.3	13.7	**80 for 24 hrs**	**40 for 24 hrs**
2	Oxides of Nitrogen (as No_x)	µg/m3	26.3	25.6	24.9	**80 for 24 hrs**	**25 for 24 hrs**
3	Respirable Particulate Matter (PM_{10})	µg/m3	76.8	78.1	77.8	**100 for 24 hrs**	**45 for 24 hrs**
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m3	38.4	31.9	34.2	**60 for 24 hrs**	**15 for 24 hrs**
5	Ozone (as O_3)	µg/m3	14.1	15.6	15.2	**100 for 8 hrs**	**100 for 8 hrs**
6	Lead (as Pb)	µg/m3	BDL (DL:0.05)	BDL (DL:0.05)	BDL (DL:0.05)	**1.0 for 24 hrs**	-
7	Carbon Monoxide (as CO)	mg/m3	BDL (DL:1.14)	BDL (DL:1.14)	BDL (DL:1.14)	**2 for 8 hrs**	**4 for 24 hrs**
8	Ammonia (as NH_3)	µg/m3	6.58	11.70	10.20	**400 for 24 hrs**	-
9	Benzene (as C_6H_6)	µg/m3	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	**5 (annual)**	-
10	Benzo (a)Pyrene (BaP)	ng/m3	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	**1 (annual)**	-
11	Arsenic (as As)	ng/m3	BDL(DL:2.0)	BDL(DL:2.0)	BDL(DL:2.0)	**6 (annual)**	-
12	Nickel (as Ni)	ng/m3	BDL(DL:10)	BDL(DL:10)	BDL(DL:10)	**20 (annual)**	-

4.2 SURFACE WATER

(a) Surface Water samples were taken at five different locations within 500 metres radius of outside site premises and two samples were taken inside the site premises which was near to Kodungaiyur Canal . Results taken from Surface water inside site indicates that parameters like Total Dissolved solids, Chemical Oxygen Demand, Alkalinity, Chlorides, Heavy metals like chromium , lead are exceeding the permissible limits. Faecal coliforms is also exceeding the limits. Based on the results the Kodungaiyur canal water can't be used for any purpose as notified by TNPCB (Class A, Class B, Class C, Class D and Class E) . The main reason for non-acceptable water quality is due to the mixing of leachate into the Kodungaiyur Canal. The leachate generated from the dumpsite is drained into the Kodungaiyur canal thereby causing pollution. To prevent this from happening all the leachate which is generated at Kodungaiyur dump site needs to be collected and treated in compliance with SWM rules 2016.

(b) On analysis of surface water samples outside site premises, results indicate that the Total Dissolved Solids (TDS), Chemical Oxygen Demand (COD), Alkalinity, Chlorides, Heavy metals like chromium , lead and nickel are exceeding the limits including the faecal coliforms. Maximum pollution is observed at the location where Kodungaiyur canal and Captain cotton canal meets one another. Also at upstream of Buckingham canal the pollution level is also high. The junction where the Kodungaiyur canal, captain cotton canal and Buckingham canal meets is also polluted.

(c) The results indicate that all the three surface water bodies i.e. Kodungaiyur canal, Captain Cotton Canal and Buckingham Canal are polluted. Further examination indicate that captain cotton canal and Buckingham canal are already polluted by other polluting sources before the Kodungaiyur canal joins them. This can be inferred from the results obtained from locations number SW-5 and SW-1. From the Kodungaiyur dumpsite point of view the leachate contamination into Kodungaiyur canal needs to be stopped by establishing Leachate Treatment Plant.

(d) To prevent overall surface water pollution, action needs to be taken on: how to prevent pollution of Captain cotton canal and Buckingham canal from other polluting sources.

Table 8: Surface water characteristics at Kodungaiyur

Parameters	Kodungaiyur Canal (SW-3)	Kodungaiyur canal (SW-4)	KDG and captain cotton canal (SW-6)	TNPCB Standards				
				Class A	Class B	Class C	Class D	Class E
Color	50	50	120	10	300	300		
Odour	Septic	Septic	Septic	Unobjectionable				
Turbidity	31.3	14.8	660					
pH Value @ 25 ^{0} C	7.14	7.05	7.09	8.5	8.5	8.5	8.5	8.5
Temperature	27.2	27.4	26.8					
Total Dissolved Solid @ 180^0 C	1372	1391	2166					
Bio Chemical Oxygen Demand (27^0 C For 3 Days)	69.2	54	373	2	3	3		
Chemical Oxygen Demand (COD)	230	177	1245					
Dissolved Oxygen (Do)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	6.0	5.0	4	4	
Calcium (as Ca)	126	122	130					
Chlorides (as CI)	362	327	372	250		600		600
Copper (as Cu)	0.04	0.02	1.27	1.5		1.5		
Iron (as Fe)	6.37	3.06	62.3	0.3		50		
Magnesium (as Mg)	48.5	43.4	48.5	100		50		
Potassium (as k)	29.3	20.6	21.8					
Nitrate (as NO_3)	14.6	16.3	16.5	20		50		
Phenolic Compound (as C_6H_5OH)	BDL (DL:0.0001)	BDL (DL:0.0001)	BDL (DL:0.0001)	0.005	0.005	0.005		
Sulphates (as SO_4^{-2})	84.9	66.6	187.0	400		400		1000
Pesticides	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)					
Total Alkalinity (as CaCo3)	612	591	686					
Total Hardness (as CaCo3)	515	483	525	300				
Zinc (as Zn)	0.08	0.03	1.67	15		15		
Cadmium (as Cd)	BDL(DL:0.001)	BDL(DL:0.001)	0.18	0.01		0.01		
Cyanide (as CN)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	0.05	0.05	0.05		

Parameters	Kodungaiyur Canal (SW-3)	Kodungaiyur canal (SW-4)	KDG and captain cotton canal (SW-6)	TNPCB Standards				
				Class A	Class B	Class C	Class D	Class E
Lead (as Pb)	22.8	BDL(DL:0.01)	33.8	0.1		0.1		
Mercury (as Hg)	0.03	0.16	0.09	0.001				
Nickel (as Ni)	0.04	0.06	0.31					
Total Arsenic (as As)	BDL(DL:0.001)	0.05	0.06	0.05	0.2	0.2		
Total Chromium (as Cr)	0.24	0.27	1.9					
Faecal Coliform	40	17	22					
Total Coliform	140	80	130	50	500	5000		

Parameters	K. Canal, C. Canal and B. Canal joining location (SW-7)	Captain Cotton Canal (SW-5)	B canal-2 (SW-2)	B.Canal 1 (SW-1)	TNPCB Standards				
					Class A	Class B	Class C	Class D	Class E
Color	90	120	60	70	10	300	300		
Odour	Septic	Disagreeable	Disagreeable	Agreeable	Unobjectionable				
Turbidity	166	162	38.1	54					
pH Value @ 25 ^{0}C	7.02	6.68	7.16	7.7	8.5	8.5	8.5	8.5	8.5
Temperature	27.3	27.1	27.6	28.1					
Total Dissolved Solid @ 180^{0} C	1402	1074	1420	1810					
Bio Chemical Oxygen Demand (27^{0} C For 3 Days)	160	173	55.8	48.9	2	3	3		
Chemical Oxygen Demand (COD)	541	578	185	163					

Parameters	K. Canal, C. Canal and B. Canal joining location (SW-7)	Captain Cotton Canal (SW-5)	B canal-2 (SW-2)	B.Canal 1 (SW-1)	TNPCB Standards				
					Class A	Class B	Class C	Class D	Class E
Dissolved Oxygen (Do)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	6.0	5.0	4	4	
Calcium (as Ca)	126	84.1	117	126					
Chlorides (as CI)	393	288	429	562	250		600		600
Copper (as Cu)	0.22	0.17	0.08	0.06	1.5		1.5		
Iron (as Fe)	15.7	16.9	6.84	11	0.3		50		
Magnesium (as Mg)	56.1	38.3	46	74	100		50		
Potassium (as k)	24.4	37.6	35.7	41.7					
Nitrate (as NO_3)	15.6	18.3	12.6	12.5	20		50		
Phenolic Compound (as C_6H_5OH)	BDL (DL:0.0001)	BDL (DL:0.0001)	BDL (DL:0.0001)	BDL (DL:0.0001)	0.005	0.005	0.005		
Sulphates (as SO_4^{-2})	93.2	81.6	102	155	400		400		1000
Pesticides	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)					
Total Alkalinity (as CaCo3)	612	559	580	610					
Total Hardness (as CaCo3)	546	368	483	620	300				
Zinc (as Zn)	0.23	0.41	0.1	0.07	15		15		
Cadmium (as Cd)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.01		0.01		
Cyanide (as CN)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	0.05	0.05	0.05		
Lead (as Pb)	22.7	11.9	0.41	0.41	0.1		0.1		
Mercury (as Hg)	0.08	0.10	0.21	0.21	0.001				
Nickel (as Ni)	0.07	0.09	0.05	0.05					
Total Arsenic (as As)	0.03	0.03	0.02	0.02	0.05	0.2	0.2		

Parameters	K. Canal, C. Canal and B. Canal joining location (SW-7)	Captain Cotton Canal (SW-5)	B canal-2 (SW-2)	B.Canal 1 (SW-1)	TNPCB Standards				
					Class A	Class B	Class C	Class D	Class E
Total Chromium (as Cr)	0.41	0.28	0.24	0.24					
Faecal Coliform	33	27	17	17					
Total Coliform	110	110	80	80	50	500	5000		

4.3 GROUND WATER

(a) The Ground water monitoring in order to ascertain the groundwater quality in and around the dumpsite. Ground water from 10 locations inside the site was taken and 5 locations outside site which are within 500m radius of the Kodungaiyur site boundary. The water samples analyzed and the results were compared with IS 10500 standard from drinking water and WHO guidelines for drinking water quality.

(b) The ground water inside site is fully polluted. The main reason for pollution is that the leachate from the dumped waste has seeped in to the ground water thereby causing pollution. The leachate contamination into ground water is clearly evident with the higher value of Total Dissolved Solids, Hardness, Chlorides and Alkalinity in ground water samples. Additionally heavy metals like mercury, lead, nickel are also found to be exceeding the limits. The faecal and total coli forms are also found to be higher in ground water. In order to prevent further ground water contamination the leachate generated from the dumpsite should be prevented from entering ground water table. This can be achieved by installing a Leachate treatment plant.

(c) The ground water quality outside the site indicate that at four locations Hardness, TDS, Chlorides, Sulphates and Coliforms are exceeding the permissible limits which means that the ground water needs to be pre-treated before using it for drinking and other non-potable purpose. Pre-treatment usually involves installation of cardon filters, ion exchange filters, membrane treatment (if necessary) for removal of the TDS, hardness and for elimination of coliforms (the water needs to be disinfected before using). The other chemical parameters are found to be within the limits. Ground water at Netaji nagar is highly polluted as most of the chemical parameters are exceeding the permissible limits. This is due to presence of industries near to Netaji Nagar who are disposing effluent without any treatment resulting ground water contamination.

Table 9: Ground Water characteristics inside Kodungaiyur site

S.no	Parameters	L-1	L-2	L-3	L-4	L-5	Permissible limits as per IS 10500 (2012)	Permissible Limit in the absence of alternative source as per IS 10500 (2012)	WHO Guidelines for Drinking water quality
1	Color	90	150	80	90	70	5	15	
2	Turbidity	32.2	19.6	31.1	7.6	9.4	1	5	
3	pH Value @ 25 ^{0} C	7.36	7.33	7.15	7.39	7.06	6.5-8.5	No relaxation	6.5-8.5
4	Total Hardness (as $CaCO_3$)	266	656	599	380	827	200	600	
5	Iron (as Fe)	5.22	1.36	3.63	1.62	4.23	0.3	No relaxation	
6	Chloride (as CI)	521	1919	1521	1082	1848	250	1000	
7	Total Dissolved Solids @1800C	1810	5500	4040	3032	4460	500	2000	
8	Copper (as Cu)	0.03	0.27	0.03	BDL(DL:0.01)	0.07	0.05	1.5	2.0 mg/l
9	Sulphates (as SO_4)	206	657	652	351	769	200	400	
10	Nitrate (as NO_3)	25.3	142.0	25.9	24.9	20.2	45	No relaxation	50 mg/l
11	Phenolic Compound (as C_6H_5OH)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.01)	BDL(DL:0.01)	0.001	0.002	
12	Mercury (as Hg)	9.92	5.78	9.60	10.60	6.40	0.001	No relaxation	6.0 µg/l
13	Cadmium (as Cd)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.003	No relaxation	3.0 µg/l
14	Arsenic (as As)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.01	0.05	10 µg/l
15	Cyanide (as CN)	BDL(DL:0:02)	BDL(DL:0:02)	BDL(DL:0:02)	BDL(DL:0:02)	BDL(DL:0:02)	0.05	No relaxation	
16	Chromium (as Cr^{6+})	BDL(DL:0:03)	BDL(DL:0:03)	BDL(DL:0:03)	0.05	0.14	0.05	No relaxation	50 µg/l
17	Lead (as Pb)	0.32	5.68	7.01	0.95	3.97	0.01	No relaxation	10 µg/l
18	Zinc (as Zn)	BDL(DL:0.01)	0.06	BDL(DL:0.01)	BDL(DL:0.01)	0.02	5	15	

19	Total Alkalinity (as $CaCO_3$)	686	1751	559	475	454	200	600	
20	Nickel (as Ni)	0.03	0.15	0.02	0.02	0.03	0.02	No relaxation	70 µg/l
21	Faecal Coliforms	11	23	13	23	22	Shall not be deductable	Less than 2	Must not be deductable
22	Total Coliform	34	90	80	60	110	Shall not be deductable	Less than 2	Must not be deductable

S.no	Parameters	L-6	L-7	L-8	L-9	L-10	Permissible limits as per IS 10500 (2012)	Permissible Limit in the absence of alternative source as per IS 10500 (2012)	WHO Guidelines for Drinking water quality
1	Color	180	120	160	250	90	5	15	
2	Turbidity	23.5	12.8	19.6	36.8	39	1	5	
3	pH Value @ 25 ^{0}C	7.11	7.01	7.23	7.07	7.38	6.5-8.5	No relaxation	6.5-8.5
4	Total Hardness (as $CaCO_3$)	1425	1615	1386	1785	399	200	600	
5	Iron (as Fe)	4.69	6.19	12.4	26.1	7.34	0.3	No relaxation	
6	Chloride (as CI)	2399	3675	2552	3318	1174	250	1000	
7	Total Dissolved Solids @1800C	6430	9752	6920	9684	2972	500	2000	
8	Copper (as Cu)	BDL(DL:0.01)	0.02	0.02	0.03	BDL(DL:0.01)	0.05	1.5	2.0 mg/l
9	Sulphates (as SO_4)	102	238	272	293	307	200	400	
10	Nitrate (as NO_3)	18.3	24.1	148.0	280	21.8	45	No relaxation	50 mg/l
11	Phenolic Compound (as C_6H_5OH)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.0001)	0.001	0.002	

12	Mercury (as Hg)	0.46	0.58	3.79	4.11	2.52	0.001	No relaxation	6.0 µg/l
13	Cadmium (as Cd)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.003	No relaxation	3.0 µg/l
14	Arsenic (as As)	0.02	0.03	0.11	0.09	0.03	0.01	0.05	10 µg/l
15	Cyanide (as CN)	BDL(DL:0:02)	BDL(DL:0:02)	BDL(DL:0:02)	BDL(DL:0:02)	BDL(DL:0:02)	0.05	No relaxation	
16	Chromium (as Cr^{6+})	0.05	0.07	0.06	0.09	BDL(DL:0:03)	0.05	No relaxation	50 µg/l
17	Lead (as Pb)	1.39	1.17	BDL(DL:0.01)	4.30	2.10	0.01	No relaxation	10 µg/l
18	Zinc (as Zn)	0.02	0.02	BDL(DL:0.01)	0.04	BDL(DL:0.01)	5	15	
19	Total Alkalinity (as $CaCO_3$)	3165	1736	2532	3798	348	200	600	
20	Nickel (as Ni)	0.10	0.19	0.10	0.18	0.02	0.02	No relaxation	70 µg/l
21	Faecal Coliforms	40	50	23	70	17	Shall not be deductable	Less than 2	Must not be deductable
22	Total Coliform	110	170	90	220	50	Shall not be deductable	Less than 2	Must not be deductable

Table 10: Ground Water characteristics outside Kodungaiyur site

S.no	Parameters	Susila Nagar	Abirami Avenue, Kodungaiyur	Meenambal Street, KKD	KKD Nagar Borewell	Netaji nagar Well water	Permissible limits as per IS 10500 (2012)	Permissible Limit in the absence of alternative source as per IS 10500 (2012)	WHO Guidelines for Drinking water quality
1	Color	80	60	10	60	52	5	15	
2	Turbidity	9.5	30.5	5.7	48.6	6.6	1	5	
3	pH Value @ 25 ^{0} C	7.07	7.03	6.79	6.58	6.87	6.5-8.5	No relaxation	6.5-8.5
4	Total Hardness (as $CaCO_3$)	912	789	684	286	2268	200	600	
5	Iron (as Fe)	2.15	0.97	0.98	4.57	0.54	0.3	No relaxation	
6	Chloride (as CI)	444	740	735	128	3829	250	1000	

7	Total Dissolved Solids @1800C	1048	1580	1512	826	10814	500	2000	
8	Copper (as Cu)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	0.05	1.5	2.0 mg/l
9	Sulphates (as SO_4)	175	550	623	66.9	1643	200	400	
10	Nitrate (as NO_3)	20.0	9.64	5.66	6.40	11.7	45	No relaxation	50 mg/l
11	Phenolic Compound (as C_6H_5OH)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.0001)	BDL(DL:0.0001)	0.001	0.002	
12	Mercury (as Hg)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.001	No relaxation	6.0 µg/l
13	Cadmium (as Cd)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	BDL(DL:0.001)	0.003	No relaxation	3.0 µg/l
14	Arsenic (as As)	BDL(DL:0.001)	0.04	0.06	0.02	0.12	0.01	0.05	10 µg/l
15	Cyanide (as CN)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	0.05	No relaxation	
16	Chromium (as Cr^{6+})	BDL(DL:0.03)	BDL(DL:0.03)	BDL(DL:0.03)	BDL(DL:0.03)	BDL(DL:0.03)	0.05	No relaxation	50 µg/l
17	Lead (as Pb)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	0.01	No relaxation	10 µg/l
18	Zinc (as Zn)	0.02	0.04	0.04	0.10	0.15	5	15	
19	Total Alkalinity (as $CaCO_3$)	981	897	443	338	363	200	600	
20	Nickel (as Ni)	0.02	0.02	BDL(DL:0.01)	0.03	0.03	0.02	No relaxation	70 µg/l
21	Faecal Coliforms	13	17	13	17	0	Shall not be deductable	Less than 2	Must not be deductable
22	Total Coliform	40	70	50	20	90	Shall not be deductable	Less than 2	Must not be deductable

4.4 LEACHATE SAMPLING AND ANALYSIS

(a) Leachate sampling was done at seven different locations within the dump site. Since this site is non-engineered low-lying open controlled waste dumping ground and do not have a liner system with leachate collection and treatment system so whatever leachate that is generated is either drained out to Kodungaiyur canal or seeps into the ground water table below site thereby causing both ground water and surface water pollution. On analysis it was found that most of the parameters are higher than the prescribed limits which clearly indicate that the leachate generated should be collected and treated with the help of proper leachate treatment plant, Post treatment treated leachate shall be disposed/used as per Tamil Nadu Pollution Control Board Guidelines and SWM rules 2016.

Table 11: Leachate Characteristics at Kodungaiyur site

Parameters	L-1	L-2	L-3	L-4	Inland surface water	Public sewers	Land disposal
Total Suspended Solids @105^{0}C	124	302	134	1145	100	600	200
Total Dissolved Solid @180^{0}C	8520	10530	6865	13555	2100	2100	2100
pH @ 25 ^{0}C	8.06	8.02	8.12	7.70	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
Ammonical Nitrogen (as N)	597	1004	620	730	50	50	
Total Kjehdahl Nitrogen (as N)	1324	1763	1251	1616	100		
Total Hardness (as $CaCo_3$)	2470	2755	2185	2945			
Bio Chemical Oxygen Demand (27^{0}C For 3 Days)	408	733	302	1501	30	350	100
Chemical Oxygen Demand (COD)	2267	4008	1741	7934	250		
Arsenic (as As)	0.02	0.02	0.02	0.07	0.2	0.2	0.2
Mercury (as Hg)	1.49	2.33	1.75	3.18	0.01	0.01	0.01
Lead (as Pb)	BDL(DL:0.01)	0.03	BDL(DL:0.01)	0.04	0.1	1.0	
Cadmium (as Cd)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	2.0	1.0	
Acidity (as $Caco_3$)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)	BDL(DL:1.0)			
Total Chromium (as Cr)	0.25	0.44	0.17	0.70	2.0	2.0	
Copper (as Cu)	0.19	0.28	0.09	0.23	3.0	3.0	
Zinc (as Zn)	0.14	0.24	0.19	0.37	5.0	15.0	
Total Alkalinity (as $CaCo_3$)	4748	5486	4431	8968			
Nickel (as Ni)	0.18	0.21	0.14	0.24	3.0	3.0	
Iron (as Ni)	6.72	8.60	5.09	7.78			
Manganese (as Mn)	0.35	0.39	0.43	0.5			
Cyanide (as CN)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	0.2	2.0	0.2
Chloride (as CI)	2859	3063	1940	4084	1000	1000	600
Fluoride (as F)	12.8	11.7	22.5	5.16	2	1.5	
Silica (as SiO_2)	1.05	24.1	22.5	80.8			
Sulphate (as SO_4)	214	349	117	1365	50	50	

Phenolic Compounds (as C_6H_5OH)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	1.0	5.0	

Parameters	**L-5**	**L-6**	**L-7**	**Inland surface water**	**Public sewers**	**Land disposal**
Total Suspended Solids @105^{0}C	119	610	103	100	600	200
Total Dissolved Solid @180^{0}C	7175	7585	7855	2100	2100	2100
pH @ 25 ^{0}C	8.24	8.03	8.18	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
Ammonical Nitrogen (as N)	555	1022	626	50	50	
Total Kjehdahl Nitrogen (as N)	1170	1873	1318	100		
Total Hardness (as $CaCo_3$)	2280	2375	2850			
Bio Chemical Oxygen Demand (27^{0}C For 3 Days)	344	711	317	30	350	100
Chemical Oxygen Demand (COD)	2024	3927	1984	250		
Arsenic (as As)	0.02	0.02	0.03	0.2	0.2	0.2
Mercury (as Hg)	1.15	3.43	4.29	0.01	0.01	0.01
Lead (as Pb)	BDL(DL:0.01)	0.04	BDL(DL:0.01)	0.1	1.0	
Cadmium (as Cd)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	2.0	1.0	
Acidity (as $Caco_3$)	BDL(DL:1.0)	BDL(DL:0.01)	BDL(DL:1.0)			
Total Chromium (as Cr)	0.18	BDL(DL:1.0)	0.24	2.0	2.0	
Copper (as Cu)	0.09	0.22	0.09	3.0	3.0	
Zinc (as Zn)	0.09	0.32	0.09	5.0	15.0	
Total Alkalinity (as $CaCo_3$)	4115	5381	4009			
Nickel (as Ni)	0.13	0.21	0.15	3.0	3.0	
Iron (as Ni)	5.02	10.2	3.91			
Manganese (as Mn)	0.40	0.63	0.41			
Cyanide (as CN)	BDL(DL:0.02)	BDL(DL:0.02)	BDL(DL:0.02)	0.2	2.0	0.2
Chloride (as CI)	**2093**	**2552**	**2399**	1000	1000	600
Fluoride (as F)	21.4	1.41	4.69	2	1.5	
Silica (as SiO_2)	71.2	41.0	81.3			
Sulphate (as SO_4)	117	452	225	50	50	
Phenolic Compounds (as C_6H_5OH)	BDL(DL:0.01)	BDL(DL:0.01)	BDL(DL:0.01)	1.0	5.0	

4.5 ODOUR MONITORING

(a) Odour Monitoring was done in order to check the presence of Hydrogen Sulphide (H2S) inside and outside site premises. Inside site the odour monitoring was done at 10 locations and outside site at 7 locations.

(b) Results indicate that Hydrogen sulphide is found to be below detectable limits at all the seven locations outside site. The odor from KDG site is minimal because C&D waste is used as

covering layer for fresh dumped waste there by preventing odor release to atmosphere. On discussion with nearby residents they informed that during summer season the odour nuisance is very minimal but only during the rainy days with high wind speed people encounter odour related problems. Also during waste transportation by compactors odour is encountered which is due to the fresh waste that is transported to KDG is under various stages of decomposition.

(c) Inside site the hydrogen sulphide is also found to be in very minimal concentration, the reason is also indicate above. The results of Hydrogen sulphide inside and outside site premises are mentioned below

Table 12: Odour Monitoring inside site

Parameter	location-1	location-2	location-3	location-4	location-5	location-6	location-7	location-8	location-9	location-10
H2S (ppm)	0.00	3.00	0.50	2.00	0.50	0.00	0.00	0.00	0.00	0.00

Table 13: Odour Monitoring outside site

Parameter	location-1	location-2	location-3	location-4	location-5	location-6	location-7
H2S (ppm)	BDL	BDL	BDL	BDL	BDL	BDL	BDL

4.6 NOISE MONITORING

(a) Noise monitoring was done at total of 22 locations (17 locations within site) and 5 locations outside site. The monitoring was done in order to ascertain the impacts of site operations on nearby surroundings. Results indicate that the noise is within the prescribe CPCB limits and WHO standards .The main reason of low noise level is that at site only dumping and levelling of waste takes place at two three locations of the site. This prevents overcrowding of vehicles at particular location thereby keeping the noise under control. Also in C&D waste processing plant, garden waste processing plant, incinerator plant facility noise emission under control. So the noise is found to be within the permissible limits, within and outside the site.

Table 14: Noise Monitoring inside and outside Kodungaiyur Site

Parameter	location-1	location-2	location-3	location-4	location-5	location-6	location-7	location-8	location-9	location-10
Min	44.0	43.5	44.2	43.7	44.6	45.5	46.1	45.1	44.3	43.4
Max	55.6	55.1	55.8	55.3	56.2	57.1	57.7	56.6	55.8	54.9
Leq	51.8	51.3	52.0	51.5	52.4	53.4	54.0	52.9	52.1	51.2
Day Limit	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)
WHO Limits during day	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB
Min	40.7	41.1	42.1	41.8	42.5	41.6	40.9	33.6	35.6	34.7
Max	44.1	44.5	45.6	45.3	46.0	48.1	44.4	45.1	43.2	42.3
Leq	42.6	43.0	43.9	43.6	44.3	44.4	42.7	41.3	40.3	39.4
Night Limit	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)
WHO Limits during night	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB

Parameter	location-11	location-12	location-13	location-14	location-15	location-16	location-17	location-18	location-19	location-20
Min	42.9	43.6	44.3	45.0	45.3	44.6	45.1	46.8	47.3	46.7
Max	54.4	55.1	55.8	56.5	56.8	56.1	56.6	57.0	57.5	56.9
Leq	50.7	51.4	52.1	52.8	53.1	52.4	52.9	53.7	54.2	53.6
Day Limit	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)	55dB(A)
WHO Limits during day	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB	53 dB
Min	34.4	35.2	35.9	36.8	37.4	36.7	37.4	38.0	37.5	37.9
Max	41.5	42.3	41.6	41.2	41.8	41.1	41.8	42.4	41.9	42.3
Leq	39.2	40.0	39.6	39.8	40.4	39.9	40.6	41.2	40.8	41.2
Night Limit	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)	45dB(A)

WHO Limits during night	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB

4.7 LANDFILL GAS SAMPLING AND ANALYSIS

(a) Landfill gas sampling was done at 10 locations inside site in order to find the concentration of Methane, Carbon Monoxide and Volatile Organic Carbon (VOC). Results indicate that the methane concentration at site is higher at some locations because of dumping of fresh waste. Due to fresh waste dumping the biodegradable fraction of waste starts degrading at the fresh waste dumping locations there by releasing methane and other landfill gases. The locations where the fresh waste dumping is not there and the age of waste is more than two to three years old, the methane generation at these locations is minimal. In location where there is no fresh waste dumping is being carried out and the legacy waste is covered with green cover and there is no methane generation. The methane generation is mainly based on age of the waste. If the waste is fresh, then there is more methane generation but at locations where is dumping is stopped ther is very less to almost zero methane generation because whatever bridgeable fraction of waste is present would gave degraded completely and the methane gas would have escaped into the atmosphere. Similar pattern is observed in case of Carbon Monoxide and Volatile Organic Carbon investigations.

(b) The locations where fresh is being dumped, proper precautionary measures needs to be taken in order to prevent any harmful effects.

Table 15: Landfill gas Monitoring locations within site

Parameter	location-1	location-2	location-3	location-4	location-5	location-6	location-7	location-8	location-9	location-10
Methane (ppm)	1100.00	50250.00	24250.00	5100.00	24750.00	5400.00	0.00	7150.00	23000.00	5150.00
CO (ppm)	0.00	60.00	121.00	204.00	228.00	0.00	0.00	37.00	0.00	0.00
VOC (ppm)	1.10	14.75	65.15	27.40	4.29	1.39	0.00	8.36	5.26	0.95

4.8 CONCLUSION OF ENVIRONMENTAL MONITORING

(a) The results from baseline study indicate the following

(i) The Respirable Particulate Matter (PM 10) is found to exceed the NAAQS limits inside site and rest of the parameters are within the limits.

(ii) The Kodungaiyur canal surface water is polluted due to draining out of leachate into the canal from dumpsite. The other surface water bodies like Buckingham canal and Captain cotton canal are also polluted as the Kodungaiyur canal joins them at different locations. In originality these canals are already polluted before the leachate from Kodungaiyur dumpsite mixes with them. Even after the leachate from dumpsite is prevented by establishing leachate collection and treatment system more efforts needs to be taken from various government bodies in order to prevent pollution of these canals.

(iii) The Ground water quality inside site is contaminated because of leachate percolation into the ground water table. To prevent this from happening proper leachate collection and treatment system at site needs to established. The outside site premises groundwater has higher concentration of chlorides, hardness and coliform content. So before consuming the ground water it requires pre-treatment and disinfection.

(iv) The noise quality inside and outside site premises are found to be within the prescribed CPCB limits.

(v) The leachate generated from the dump is not collected and treatment which has resulted in contamination of water. To prevent this leachate treatment plant needs to be established.

(vi) The H2S concentration which is one of the main source of odour nuisance is found to be very minimal.

(vii) The LFG gases like methane, carbon monoxide and Volatile organic compounds are found to be in higher concentration where there is fresh waste dumping. In locations where the dumping is stopped and age of waste is old then there is very less LFG gas generation.

4.9 SOCIAL IMPACT ASSESSMENT

(a) In the preliminary stage the various stakeholders of the proposed project were identified as follows:

(i) **Ragpickers**: Informal Waste Workers who earn their livelihood by picking and selling recyclable items from the fresh waste being dumped at the project site.

(ii) GCC Workers: Employees of GCC (permanent & contractual) who work at the project site

(iii) Nearby Recyclers: Recyclers having shops in the immediate vicinity of the project site where the ragpickers sell a portion of their recovered items

(iv) Nearby Households / Resident Welfare Associations: Households/ Resident Welfare Associations in the immediate vicinity of the project site

(b) The Social Baseline Survey was conducted in the period March- July 2022 which comprised of the following:

(i) Ragpickers Census Survey

(ii) Focus Group Discussions with Ragpickers

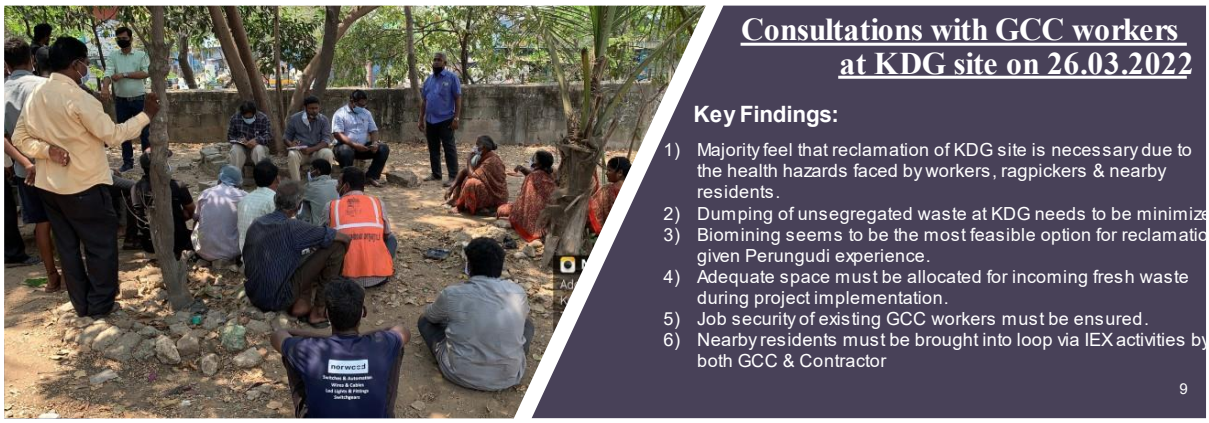
(iii) Focus Group Discussions with GCC Workers

(iv) Focus group Discussions with nearby Resident Welfare Associations

(c) As per the survey results, there are no encroachments in the project site. There are 327 Ragpickers (176 males & 151 females) who access the Project Site for their livelihood. A detailed census survey of the Ragpickers was undertaken and the details are provided in Annexure 6.

(d) There are around 10 shops in the immediate vicinity of the project site where the ragpickers sell a portion of their recovered items.

(e) The details of the Focus Group Discussions are provided in Annexure 2. The key points put forth by the different stakeholders are as follows:



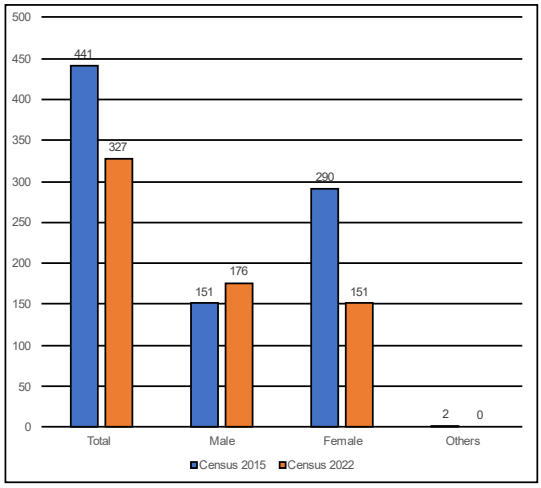
4.10 BASELINE SOCIO-ECONOMIC SURVEY OF RAGPICKERS

(a) The census of the ragpickers at the Kodungaiyur site was conducted in the Period March – July 2022

(b) The ragpickers are present at two locations in the site where fresh waste is being deposited.

(c) The baseline findings are given below:

Ragpickers Enumeration Surveys Comparison (2015 & 2022)



(i) Reduction in total ragpickers at KDG by 26 %
(ii) Increase in male ragpickers at KDG by 16.5%
(iii) Decrease in female ragpickers at KDG by 48 %

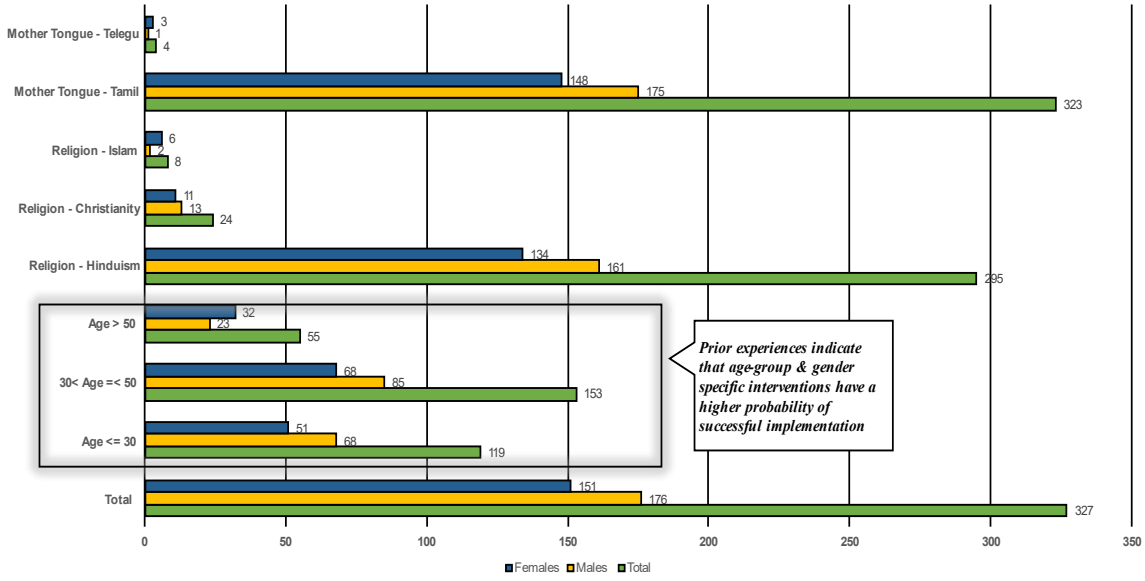
- *Primary reason for these trends seems to be Covid 19 impact*
- Closer scrutiny reveals that 47 ragpickers (M – 27 & F – 20) have come to site after 2015.
- Hence effective changes are shown below.

Sl. No.	Category	Census 2015	Census 2022	New Additions after 2015	Effective Change from 2015 Survey	Effective Change from 2015 Survey (%)
1	Total	441	327	47	-161	-36.51
2	Male	151	176	27	52	34.44
3	Female	288	151	20	-157	-54.51
4	Others	2	0			

- *There is a possibility of some of the 161 ragpickers returning to KDG at some point soon.*
- *Hence the cutoff date for entry into final enumeration before implementation of abbreviated RAP is extremely crucial– 6 months before estimated COD?*
- *An exit plan for those ragpickers not meeting the cut-off date is required as well.*

16

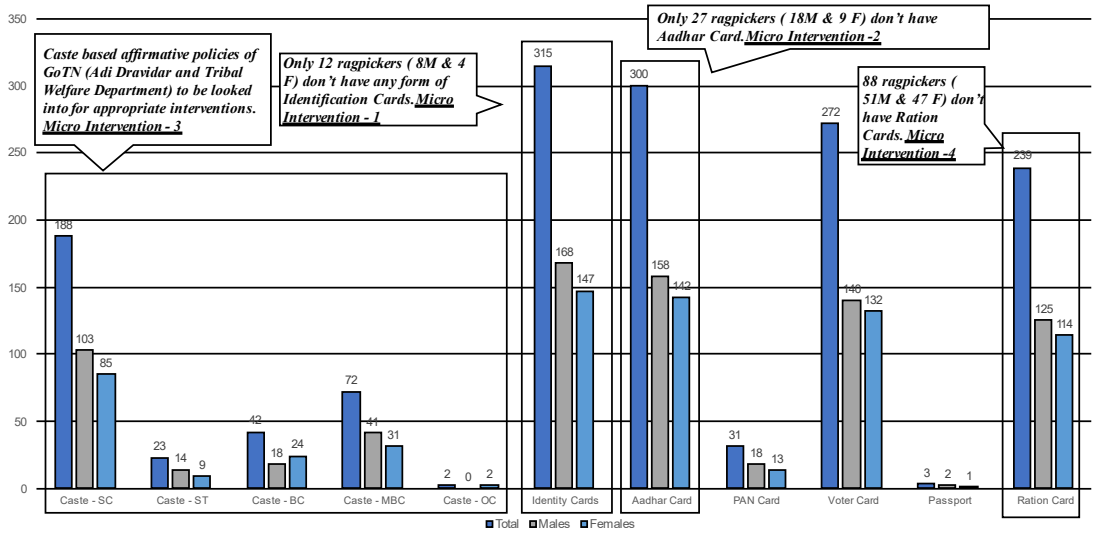
Ragpickers – Demographic Profile [Total – 327]



Prior experiences indicate that age-group & gender specific interventions have a higher probability of successful implementation

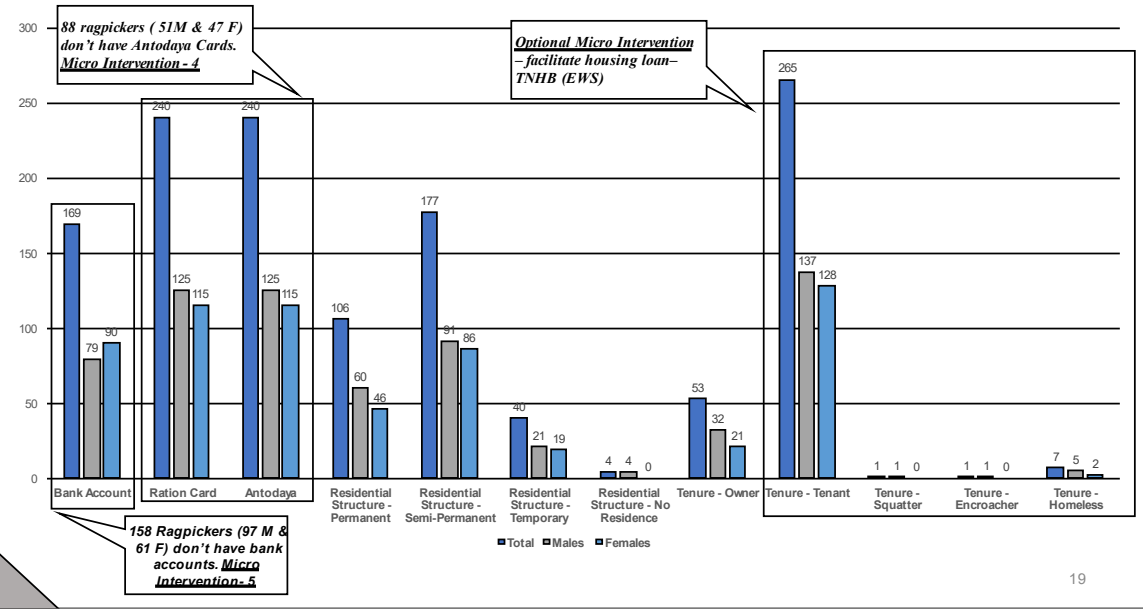
17

Ragpickers – Social Profile



18

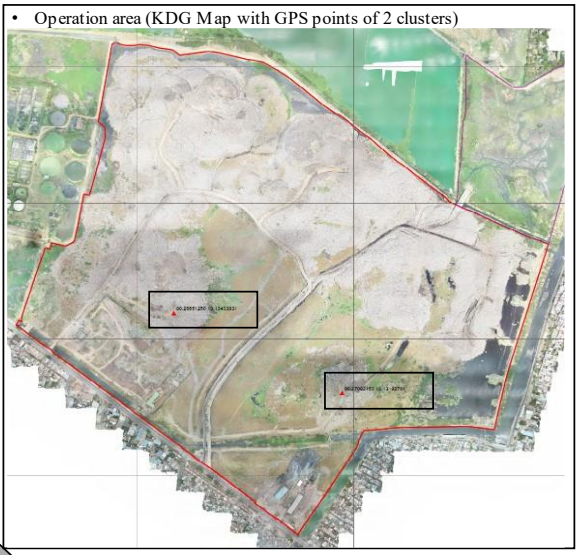
Ragpickers – Economic Profile

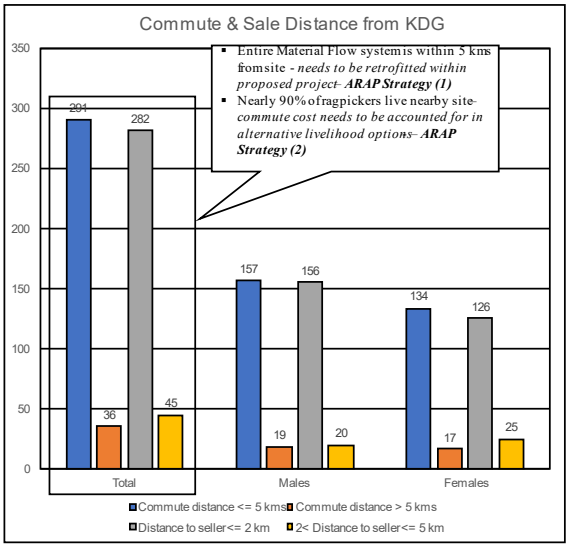


19

Ragpickers – Occupation Profile (1)

- Operation area (KDG Map with GPS points of 2 clusters)





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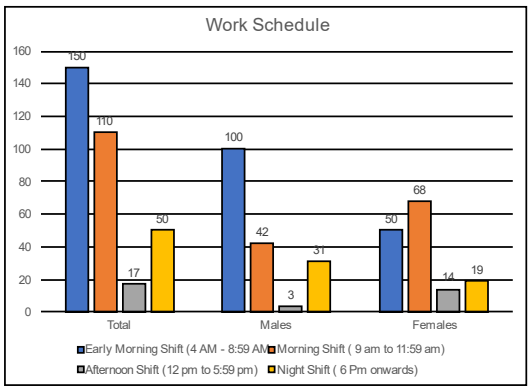
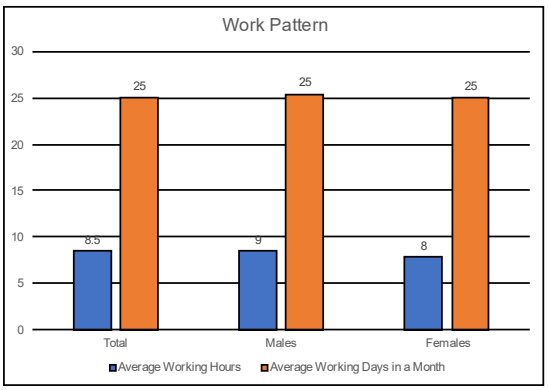
Ragpickers – Occupation Profile (2)



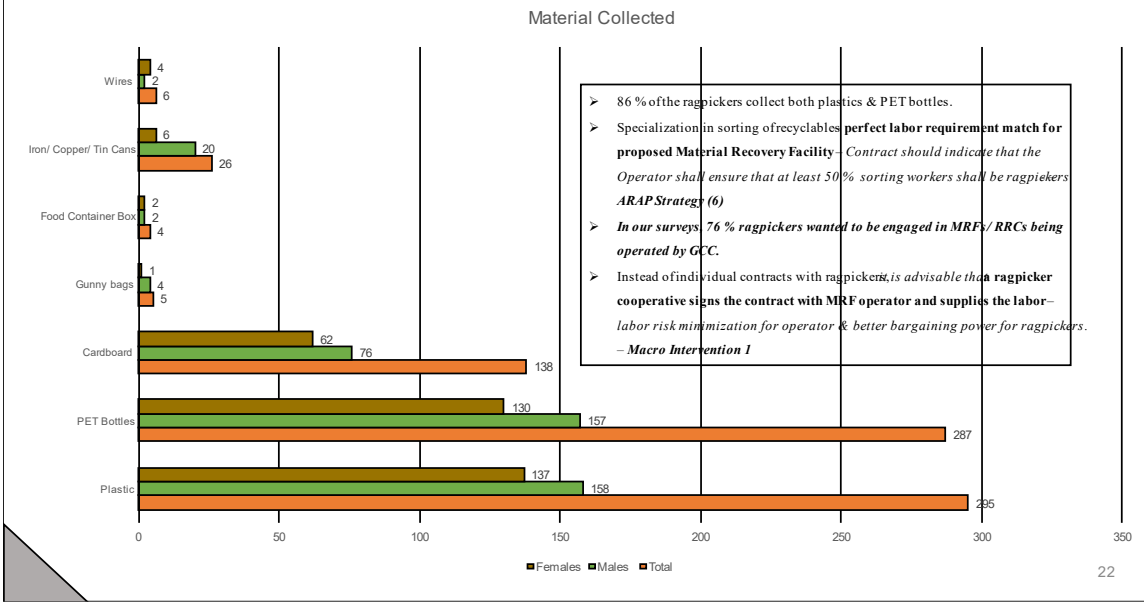
- Alternative Livelihood Options will not be able to provide early morning & night shift working options ***lack of flexible working hours needs to be accounted for in the ARAP- – ARAP Strategy (3)***
- ***Streamlining of working hours and working days will be tough for ragpickers used to working as per their need & convenience sufficient discussions and handholding to be done by PMC- ARAP Strategy (4)***
- ***Initial 1-2 years of employment should provide for the option to take weekly day off as per their requirement instead of a fixed day- ARAP Strategy (5)***



- Difference of 1 hr in average working hours of male & female ragpickers– ***working hours will not be a hindrance in ARAP***
- 25 working days a month– ***goes against standard narratives***- covid impact?
- Average working days in a month and working hours seem to be aligned with industry standards ***will not be a hindrance in ARAP***

21

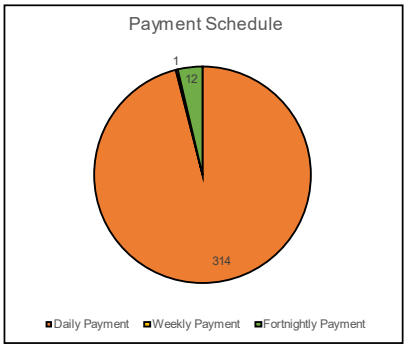
Ragpickers – Occupation Profile (3)



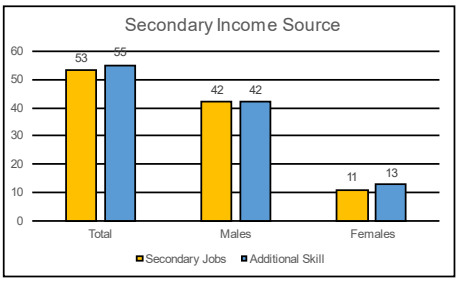
- 86 % of the ragpickers collect both plastics & PET bottles.
- Specialization in sorting of recyclables **perfect labor requirement match for proposed Material Recovery Facility** – *Contract should indicate that the Operator shall ensure that at least 50% sorting workers shall be ragpickers* ***ARAP Strategy (6)***
- ***In our surveys, 76 % ragpickers wanted to be engaged in MRFs / RRCs being operated by GCC.***
- Instead of individual contracts with ragpickers, *it is advisable that* **a ragpicker cooperative signs the contract with MRF operator and supplies the labor** – *labor risk minimization for operator & better bargaining power for ragpickers.* – ***Macro Intervention 1***

22

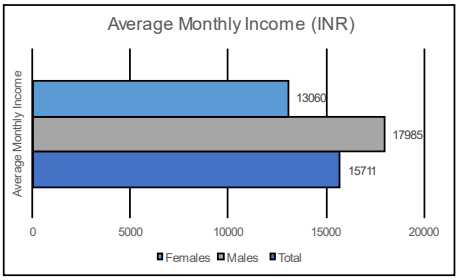
Ragpickers – Income Profile



- **Ragpickers are used to daily cash flow. This habit can only be changed over the long term,**
- *Alternative livelihood options should accommodate* ***weekly/ fortnightly payment disbursal*** *–* ***ARAP Strategy (7)***
- IEC activities for creating financial awareness among ragpickers – ***ARAP Strategy (8)***

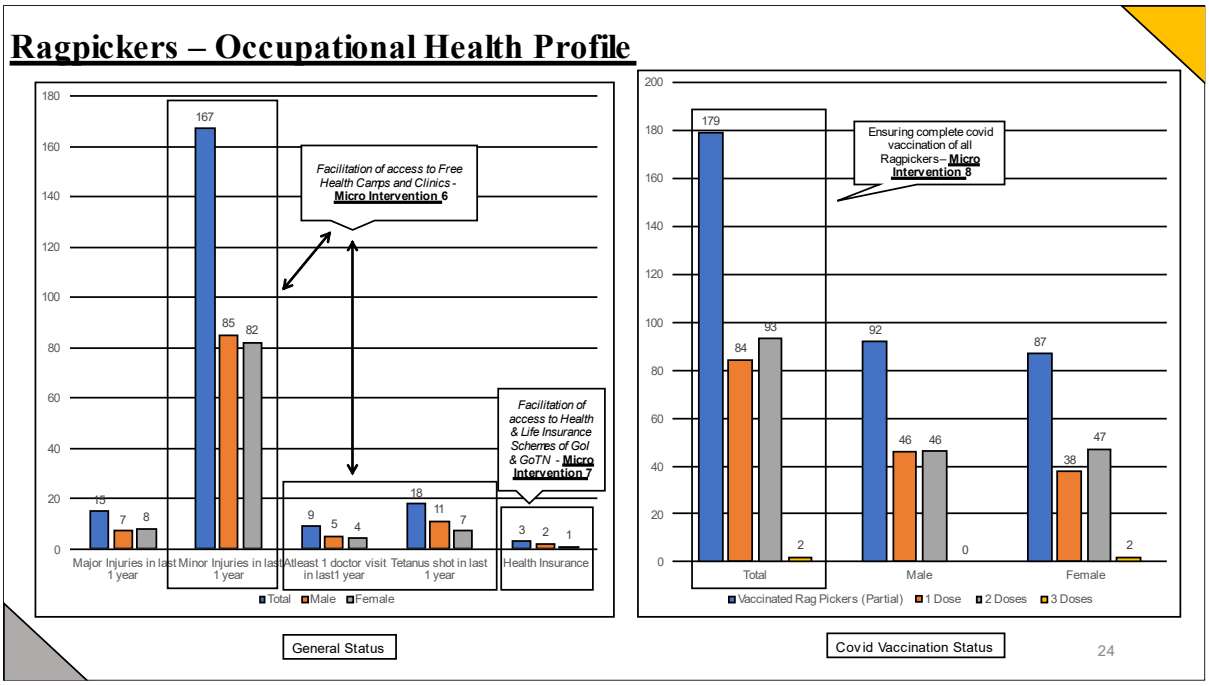


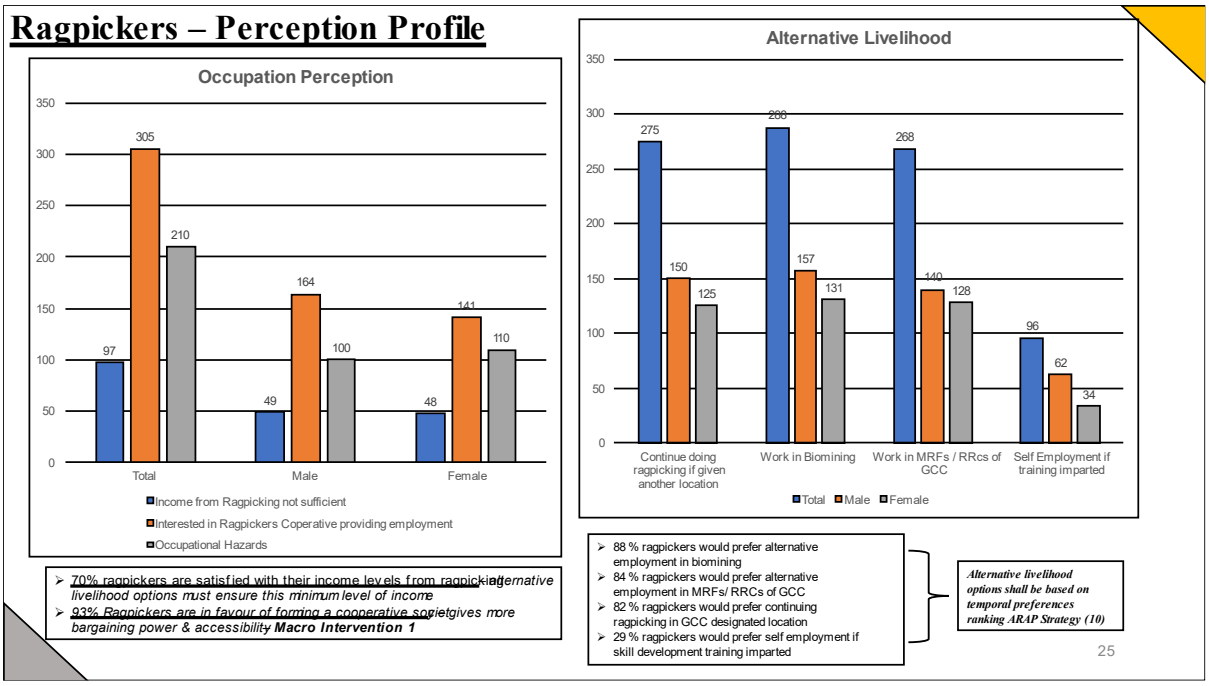
- Only 16 % Ragpickers have another income source.
- **Income from additional source of those ragpickers amounts to around 15 % of their monthly income** – *to be considered in offering alternative livelihood options.*
- This correlates with number of Ragpickers having additional skills.
- ***Skill development of interested ragpickers might be considered*** – ***upskilling*** – ***Optional Micro Intervention***



- Income disparity of 27% between males & females – attributable to product mix & weight
- **Median monthly income is Rs. 15711 in 2022 prices**
- ***Alternative livelihood options need to provide this amount as the minimum monthly wages (in hand)*** – – ***ARAP Strategy (9)***

23





4.11 SOCIAL IMPACT & MITIGATION MEASURES

(a) The entire site was screened for Social Impacts, and it was found that:

(i) The amount of land required for construction and implementation of this project is available with GCC. *Hence this project doesn't involve land acquisition.* The Land Use Map provided in Annexure 3 clearly demarcates entire plot as Institutional.

(ii) This project doesn't involve R&R since there are no people residing at the project site.

(iii) There are about 327 rag pickers at the project site who access the site for their livelihood. During the biomining project, they shall have access to the 2 demarcated areas where incoming fresh waste shall be received and managed by GCC. Since the quantum of daily incoming fresh waste shall remain the same (2000 TPD) and the land allocated for the same has been considered taking a capacity of 2 years of daily dumping of fresh waste (50 acres), the designated land area shall be sufficient for them.

(iv) GCC workers (29 Permanent & 37 Contractual) at the KDG site will continue working at the 2 demarcated areas where incoming fresh waste shall be received and managed by GCC.

(v) Hence nearby recyclers shall not be affected as well since the ragpickers shall be supplying recycled items as usual.

(vi) The project shall not have any impact on any poor, indigenous and/or ethnic minorities, and other vulnerable groups other than ragpickers.

(vii) Gendered impacts are not foreseen for any other groups other than ragpickers which shall be mitigated via implementation of RAP (Long Term Ragpickers Integration Program – LTRIP/ RAP)

(b) The census socioeconomic survey of the 327 ragpickers at the project site has been carried out and the details are provided above.

(c) GCC is also in the process of hiring a consultant for preparation of an Implementation Strategy for the Long Term Ragpickers Integration Program (LTRIP/ RAP) wherein a registered body / cooperative society for the ragpickers shall be created for smoother absorption of ragpickers in the proposed fresh waste processing facilities once reclamation is completed in the long term. In the short term (biomining project period) the registered body / cooperative society for the ragpickers shall devise and implement a fresh waste site access plan for the ragpickers.

(d) The consultant shall also evaluate gender impacts, and the socioeconomic situation, impacts, needs and priorities of women and integrate the necessary measures into the LTRIP/ RAP Implementation Strategy.

Table 16: Summary of Baseline Socio-economic Survey of Ragpickers

Sl. No.	Category	Details
1	Location	Kodungaiyur Dumping Ground in Zone 4
2	Proposed Project	Reclamation of Kodungaiyur Dumping Ground
3	Ragpickers Information (Gen)	(i) Total no. at site: 327 & Total HHs: 248 (ii) Comprises of SC, ST, BC and MBC (iii) 27 Ragpickers (RPs don't have Aadhar Card (iv) 88 Ragpickers don't have Ration cards (v) 158 RPs don't have bank accounts

Sl. No.	Category	Details
4	Ragpickers Income Profile	(i) Median monthly income is Rs. 15711 in 2022 prices (ii) Only 16 % Ragpickers have another income source (iii) Income from additional source amounts to around 15 % of their monthly income (iv) Median HH Annual Income is Rs. 2.89 Lakhs (v) Majority HHs (189/247) have only 1 ragpicker (vi) Majority HHs (145/247) have only 1 wage earner
5	Ragpickers Occupation Profile	(i) Average working hours: 8.5 (ii) Average working days in a month: 25 (iii) Materials collected: Plastic, PET Bottles, Metals, Cardboard
6	Ragpickers Perception Profile	(i) 88 % ragpickers would prefer alternative employment in biomining (ii) 84 % ragpickers would prefer alternative employment in MRFs/ RRCs of GCC (iii) 82 % ragpickers would prefer continuing ragpicking in GCC designated location (iv) 29 % ragpickers would prefer self-employment if skill development training imparted (v) *93% Ragpickers are in favour of forming a cooperative society*

5 IMPACT ASSESSMENT AND MITIGATION MEASURES

(a) As per the baseline data observed in the earlier chapter, the following are the Environmental and Social Impacts.

Table 17: Impact on Environmental setting

Project Activities	Land	Air Quality	Odour	Noise	Surface water	Ground water	Land acquisition	Resettlement	Health and safety	Damage to public property or sensitive area
Pre-Construction and Construction Phase of Biomining										
Waste excavation	✓	✓	✓	✓	✓	✓	×	×	✓	×
Waste Shifting	✓	✓	✓	✓	✓	✓	×	×	✓	×
Construction of the biomining plant	×	✓	×	✓	✓	✓	×	×	✓	×
Operation phase of Biomining										
Waste excavation, turning and shifting	✓	✓	✓	✓	✓	✓	×	×	✓	×
Plant operation	✓	✓	✓	✓	✓	✓	×	×	✓	×
Recovered products shifting and disposal	✓	✓	✓	✓	×	✓	×	×	✓	×

Table 18:Potential E&S impacts

Phase of the Project	Activity	Potential Risks
Construction Phase of Biomining	Legacy Waste excavation and installation of plant & machinery	a. Odour nuisance because of excavation of old waste b. Release of leachate due to waste excavation c. Noise due to vehicle operation and movement d. Increase of respirable suspended particulate matters & dust in surrounding ambient air e. Release of odour and gases.

Phase of the Project	Activity	Potential Risks
		f. Health Impact due to the above
	Waste shifting	a. Increase of respirable suspended particulate matters & dust in surrounding ambient air b. Noise due to vehicle movement c. Increased vehicle traffic movement with site d. Release of odour. e. Health Impact due to the above
	Construction activities	a. Dust during construction activity b. Release of wastewater during construction activities c. Spillage of oil and other substances during the civil works d. Noise during construction activity
Operation Phase of Biomining	Waste excavation and stabilization in windrow platform	a. Odour nuisance because of excavation of old waste and turning of waste in windrow platform. b. Increase of respirable suspended particulate matters & dust in surrounding ambient air c. Release of leachate due to waste excavation d. Noise due to vehicle operation and movement e. Release of odour during turning of waste. f. Increased pest incidences
	Plant operations and shifting/disposal of recovered products.	a. Odour nuisance and release of gases during plant operation b. Noise due to plant, machinery and vehicle operation, movement c. Dust emissions due to transportation and shifting/disposal of recovered products d. Leachate generation e. Increased Traffic Congestion & GHG Emissions due to high increase in movement of disposal

Phase of the Project	Activity	Potential Risks
		vehicles on the narrow main and arterial roads adjacent to KDG site
Common	Health and safety	a. Health and safety of the workers at site b. Fire and emergency preparedness system at site. c. Loss of access to livelihood for Ragpickers once entire site is reclaimed and fresh incoming waste is processed

5.1 AIR ENVIRONMENT:

5.1.1 IMPACT ON AIR QUALITY DURING CONSTRUCTION:

Air quality in and around the project site would be impacted to some extent due to construction and construction related activities. The main impact will be during site leveling, excavation, material handling shifting etc., the likely emissions from construction activities would include the following:

1. Dust Emission due to movement of vehicles and plying of heavy construction machinery.
2. Gaseous emissions from operation of diesel generators for power requirement during construction phase.
3. Vehicular movement at the site and also increase in traffic volume on the connecting roads will rest in increase in vehicular emissions.
4. Traffic Movement at the site and also increase in traffic volume on the connecting roads will rest in increase in vehicular emissions.

5.1.2 IMPACT ON AIR QUALITY DURING OPERATION PHASE

The main impacts during the operation phase will be during waste stabilization, shifting, disposal of recovered fractions outside of site like RDF, bio soil, inerts etc., the likely emissions would include the following:

1) Dust generation during movement of vehicles during operation of plant and during disposal of recovered fractions post biomining.
2) Release of gases during waste excavation and stabilization and shifting.
3) Gaseous emissions from operation of diesel generators for power requirement during operation phase.

5.1.3 MITIGATION MEASURES

1) The impact of emissions both from vehicular movement and emissions required to be minimized by proper maintenance of vehicles, sprinkling of water on unpaved roads, at the construction site and planned movement of vehicles.
2) The emissions from diesel generators need to be controlled to minimize impacts of air emissions by optimized operations, orientation at the site and providing adequate stack height for wider dispersion of gaseous emissions.
3) All the tippers that carry waste should be covered with tarpaulins.

4) Periodic emission check for vehicles
5) Clean fuel shall be used in vehicles. Any adulterated fuel shall be avoided.
6) Vehicles having PUC Certificates will be used for construction activities
7) Vehicles will carry the waste only as per designed capacity & will not be overloaded.
8) Vehicles having PUC Certificates will be used for collection & transportation.
9) Periodical maintenance of vehicles and machineries to be done in order to avoid problems related to air emissions.
10) Workers / Labor should be given proper air masks and helmets, PPE equipments.

5.2 NOISE ENVIRONMENT

5.2.1 IMPACT ON NOISE ENVIRONMENT DURING CONSTRUCTION PHASE

(a) Use of heavy machineries and vehicles during construction activity of biomining plant operations

(b) Noise generation from operation of diesel generators for power requirement during construction phase

(c) Noise generation during construction and installation of plant/machinery required for biomining operations.

5.2.2 IMPACT ON NOISE ENVIRONMENT DURING OPERATION PHASE

(a) Use of heavy machineries, Plant & machinery and vehicles during biomining plant operations during waste processing.

(a) Noise generation from operation of diesel generators for power requirement during plant operations.

(b) Noise generation during frequent vehicle movement during waste shifting, handling and disposal.

5.2.3 MITIGATION MEASURES

(a) Avoid construction during night time so that the noise levels are reduced to the permissible limits.

(b) Acoustic enclosures and noise barriers will be provided in areas of high noise generating sources;

(c) High noise generating activity will be permitted only during daytime

(d) Regular maintenance of its vehicles and repair of its equipment/ machinery to avoid noise.

(e) Mobile noise sources such as cranes, earth moving equipment and heavy goods vehicles (HGVs) will be routed in manner that there is minimum disturbance to habitation;

(f) Workers working near high noise generation shall be provided with ear plugs/ earmuffs to limit exposure to occupational hazards.

5.3 WATER ENVIRONMENT (GROUND AND SURFACE WATER)

5.3.1 IMPACTS ON WATER DURING CONSTRUCTION PHASE

(a) Spillage of oil and grease from the vehicles from vehicles washing, workshop and construction activities.

(a) Generation of leachate during excavation and construction works.

5.3.2 IMPACTS ON WATER DURING OPERATION PHASE

(b) Spillage of oil and grease from the vehicles from vehicles washing, workshop during biomining plant operations.

(c) Generation of leachate during excavation and biomining plant operation works.

5.3.3 MITIGATION MEASURES

(a) Spillage of oil and grease from the vehicles shall be washed and collected separately

(b) Leachate generated shall be collected and stored separately, treated by Leachate Treatment Plant.

5.4 ECOLOGY

(a) There is no activity of tree cutting for the proposed project site. Hence no impact on the ecology/vegetation in the project site.

5.5 TRAFFIC AND TRANSPORT

5.5.1 IMPACT DURING CONSTRUCTION PHASE

(a) Due to the excavation work, material movement during construction phase and movement of fresh incoming waste takes places simultaneously there will be a disturbance in the traffic movement. People may experience some inconvenience during the morning and evening peak hours.

(b) Traffic congestion within the site due to frequent vehicle movement (fresh waste vehicles and vehicles used for construction activity).

5.5.2 IMPACT DURING OPERATION PHASE

(a) Due to the excavation work, material movement during operation phase where the biomining waste, recovered products like RDF, bio-soil disposal will happen and movement of fresh incoming waste takes places simultaneously there will be a disturbance in the traffic movement. People may experience some inconvenience during the morning and evening peak hours.

(b) Traffic congestion within the site due to frequent vehicle movement (fresh waste vehicles and vehicles used for construction activity).

5.5.3 MITIGATION MEASURES

Traffic Management Plans need to be prepared by the respective contractors in coordination with GCC. The Traffic The guidance for traffic management plan is provided in Annexure 5

5.6 SOCIAL IMPACT & MITIGATION MEASURES

(c) The entire site was screened for Social Impacts, and it was found that:

(viii) The amount of land required for construction and implementation of this project is available with GCC. *Hence this project doesn't involve land acquisition.* The Land Use Map provided in Annexure 3 clearly demarcates entire plot as Institutional.

(ix) This project doesn't involve R&R since there are no people residing at the project site.

(x) There are about 327 rag pickers at the project site who access the site for their livelihood. During the biomining project, they shall have access to the 2 demarcated areas where incoming fresh waste shall be received and managed by GCC. Since the quantum of daily incoming fresh waste shall remain the same (2000 TPD) and the land allocated for the same has been considered taking a capacity of 2 years of daily dumping of fresh waste (50 acres), the designated land area shall be sufficient for them.

(xi) GCC workers (29 Permanent & 37 Contractual) at the KDG site will continue working at the 2 demarcated areas where incoming fresh waste shall be received and managed by GCC.

(xii) Hence nearby recyclers shall not be affected as well since the ragpickers shall be supplying recycled items as usual.

(xiii) The project shall not have any impact on any poor, indigenous and/or ethnic minorities, and other vulnerable groups other than ragpickers.

(xiv) Gendered impacts are not foreseen for any other groups other than ragpickers.

(d) The census socioeconomic survey of the 327 ragpickers at the project site has been carried out and the details are provided in Annexure 7.

(e) As per ECSMF, the eligible entitlements for the rag pickers at Kodungaiyur site has been worked out in the following table:

Table 19: Eligible Entitlement & Budget Estimate

Sl. No.	Impact Category	Entitlements as per ECSMF	No. of PAPs	Compensation (INR)
1	Loss of Livelihood	Subsistence allowance equivalent monthly minimum agricultural/industrial wages for 3 months. (minimum wage rate of INR 424 taken)	327	327*90*424 = 1,24,78,320

Sl. No.	Impact Category	Entitlements as per ECSMF	No. of PAPs	Compensation (INR)
2	Vulnerable PAFs	Training for skill development. This assistance includes cost of training and financial assistance for travel/ conveyance and food. One adult member of the affected household, whose livelihood is affected, will be entitled for skill development.	248	248*6000 = 14,88,000
		Additional assistance to the vulnerable PAFs whose livelihood/loss of shelter is impacted by the project will be paid additional one-time assistance of INR 6700.	248	248 * 6700 =16,61,600
		Wherever possible, the vulnerable people shall be assisted in enrolling for the applicable government programmes.		
Total Compensation				**1,56,27,920**

(f) However, both GCC & GoTN were of the opinion that cash compensation shall neither be sustainable in the long run nor fiscally prudent. Hence it has been decided that instead of cash compensation as per ECSMF, GCC shall ensure that the ragpickers shall be gainfully employed in the proposed waste processing facilities which shall be established at the Kodungaiyur site post biomining completion. Prior to this, they shall have access to designated areas of the project site as per GCC instructions.

(g) GCC is also in the process of hiring a consultant for preparation of an Implementation Strategy for the Long Term Ragpickers Integration Program (LTRIP)/ RAP wherein a registered body / cooperative society for the ragpickers shall be created for smoother absorption of ragpickers in the proposed fresh waste processing facilities once reclamation is completed in the long term. In the short term (biomining project period) the registered body / cooperative society for the ragpickers shall devise and implement a fresh waste site access plan for the ragpickers.

(h) The consultant shall also evaluate gender impacts, and the socioeconomic situation, impacts, needs and priorities of women and integrate the necessary measures into the LTRIP Implementation Strategy.

(i) The proposed timeline for LTRIP/ RAP Implementation is as follows:

LRP Phases	Expected Timeline	Current Status
Phase 1: Preparation of LTRIP/ RAP & Approval by KfW	July 2023- October 2023	Consultant to be appointed by 15.07.2023
Phase 2: Implementation of the approved LTRIP/ RAP during Biomining project	Throughout the biomining contract period – short term measures	NA
Phase 3: Implementation of the approved LTRIP/ RAP after Biomining project	Long term measures	NA

(j) An indicative phasing of activities under LTRIP/ RAP is provided in Annexure 20 which shall be developed upon in detail by the LTRIP/ RAP consultant. The LTRIP/ RAP shall be prepared

as per the Environmental & Social Standards (ESS) of World Bank and shall be subject to obtaining of No Objection (NO) from KfW. Post KfW approval the LTRIP/ RAP shall be incorporated into the ESIAR and shall be disclosed to the public,

(k) The registered body/ society of ragpickers which shall be established in Phase 1 of LTRIP/ RAP shall be responsible for the the Health & Safety mitigation measures to be implemented and monitored for ragpickers during ongoing waste picking activities. SEP & GRM for Ragpickers shall be part of LTRIP/ RAP.

(l) In phase 1 of LTRIP/ RAP implementation, once the Registered Body/ Society of Ragpickers is established, it shall be responsible for the following (including the costs thereof):

(i) Ensuring access to fresh waste disposal areas within Project Site for the Ragpickers by issuing identity cards to all the ragpickers. These identity cards shall be verified by the contractors to allow access to the incoming fresh waste sites.

(ii) Providing trainings / Health & Safety awareness to the Ragpickers

(iii) Providing PPE and Safety Equipment to the Ragpickers

(iv) Assistance in obtainment of Life Insurance, health Insurance and all other applicable benefits in line with GoI/ GOTN programs for the Ragpickers.

(v) Assistance in case of accidents, incidents, emergencies in the rag-picker´s areas in close coordination with GCC and respective Contractor

5.7 CLIMATE RESILIENCE FOR THE PROJECT:

(a) This section entails about the climate resilience factors considered while designing the project and what are the its benefits. The main factors considered here are

(i) Reduction of GHG emissions due to implementation of Project

(ii) Reduction in Water Pollution due to implementation of Project.

(iii) Reduction in use of natural resource due to implementation of the Project

(iv) Reduction in issue of traffic management

(b) **Reduction of GHG emissions due to implementation of Project:**

(i) Kodungaiyur dumpsite is used as open dumpsite for dumping of municipal solid waste for more than 40 years. This has led to release of abundant amount of GHG emissions into the atmosphere. So by Biomining we are going to entirely stop further GHG emissions by processing the legacy dumped waste at site. The conversion factor for 1 MT of solid waste is 0.6925 tons of Co2 emission.

(ii) On adopting this conversion factor we are reducing the overall quantity of 46,06,860.18 Tons of Co2 emissions/year by this project.

(iii) Additionally the RDF generated in the project shall be used as substitute for coal in coal-based cement plants which shall result in around 57,430.18 tons of Co2 emissions being avoided.

(iv) This project shall involve vehicular emissions due to movement of vehicles within the Project Site and disposal of RDF to cement companies (average distance of 800 kilometres) which shall result in 81,633.34 tons of Co2. The estimated GHG emissions is given below

S. No.	Proposed Packages at Kodungaiyur Dump Site	Waste Volume (cubic metres)	Waste Quantity (MT) @ density of 900 kg/cubic meter	Processing of one MT of legacy waste avoids 0.6925 MT of C02 Emission	Total Co2 emission saved/year (in MT)
1	Package 1	23,55,656.40	21,20,090.76	0.6925	14,68,162.85
2	Package 2	4,60,236.76	4,14,213.08	0.6925	2,86,842.56
3	Package 3	12,61,529.50	11,35,376.55	0.6925	7,86,248.26
4	Package 4	4,90,225.50	4,41,202.95	0.6925	3,05,533.04
5	Package 5	20,39,115.76	18,35,204.18	0.6925	12,70,878.89
6	Package 6	7,84,909.06	7,06,418.15	0.6925	4,89,194.57
Sub Total (A)		73,91,672.98	66,52,505.68		46,06,860.18
7	**Total CO2 Emissions avoided by the Proposed Project { (A)*2 years}**				**92,13,720.36**
8	**Total CO2 Emissions avoided due to usage of RDF instead of Coal by Cement Factories (overall)**				**57,430.18**
9	**Total CO2 Emissions due to Project Implementation**				**81,633.34**
10	**Net CO2 Emissions avoided due to implementation of the Project**				**91,89,517.20**

(c) **Reduction in use of Natural resource due to implementation of the Project:**

(i) As indicated above, the RDF fraction of waste obtained from Biomining activity will be used in cement industries as substitute for coal. By sending the RDF to cement plant a total quantity of approximately around **13 lakhs MT of coal** is substituted by RDF thereby were are preventing the depletion of natural resource to considerable extent.

(d) **Reduction in Water Pollution due to implementation of Project:**

(i) By collecting and treating the leachate (waste water) generated from the Project activity using Leachate Treatment Plant, water pollution (both ground and surface water) reduction will happen. the leachate treatment plant will treat the leachate and disposed the treated leachate incompliance with CPCB standards thereby reducing the effect of water pollution caused by site.

5.8 CLIMATE RESILIENCE TO THE PROJECT

(a) This section deals about the various climate risk factors considered to occur during implementation of the project.

(i) **Extreme Weather Conditions:** This project was designed by taking into consideration of the extreme rain fall conditions. During the monsoon when the rainfall in very high the plant will be shutdown totally. The number of non-operational days due to extrement weather conditions were taken into account. One meter clearance above the High Flood Level is considered for the project.

Risks Assessment and Project Caterorization

Environmental and Social Standards	Relevance to this project & actions
ESS1 Assessment and Management of Environmental and Social Risks and Impacts	Biomining Project involves processing of Legacy waste using machinery like trommel, conveyors, separator, shredders, Leachate Treatment Plant etc.ESS1 is relevant for this project. There are no sensitive or protected environmental features within the project area. So detailed ESIA is required.
ESS2 Labor and Working Conditions	Labours including migrant labour, local labours according to the skill sets will be expected to be engaged. ESS2 is relevant for this project. As per ESS2, LMP is to be prepared by the contractor . The LMP will describe the findings of the ESIA, national labor policies and practices, the types of project workers that are likely to be involved, worker influx, the procedures to apply ESS2, and a grievance mechanism.
ESS3 Resource Efficiency and Pollution Prevention and Management	The Project will generate around 65% of Bio-earth/soil which will be reused within the site. The Project generates leachate which shall be treated by Leachate Treatment Plant. ESS3 is relevant for this project.
ESS4 Community Health and Safety	The Project involves larger vehicle movement which creates traffic management issues for which the appropriate measures which will be included in the ESMP. ESS4 is relevant for this project.
ESS5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	There is no land acquisition, restrictions on land use and involuntary resettlement requirements. Ragpickers shall have access to demarcated areas where fresh waste will be deposited. ESS5 is not triggered for this project.
ESS6 Biodiversity Conservation and Sustainable Management of Living Natural Resources	The project doesn't affect any bio-diversity conservation and sustainable management of Living Natural resources. ESS6 is not relevant to this sub-project.

Environmental and Social Standards	Relevance to this project & actions
ESS7 Indigenous Peoples/Sub-Saharan African Historically Underserved Traditional Local Communities	ESS7 is not relevant to this sub-project.
ESS8 Cultural Heritage	The project area does not have any protected site or monuments of cultural importance. Hence ESS8 is not relevant to this sub-project.
ESS9 Financial Intermediaries	ESS9 is not relevant.
ESS10 Stakeholder Engagement and Information Disclosure	This ESS10 is applicable to the sub-project. Accordingly, Stakeholder Engagement Plan is prepared and included in the ESIA

(ii) The project envisages leachate generation, odour nuisance, fire hazards, health and safety risks to the workers and the environmental risks associated with the project are "substantial".

(iii) This project involves livelihood impacts on 327 rag pickers .Based on this, the Social risk associated with this project is "substantial ".

(iv) In view of the above, the project is Categorized as "B+" as per the updated ECSMF.

(v) Unforeseen impacts encountered during implementation a social impact assessment will be conducted in accordance with updated ECSMF. The Environmental, Climate Change and Social Screening Form is attached in Annexure:1

6 ANALYSIS OF ALTERNATIVES

6.1 ANALYSIS OF ALTERNATIVES FOR THE PROPOSED PROJECT:

(a) The proposed project was decided to be implemented through Biomining after comparing and analyzing various options available for land reclamation followed all over the India and also based on universal experience.

(b) The three different options available for Reclamation of Kodungaiyur Dump Site are given below:

(i) Biomining (Landfill Mining) with land Reclamation

(ii) Bioreactor Landfill

(iii) Landfill Capping

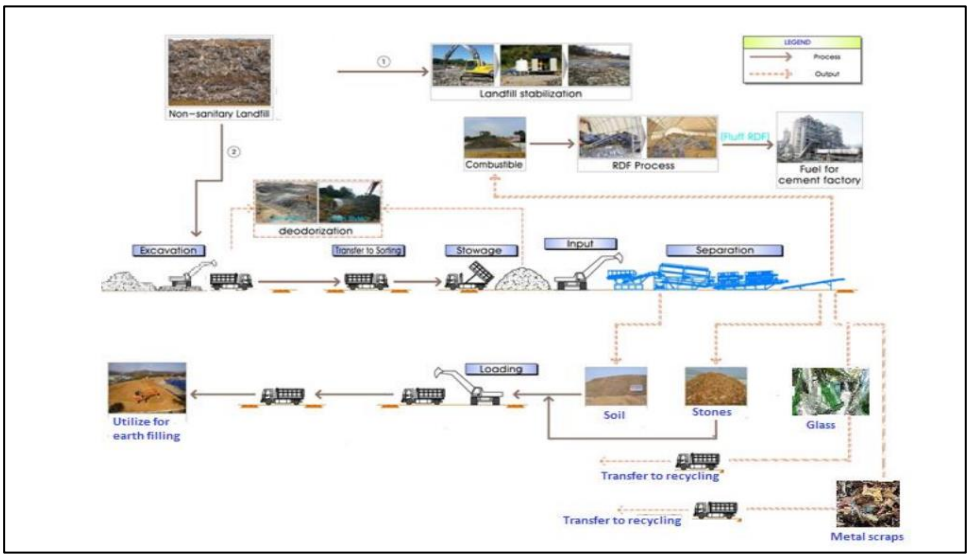
6.1.1 BIOMINING (LANDFILL MINING) WITH LAND RECLAMATION

(a) Biomining typically consists of three basic operations: excavating & stabilization of waste, processing/sieving the excavated material, and managing/recycling/selling/reuse/co-processing the excavated or processed material/output.

(b) Waste is first excavated using equipment commonly employed in surface mining operations such as a backhoe or a hydraulic excavator. The excavated waste can be sieved to meet several objectives, including separating bulky materials, sorting hazardous material and other unidentified waste, screening soils from waste, and sorting materials for recycling or use as fuel. Several common mechanical processes (such as magnets for ferrous metal and eddy current separators for aluminium) can be used to separate recyclable materials.

(c) The landfill/dumpsite is converted into equisized windrows and applied with bio-culture and deodorizer. The windrows are then turned continuously ensuring equal exposure of bio culture and the waste is completely stabilized. The stabilized waste shall then be excavated and fed into the trommel and conveyor segregation system. The segregation system using its various processes segregates the material into (a) Combustible Fractions (b) Non-combustible fine fraction (c) Non-combustible coarse fraction (d) Glass scrap (e) Metal scraps. The aggregates/products are responsibly disposed in compliance to SWM Rules 2016, CPHEEO Guidelines 2016 for MSWM and CPCB Guidelines for Legacy Waste Management 2019.

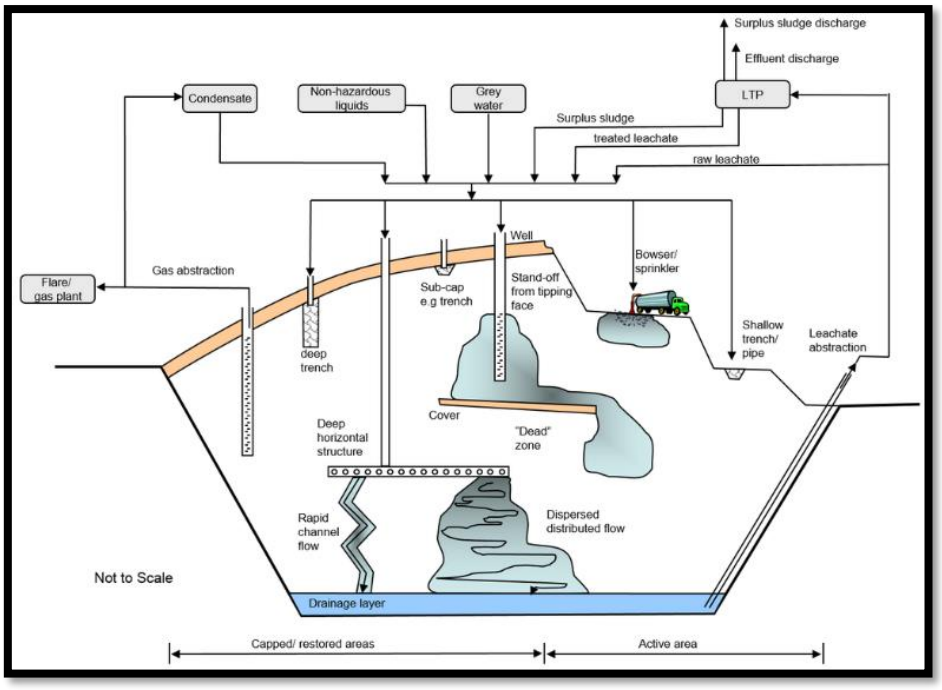
Figure 10: Process Flow Chart of Biomining Operations



(d) In addition, bio-mining can be used as a measure to remediate poorly designed or improperly operated landfills and to upgrade landfills that do not meet environmental and public health specifications. Material recovery operations associated with Bio-Mining activities undertaken to-date have primarily comprised of soil and metal removal, and, on occasion, the preparation of a refused derived fuel and the replacement and compaction of residual materials back into the landfill.

6.1.2 BIO-REACTOR LANDFILL

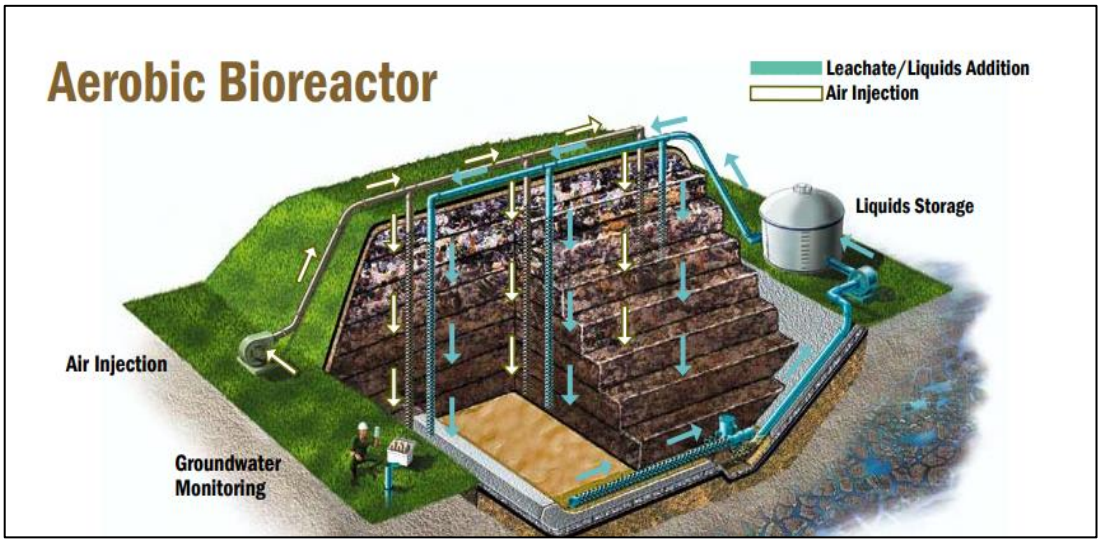
(a) A bioreactor landfill is a wet landfill designed and operated with the objective of converting and stabilizing biodegradable organic components of the waste within a reasonable time frame by enhancing the microbiological decomposition processes. The technology significantly increases the extent of waste decomposition, conversion rates and process effectiveness i.e., making possible substantial reduction in volume and waste stabilization. This is generally applied in conventional wet landfill. Stabilization in this context means that landfill gas and leachate emissions are managed within one generation (twenty to thirty years) and that any failure of the containment system after this time would not result in environmental pollution. There is better energy recovery including increased total gas available for energy use and increased greenhouse reduction from reduced emissions and increase in fossil fuel offsets. These factors lead to increased community acceptance of this waste technology. Management of a bioreactor landfill requires a different operating protocol to conventional landfills. Liquid addition and recirculation are the single most important operational variable to enhance the microbiological decomposition processes. Other strategies can also be used to optimize the stabilization process, including waste shredding, pH adjustment, nutrient addition, and temperature management.



(b) There are three different general types of bioreactor landfill configurations:

(i) **Aerobic** - The Aerobic Bioreactor shall accelerate waste degradation by optimizing conditions for aerobes. Aerobes are organisms that require oxygen for cellular respiration. In aerobic respiration, energy is derived from organic molecules in a process that consumes oxygen and produces carbon dioxide. Aerobes require sufficient water to function just as anaerobes do. However, aerobic organisms can grow more quickly than anaerobes because aerobic respiration is more efficient at generating energy than anaerobic respiration. One consequence of this is that aerobic degradation can proceed faster than anaerobic degradation. Another consequence is that aerobic respiration can generate large amounts of metabolic heat, which requires significant quantities of water. In landfills aerobic activity is promoted through injection of air or oxygen into the waste mass. It is also possible to apply a vacuum to the waste mass and pull air in through a permeable cap. Liquids are typically added through leachate recirculation, with the need for additional sources of moisture even more acute than for anaerobic reactors. The aerobic process does not generate methane.

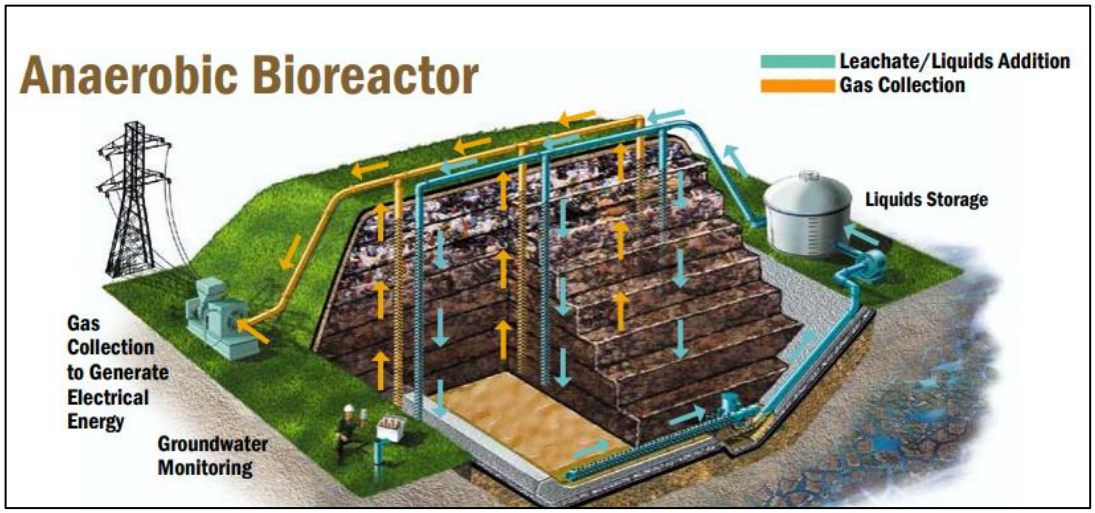
Figure 11: Aerobic Bioreactor Landfill



Source: Waste Management

(ii) **Anaerobic** - In an anaerobic bioreactor landfill, moisture is added to the waste mass in the form of re-circulated leachate and other sources to obtain optimal moisture levels. Biodegradation occurs in the absence of oxygen (anaerobically) and produces landfill gas. Landfill gas, primarily methane, can be captured to minimize greenhouse gas emissions and for energy projects.

Figure 12: Anaerobic Bioreactor Landfill

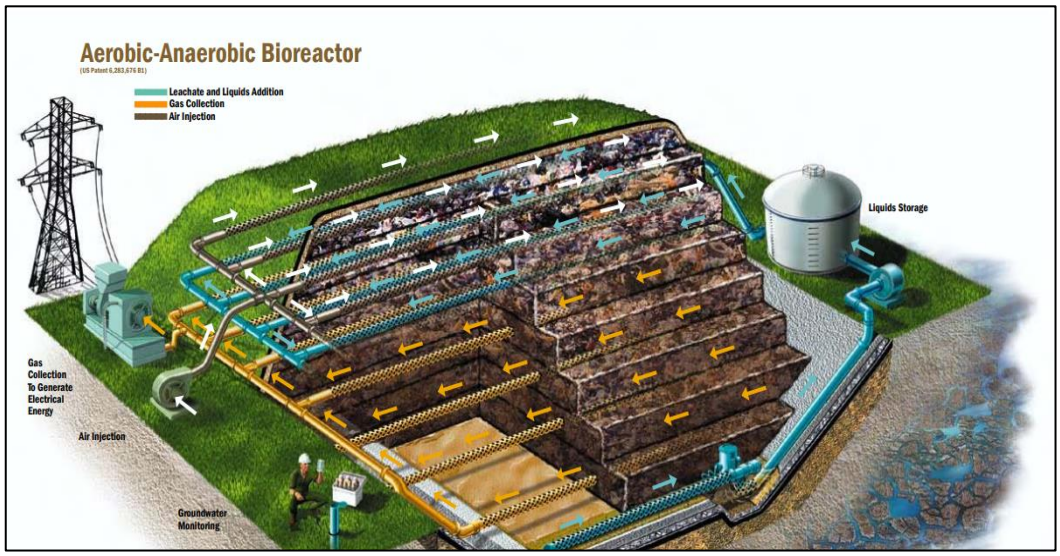


Source: Waste Management

(iii) Hybrid **(Aerobic-Anaerobic)** - The Aerobic-Anaerobic Bioreactor is designed to accelerate waste degradation by combining attributes of the aerobic and anaerobic bioreactors. The objective of the sequential aerobic-anaerobic treatment is to cause the rapid biodegradation of food and other easily degradable waste in the aerobic stage in order to reduce the production of organic acids in the anaerobic stage resulting in the earlier onset of methanogenesis. In this system the uppermost lift or layer of waste is aerated, while the lift immediately below it receives liquids. Landfill gas is extracted from each lift below the lift

receiving liquids. Horizontal wells that are installed in each lift during landfill construction are used convey the air, liquids, and landfill gas. The principal advantage of the hybrid approach is that it combines the operational simplicity of the anaerobic process with the treatment efficiency of the aerobic process. Added benefits include an expanded potential for destruction of volatile organic compounds in the waste mass.

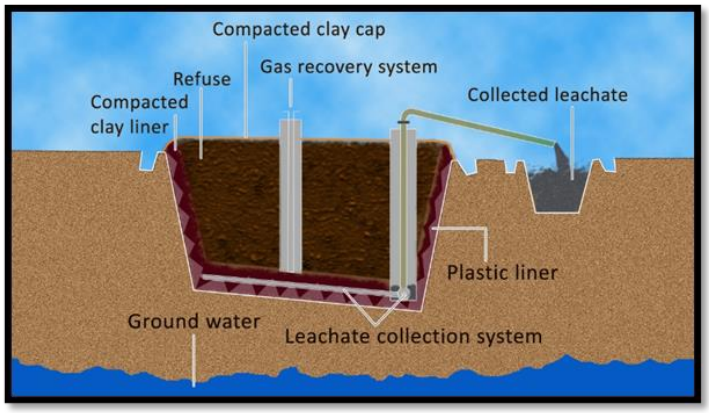
Figure 13: Aerobic-Anaerobic Bioreactor



6.1.3 LANDFILL CAPPING WITH ACTIVE GAS FLARING/EXTRACTION SYSTEM

(a) Landfill Capping is the third option available for reclamation of land. The scientific closure uses a capping technology in accordance with SWM rules, 2016 and has in place an intricate landfill gas collection and conveyance piping network to collect the Methane gas. The scientific closure strategy comprises of levelling and reforming the existing heap of MSW and incorporating environmental mitigation measures including laying of impermeable surface cover (Geotextile/HDPE sheet), sheet piling to secure the site against ingress of water during monsoon, landfill gas (predominantly methane) collection and leachate collection and treatment system, development of a green belt and landscaping including a green cover over the dumpsite.

Figure 14: Typical Capped Activity



(b) The main components of Landfill capping include

(i) Excavations and Tipping - used for shifting and relocation of waste

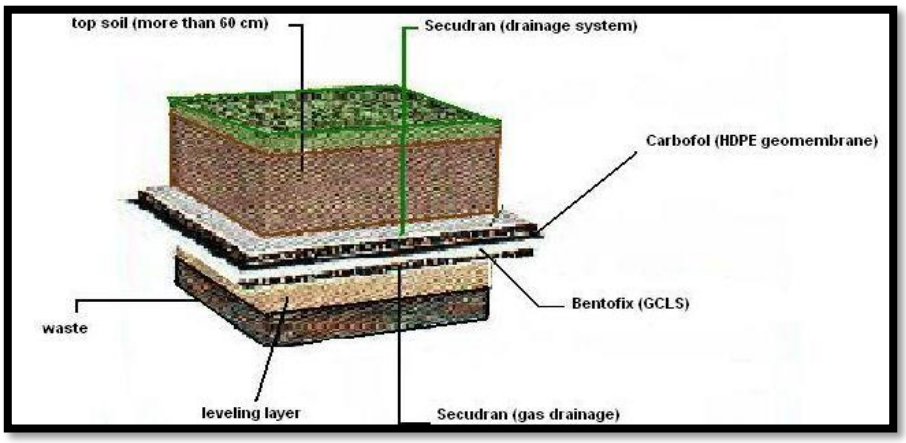
(ii) Soil Compaction and dozing– used for compaction of waste to attain specific compaction ratio

(iii) Leachate Management - collection of leachates generated from the capped site.

(iv) Gas Collection and Flaring System- for collection of landfill gas generated if any from the capped landfill.

(c) Landfill capping also involves post closure maintenance for a period of 15 years which includes monitoring of the groundwater quality, leachate, air quality around the closed landfill.

Figure 15: Sectional diagram of Top cover system



6.2 ANALYSIS OF THREE OPTIONS

Table 20: Analysis of various option for Kodungaiyur

Sn	Parameter	Bio-Mining	Bioreactor Landfill (Aerobic-In Situ)	Capping with Gas Network
1	Benefits	a) Waste volume is reduced leading to	a) Faster rate of degradation of solid	a) Landfill Gas can be trapped and used for

Sn	Parameter	Bio-Mining	Bioreactor Landfill (Aerobic-In Situ)	Capping with Gas Network
		possibility of land reclamation for other uses. b) A useful resource extraction method in which recovered materials, such as ferrous metals, aluminum, plastic, and glass, can be sold if markets exist for these materials c) Reclaimed soil can be used as daily cover material for other active landfill cells, thus saving the cost of buying cover material. Also, a market might exist for stabilized humus as compost d) Combustible reclaimed material can be used to produce energy. e) Savings in the landfill closure cost due to reduction in the landfill "footprint" due to utilization of recovered material from the waste reclamation. leads to f) Hazardous wastes if uncovered during biomining, especially at older landfills, could be managed in an environmentally sound manner.	organic material & its conversion to soil amendments b) Avoidance of production of methane (greenhouse gas) and odour during decomposition. c) Increase settlement/ airspace recovery d) Reduce leachate management liability and costs e) Removal of anaerobically recalcitrant compounds (i.e., ammonia-nitrogen) f) Operational flexibility and simple & robust technology g) Successfully applied to several landfills in Europe (Germany, Austria, Italy, Switzerland, and The Netherlands), North America and Asia (over half of the number of the landfills in Korea and a few landfills in Malaysia) h) Reduce environmental risk	power generation or steam generation if significant quantity. b) Possibility of land reclamation after waste relocation in smaller footprint and closure c) An impermeable cover system allows a minimum amount of water to enter to the landfill body and decreases the leachate generation to minimize groundwater pollution. d) Reduces emissions of gases to the air and avoids air inputs into the landfill. e) Simple & robust, least expensive method among various available technologies f) Effectively manages the human and ecological risks associated with a remediation site.
2	Limitations	a) Uncertainty related to the performance of technology in terms of quality levels of recovered material and whether the materials can actually be separated out from deposited waste b) Commercial viability issue regarding the benefits from the revenue from sale of recovered material	a) Not suitable for open dumpsite since in the absence of base liner there are chances of ground water contamination b) Suitable only if the waste has high organic content and waste stabilization is not complete c) In-situ monitoring of conditions to ensure that	a) The closed landfill has to be monitored for at least 15 years post closure until it completely stabilizes b) Post-closure monitoring period includes monitoring of the groundwater quality around the closed landfill, for at least 15-20years. c) Due to a longer exploitation time, the

Sn	Parameter	Bio-Mining	Bioreactor Landfill (Aerobic-In Situ)	Capping with Gas Network
		and cost of reclaimed land versus the cost of mining operations. c) Suitable only after waste stabilization d) Workers may be exposed to Hazardous waste during mining e) Environmental & safety issues including dust, odour and leachate problems, slope stability, risks of formation of explosive and poisonous gases during waste mining operations f) Hardly any market for reclaimed material in India apart from usage of soil as daily and top cover of landfill if organic content is low g) Requires additional land for storage of recovered material/soil, until it is sold/utilized for other purposes. h) Delays landfill closure	air and liquids follow similar flow patterns d) Determining the amount of air required (the rate of mass transfer of oxygen from the gas phase to the liquid is unknown) e) Aerobic operation costs more than anaerobic due to additional capital cost on blowers f) Capital intensive activity as compared to simple landfill closure option.	impermeable system must fulfill design criteria to give a safe and long-time protection.

6.3 CONCLUSION ON ANALYSIS OF THREE OPTIONS

(a) After analyzing the various reclamation options, its merits, demerits, and cost implications, GCC has decided to reclaim the land and remove the waste by Biomining. The main factors for considering biomining are

(i) Reclamation of land is possible to maximum extent in biomining, and the reclaimed land can be used for development of Integrated Processing facilities to manage daily incoming fresh waste.

(ii) GCC doesn't have any alternative or new land available for development of processing facilities for processing and disposal of day to day generated fresh waste for upcoming years.

(iii) Availability of various options for processing/disposal of recovered by-products like use of bio-earth as soil fertility enhancer, usage of plastics as RDF in cement plant etc is more environmentally friendly in nature;

(iv) Compliance to SWM rules 2016.

(v) Already biomining is being carried out in most of the ULB's in Tamil Nadu for site reclamation using biomining technology, so there is local level cost efficient expertise is available.

(b) Hence, it was decided that the biomining is only option which frees up maximum land for future use (establishment of future waste processing capacity) as well as more cost efficient.

7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Environmental and Social Management Plan (ESMP) is a site-specific plan developed to ensure that the project is implemented in an environmentally and socially sustainable manner. ESMP also ensures that project implementation is carried out in accordance with design by taking appropriate mitigation measures to minimize impacts on the environment and social during project implementation . ESMP will outline Environmental and social aspects as well as their level of risk and protection measures to diminish this risk. This section attempts to briefly analyse the environmental and social impacts of the proposed project and suggest the possible mitigation measures and management plans for perceived negative impacts.

7.1 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR THE PROPOSED PROJECT

Table 21: Environmental and Social Management Plan for Biomining

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
Pre-construction phase							
1.1	Engineering design and alternative analysis	Ensure that the investigation and analysis of alternative engineering design and technologies adopted for the Biomining project cause minimum environmental and social risk and impact during the project cycle; Ensure project circulation plan is made for the KDG site operations as both biomining activity and fresh waste handling at the site takes place simultaneously. Ensure this causes less impact to the project. Ensure that the proper analysis is carried out for traffic management while disposing the RDF, Bio-earth, inerts etc from the project site to other location causes less E&S impact. Ensure that the waste water (Leachate) if any generated in during the pre-construction activity is collected and treated separately. Provide odour control equipments at the Project Site location to mitigate odour nuisance.	GCC/PMC, Contractor	Design/Pre-construction	Review the performance of design and technology and route decided for the project; and Consult the experts and learn from the experiences gained from such projects elsewhere	Minimum E&S risk and impact; Minimum or no impact on local ecology, water bodies and forest; Minimum impact on land and livelihood of local communities; and cost effective and O&M efficient.	Once
1.2	Permits and approvals	Obtain all permits and approvals required for E&S aspects during pre-construction, construction, operation and decommissioning phases.	GCC/Contractor	Before construction commences	Keep record of all permit, approvals and authorizations	Permits and approvals are available	One time

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		These shall be made available from the TNPCB, TANGEDCO (to be obtained by GCC) and other approvals required for the project will be obtained. Ensure that all necessary approvals for construction to be obtained by contractor like labour license / labour insurance are obtained before start of construction.					
1.3	Labour accommodation and facilities	Identify the suitable location with sufficient area for security, basic amenities, first aid etc. Follow all relevant provisions of the Contract Labour regulation and guidelines for Workers. Follow all international and national regulations for Safety of workers. applicable laws for rented labour accommodation; Provide adequate number of toilets and uncontaminated water for drinking and washing; Labour accommodation and temporary shade near work sites shall provide protection from heat, rain, flooding, insects, snakes and mosquitoes. It should have adequate provisions for emergency such as fire safety, security, etc; Adequate healthcare is to be provided for the workforce; Ensure adequate water supply in all toilets	Contractor	During Pre-construction	Visual inspection; Consultations with labour, and local communities nearby; Site inspection; Facilities made available; Type of illness and its causes; and Discussions about the level of health awareness and safety precautions taken by the workers while working on the work site.	All the facilities available as per law and standards; Assess the satisfaction level of labourers; Easy access of first-aid box with required medicine and accessories at each working site, labour accommodation, labour and office to workers all the time; and Arrangement made with the Doctors at then nearest government health and medical	Everyday

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		and urinals; Provide separate toilets/ bathrooms for women laborers and shall be screened from those for men (marked in vernacular language. Ensure rest area is provided for the workers. Provide first aid medical kit at labour accommodation, temporary labour shed and working site; train the labour for usage of items in injury, emergency, coordinate with nearest government and private medical centers for the medical services, display the contact number of medical doctor(s) and keep a vehicle for emergency travel all the time; As per provisions of WHO and MOHFW guidelines of Covid-19, sanitizer, soap, mask, etc. should be made available in sufficient quantity and its use by the workers mandatorily and maintain social distancing all the time; Ensure medical tests and treatment of Covid-19 positive cases immediately; and Maintain the required data and documents at site and regularly submit the compliance report to the PMC.				center/ private clinic	

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
1.4	Public disclosure	Conducting FGDs and small group consultations. Publication about project features in Print-Newspaper, Newsletter / leaflets/ Pamphlet and through Radio information capsules. Internal department communication. Disclosure in GCC website.	GCC/PMC, Contractor, Registered Body/ society of Ragpickers established in Phase 1 of LTRIP / RAP implementation	From pre-construction phase till decommissioning phase	FGDs, public disclosure through the indicated means with people residing within 5 km radius, RWA within 5 km radius, GCC staffs, elected representatives and Rag pickers	Meeting copies, videos, Photo clippings etc.	Pre-construction- twice Construction phase- Quarterly Operation phase- Quarterly Decommissioning - twice
1.5	(i) Grievance redressal mechanism (project level) (ii) Grievance Redressal Mechanism for Ragpickers	Establish the efficient grievance redressal mechanism and accordingly constitute the grievance redressal committee (GRC) as outlined in the ESIA project level with representatives of all the stakeholders as members, including women and vulnerable groups of local communities; Ensure the wider publicity of procedure, functioning and availability of GRC since the inception of the project; All the grievances received shall be acknowledged and proper recording and tracking should be carried out; Convenor will be the coordinator for organizing GRC meetings as required, writing the proceedings, minutes of meeting, informing the aggrieved party about the	(i) GCC /PMC, Contractor (ii) Registered Body/ Society of Ragpickers established in Phase 1 of LTRIP / RAP implementation	Project life cycle	Review the proceeding and minutes of meetings; and Consultations with the members of GRC.	GRC established; GRC meetings held; Number of cases received and resolved as registered in the grievance register; Decision taken with in a timeframe; and Court case filed or withdrawn.	Monthly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		decision of GRC, etc;					
1.6	Submission of updated environmental & social management plan (ESMP) / site environmental plan (SEP); ESMP implementation and reporting for (i) Project Level (ii) Progress Report of LTRIP/ RAP	The contractor will prepare implementable ESMP plan which will be followed throughout the entire project life cycle. The ESMP measures will be with respect to air, water, noise, leachate and social aspects related to the project.	(i) Contactor/ PMC (ii) GCC/ LTRIP Consultant	From pre-construction phase till decommissioning phase	Review of reports and records	Compliance at the site	One-time / As and when need arises
1.7	Appointment and Mobilization of qualified Environment & Safety Officer	The contractor will appoint qualified and experienced qualified Environment & Safety Officer (ESO), who will be mobilized prior to start of works. ESO will dedicatedly work and ensure implementation of Environmental Management Plan including Occupational, Health and Safety measures during the project implementation.	Contractor	From pre-construction phase till decommissioning phase	Review reports and records	Appointment of qualified ESO by contractor as per RFP	One time
Construction Phase [1]- Construction phase involves in clearance of certain portion of land for installation of plant and machinery required for Biomining operations. ESMP pertaining to this construction activity is given below							
2.1.	Labour deployment and management	Based on the manpower requirement for project during construction phase the Contract will deploy the manpower accordingly.	Contractor, PMC/GCC	Construction phase	Review site management and labour plan; and Site inspection	Number and date of labour mobilization; and Date of starting works.	Periodically

[1] This entire biomining project has two phases: (a) Construction Phase & (b) Operations Phase. (a) Construction Phase comprises of clearance of part of land required for installation of equipment & machinery. (b) Operation Phase comprises of biomining operations where the waste will be stabilized then biominied to different fractions and disposal of different biomined fractions.

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		Accordingly, mobilize the labour/manpower on worksite for doing construction and operation related activites. Contractor shall prepare a Labour Management Plan which shall be reviewed by the Engineer in charge of PMC and approved.					
2.2	Site preparation	Ensure that during installation of plant and machinery required for biomining, during plant operation the land disturbance in minimal and ensure that all the other amenities including plant and machinery are constructed on even surface; Barricading of the specific area earmarked for plant & machinery , control room, recovered products storage area. Etc which will limit the disturbances or construction/operational impacts to the adjacent areas within the premises.	Contractor, GCC/PMC	Beginning of construction	Site inspection	Visual inspection of site condition with respect to before and during construciton	One time and periodically
2.3	Site Camp	Locate the suitable place at the project for the start of civil works, plant and machinery fabrication works at a particular place; Provide water and/or other health/safety facilities at the site camp location; Establish a suitable site office in portable cabin for supervision of works,	Contractor, GCC/PMC	Prior to start of construction	Review approved site camp and site office layout; and Site inspection	Approved site plan layout; and Area outside the site camp and site office designated as No-go area.	Once

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		Designate the area beyond the boundary of the site as No-Go areas for all personnel on site. No vehicles, machinery, materials and people shall be permitted in the No-Go area at any time without the permission.					
2.4	Barricading working site	Ensure that the construction site, plant and machinery fabrication area should be barricaded at all time with adequate marking, flags, reflectors etc. to isolate it from other operating areas. Ensure that during plant operation and storage of recovered fractions like RDF, bio-soil, inerts etc post biomining are clearly demarcated/barricaded with sheets and ensure that all the recovered fractions don't mix with each other.	Contractor	Prior to start of construction and during Biomining plant operation	Site inspection	Proper barricading in place; and Accident or casualty reported	Regularly
2.5	Stakeholder consultations	Undertake detailed mapping and analysis of key stakeholders. Based on the stakeholder analysis, stakeholder engagement plan is prepared that will be updated as required; Ensure that stakeholder including affected persons are consulted and made aware about the project's purpose, risks/ impacts, mitigation measures and time- frame; and Maintain the records and documentation of the procedure followed and the output of	Contractor/ PIU/PMC & GCC	Construction phase	Consultations with GCC Workers at KDG site, ragpickers and residents (within 5 km radius)	Awareness level of stakeholders, particularly the local communities, beneficiaries of the proposed project; and Perception of residents within 5 km radius, Potential Temporary	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		stakeholder engagement.				economic Impacts about the project and its impact and mitigation measures.	
2.6	Traffic management	Contractor shall prepare a Traffic Management Plant in consultation with GCC/PMC: To ensure separate route is made for vehicles that transport fresh generated waste to the KDG site during construction phase. The routing should be in such a way that vehicles carrying fresh waste and vehicles involved in biomining plant construction activity follow separate routes and don't meet each other. Ensure implementation of this traffic management plan during construction phase. Holding area shall be provided within the site for vehicles waiting to deliver loads at site to avoid queuing outside the site; Ensure that the vehicles follow speed norms of the traffic department; and Investigate and respond to complaints about traffic.	Contractor, GCC/ PMC	Construction phase	Review traffic management plan; and Site inspection	Implementation of traffic management plan adequately; Number of complaints received; and Incidence of accidents	Daily
2.7	Plant and machinery	Readymade or prefabricated machineries which requires minor modifications shall be used for installation of biomining plant and machinery into order to increase work efficiency and minimize the construction period;	Contractor, GCC/ PMC	Construction phase	Site inspection	Noise level and working of heavy machineries in order; and Construction material and its	Periodically

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		The materials that are used in biomining plant and machinery are properly covered with Tarpaulin when arriving at site;				transportation follow the norms.	
2.8	Construction material and plant /machinery items storage	Construction material stored in open shall be covered in order to avoid wind-blown dust emissions; Ensure and maintain record of proper stacking, loading and unloading of material and provide sufficient space for the movement of heavy vehicles inside the yard; Ensure handling the plant and machinery handling safely by the labour;	Contractor, GCC/PMC	Construction phase	Site inspection; and Review the material record maintained.	Clean and organized storage site; and Incidence of injury in loading, unloading and handling the material.	Periodically
2.9	Noise during biomining plant construction and vehicle movement	Ensure that all the vehicles that are involved in both construction and operation phases of biomining activity are serviced regularly Acoustic enclosure measures will be provided during operation to reduce noise level of machinery and DG set during construction; Contractor to maintain the proper record for all the construction vehicles, plant and machinery which shall have the valid fitness certificate, NOC, insurance, etc. The vehicle movement inside and outside shall be regulated so that there is less traffic and less honking is done. Ensure noise level in the residential and	Contractor	Construction phase	Review of monitoring records Random Noise measurements	Level of noise generated; and Number of registered complaints	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		industrial areas within the permissible limit; Provision of green belt around the Project site which will act as a noise barrier between project and surrounding area.					
2.10	Dust emissions	Vehicles/trucks carrying construction material for biomining plant and machinery shall be covered with tarpaulin sheet to avoid spillage; DG set if used at site shall have adequate stack height as per TNPCB requirement; Ensure that the roads used for shifting, are sprayed with water to avoid dust emissions due to vehicle movement. Periodic emission check for vehicles. Vehicles having PUC Certificates will be used during construction. Provision of Personal Protective Equipment such as face mask, gloves, nose masks & goggles for all the workers. Provision of thick green belt in and around the facility to control the dust/air emissions.	Contractor	Construction phase	Site inspection; Review of dust emission control measures.	Emission from plant and nearby roads used for construction ; Dust mitigation measures followed; and Number of complaints received.	Regularly
2.11	Air quality	Water sprinkling in all roads/routes which are used during biomining construction activity. Transportation of required construction	Contractor	Construction phase	Site inspection; Review of air pollution control measures;	Fuel emission from vehicles; Air pollution mitigation	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		materials should be done in covered vehicles/with tarpaulins to prevent fugitive emissions; Vehicles having PUC Certificates will be used. Stack heights for DG sets to be maintained in accordance with CPCB/MoEF norms; Provision of Personal Protective Equipment such as face mask, gloves, nose masks & goggles for all the workers. Provision of thick green belt in and around the facility to control the dust/air emissions				measures followed; and Number of complaints received.	
2.12	Odour	Use of herbal sanitizer and deodorizer for control of odour that is generated during construction phase.	Contractor	Construction phase	Site inspection and review of odour control measures,	Odour mitigation measures followed; and Number of complaints received.	Regularly
2.13	Water Quality (Ground and surface water)	The waste water generated from during construction shall be collected & treated separately or diverted to nearby STP for proper treatment and disposal. Preparation of spill response plans, particularly for fuel and oil storage areas.	Contractor	Construction phase	Site inspection; and Review of spillage control measures.	Fuel or lubricant spillage;	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
2.14	Protection of lakes/ water bodies	Contractor shall ensure that waste water generated during the construction phase doesn't contaminate the nearby water bodies and may be diverted to nearby STP (the contractor shall approach GCC to facilitate treatment of waste water in nearby STP till Leachate Management system with 100% scientific disposal in compliance with relevant rules and regulations becomes operational);	Contractor	Construction phase	Site inspection; functioning of and Review of spillage control measures. Site inspection	Fuel or lubricant spillage; Treated water characterisrtics from STP	Regularly
2.15	Safety of workforce	The workers and contractors involved in the construction activities will be trained on the necessary precaution and safety practices prior to commencement of works and during operations; Ensure availability and mandatory use of PPEs at the site; Ensure sufficient quantity of all PPEs, necessary safety appliances such as safety goggles, helmets, boots, safety belts, ear plugs, mask, etc. to workers and staffs; First Aid centers with facilities to be provided near the biomining plant area and at various biomining project locations; Emergency Preparedness plans shall be prepared and implemented for all manpower working centres and its field extension	Contractor, GCC/PMC	Construction phase	Site inspection; and Observation of workers with PPE and safety measures while working on work site.	Quantity and timely supply of PPEs; Awareness level about the use of PPEs; and Incidence of injury, accident, infirmity.	Everyday

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		centres. An Environment Health & Safety policy shall be prepared and implemented throughout the activities area; Routine inspections, housekeeping and maintenance will be carried out at regular intervals; The site should be provided with ambulance and should contain the number of nearby hospital phone number; Provision of fire extinguishers, fire hydrant system, fire engine to be provided at site in case of emergency and all the staff should be trained on how to handle in case of fire accidents; Proper retro reflective warning signage will be installed at various locations plant area. . Hazard Identification & Risk Assessment analysis shall be prepared for all activities; The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO)and applicable laws of India and Tamil Nadu state as applicable.					

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
2.16	Work-zone safety Management	Proper retro reflective warning signage will be installed on the access road next to the construction site about movement of plant machinery and vehicles. There shall be adequate lighting arrangement at night and adequate barricading to prevent mishaps after construction activity ceases for the day. All operational areas shall be access controlled. Watch and ward facilities at all times shall be provided by the contractor; A readily available first aid unit with necessary supplies, drinking water, resting shed, sanitation etc shall be made available in every work zone.	Contractor, GCC/PMC	Construction phase	Site inspection	Availability of safety measures Absence of safety Incidents	Everyday
2.17	Exposure to electrical equipment	The Contractor shall take all required precautions to prevent danger from electrical equipments during construction phase. All electrical devices to be marked with warning signs. Use the symbol of danger as warning of high electricity voltage or current flow on cable boxes or where required to avoid any incidence of current shock or electrocution; and Provision of specialized electrical safety	Contractor, PIU/PMC	Construction phase	Site inspection; Observation of power supply system; and Electricity safety precaution taken by workers while working on work site.	Incidence of current shock, injury, electrocution	Daily

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		training to those workers working with or around exposed components of electric circuits.					
2.18	Fire Safety	Ensure that no smoking is permitted on the working site; Ensure that sufficient and certified firefighting equipment are placed and maintained on the site; Equip all fuel stores and waste storage areas with fire extinguishers; Provision of fire extinguishers, fire hydrant system, fire engine to be provided at site in case of emergency and all the staff should be trained on how to handle in case of fire accidents. Ensure that all workforce and staff on site are aware of the location of firefighting equipment on the site; and Conduct training program on use of extinguishers, sand, etc for fire-fighting and ensure that they are trained in its operations.	Contractor	Construction phase	Inspect Attendance register for firefighting training conducted; and Observation of fire extinguishers and certificate at the sites.	Number of Fire incidents; Certified extinguishers in appropriate locations; and Workers knowledge to operate the fire extinguisher	Periodically
2.19	Emergency response to manage cyclone and other disaster conditions	Contractor shall ensure efficient communication system in place which will be required during occurrence of any natural hazard; Evacuation plan shall be in place for the site;	Contractor, GCC/ PMC	Construction Phase	Inspect attendance register for training program; and Inspect fire extinguishers and certificate	DMP in place; Communication system in existence;	When required

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		Evacuation plan or route is displayed clearly through signs or picture at prominent places within the sites; Ensure effective coordination within the workforce and concerned departments and display contact number of concerned persons at prominent places; and Earmarking of assembly points. Conduct training program and mock drills to workers to deal with the disaster situations due to occurrence of cyclones and tsunami.				Display of evacuation route; Capacity of workers to manage; and Disaster and emergency situations	
Social aspect							
2.20	Compensation and Assistances to potential temporary economic impacts	Both GCC & GoTN were of the opinion that cash compensation shall neither be sustainable in the long run nor fiscally prudent. Hence it has been decided that instead of cash compensation as per ECSMF GCC shall ensure that the ragpickers shall be gainfully employed in the proposed waste processing facilities which shall be established at the Kodungaiyur site post biomining completion. Prior to this, they shall have access to designated areas of the project site as per LTRIP/ RAP implementation. Creation of a registered/ cooperative society as part of LTRIP/ RAP implementation to represent ragpickers on all matters pertaining to the above	GCC	Pre - Construction Phase to Post commissioning phase	Baseline Survey with cutoff date Official demarcation of access to Temporary Dumping Ground during project construction phase. Establishment of Registered/ cooperative society as per LTRIP/ RAP Ragpickers society negotiates with GCC/	Compliance as approved timeline	Periodically

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
					Concessionaires to finalize long term employment options post commissioning phase.		
2.21	Loss of access	The contractor shall ensure that access to connecting roads; market, residence and other places should be congested to the minimum possible extent. In case, it is unavoidable, then alternate route should be provided to people. The nearby residents (2 km radius) should be made aware about the traffic management/diversion plan along with expected deadline for the completion of work. After completion of the work, the access should be restored as per original condition. Proper information shall be disclosed through newspapers, multimedia, signage boards, radio, banners etc	Contractor & PMC/ GCC	Construction	Visual inspection	Crossing/ access closed	Regularly
3. Operation Phase- In the Operation phase, the legacy waste will be stabilized and processed in the Biomining plant where the waste gets separated into different fraction like RDF, Bio-soil, metals, inerts etc. After this process the recovered fractions will be disposed in compliance to existing rules and regulations.							
3.1	Labour deployment and management	Based on the manpower requirement for project during operation phase the Contract will deploy the manpower accordingly. Accordingly, mobilize the labour/manpower on worksite for doing operation related activites. Contractor shall prepare a Labour Management Plan which shall be reviewed by the Engineer in charge of PMC and approved.	Contractor, PMC/GCC	Operation phase	Review site management and labour plan; and Site inspection	Number and date of labour mobilization; and Date of starting works.	Periodically

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
3.2	Traffic management	Contractor shall prepare a Traffic Management Plant in consultation with GCC/PMC: Ensure that separate route is made for vehicles that transport fresh generated waste to the KDG site during operational phase. The routing should be in such a way that vehicles carrying fresh waste and vehicles involved in biomining plant operation activities like (waste shifting, RDF disposal, bio earth disposal, inert disposal etc) follow separate routes and don't meet each other. Ensure implementation of this traffic management plan during operation phase. Ensure the recovered products disposal like RDF, inerts are done at night time or at times whenever the traffic congestion is minimal Ensure that the vehicles follow speed norms of the traffic department; and Investigate and respond to complaints about traffic.	Contractor, GCC/ PMC	Operation phase	Review traffic management plan; and Site inspection	Implementation of traffic management plan adequately; Number of complaints received; and Incidence of accidents	Daily
3.3	Noise from biomining plant, machineries and vehicles	Ensure that all the vehicles that are involved in operation phases of biomining activity are serviced regularly. The biomining plant and machinery items like trommel, conveyors, density separator, Shredder etc are following regular & timely maintenance schedule to avoid noise	Contractor	Operation phase	Review of monitoring records Random Noise measurements	Level of noise generated; and Number of registered complaints	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		emulating from plant operations. All plant and machinery to be used shall conform to the relevant Indian Standards (IS), kept in good working order, properly maintained and inspected regularly; Acoustic enclosure measures will be provided during operation to reduce noise level of machinery and DG set; Contractor to maintain the proper record for all the construction vehicles, plant and machinery which shall have the valid fitness certificate, NOC, insurance, etc. The vehicle movement inside and outside shall be regulated so that there is less traffic and less honking is done. The vehicle used for disposal shall be used only during time when the traffic movement is minimal; Ensure noise level in the residential and industrial areas within the permissible limit; Regular monitoring of noise shall be conducted at site during the operations of machines and equipment; and Technicians/mechanics working on noise generating machineries will use PPEs such					

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		as ear plug, muffler, etc. Provision of green belt around the Project site which will act as a noise barrier between project and surrounding area.					
3.4	Dust emissions	Trucks carrying waste during biomining operations shall be adequately covered with tarpaulin sheet to avoid the dust pollution and the material spillage; DG set if used at site shall have adequate stack height as per TNPCB requirement; Ensure that the roads used for waste, shifting, operations and disposal are sprayed with water to avoid dust emissions due to vehicle movement. Transportation of RDF, soil and fine aggregates etc should be done in covered vehicles/with tarpaulins to prevent fugitive emissions; Periodic emission check for vehicles. Vehicles having PUC Certificates will be used for transportation and disposal Provision of Personal Protective Equipment such as face mask, gloves, nose masks & goggles for all the workers. Provision of thick green belt in and around	Contractor	Operation phase	Site inspection; Review of dust emission control measures.	Emission from plant and nearby roads used for biomining operations; Dust mitigation measures followed; and Number of complaints received.	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		the facility to control the dust/air emissions.					
3.5	Air quality	Water sprinkling in all roads/routes where the biomining activity like waste shifting, disposal etc should be used to reduce airborne dust at sites; Transportation of RDF, soil and fine aggregates etc should be done in covered vehicles/with tarpaulins to prevent fugitive emissions; Vehicles having PUC Certificates will be used for transportation and disposal . All the tippers used for waste transportation should be covered with Tarpaulin. Stack heights for DG sets to be maintained in accordance with CPCB/MoEF norms; Provision of Personal Protective Equipment such as face mask, gloves, nose masks & goggles for all the workers. Provision of thick green belt in and around the facility to control the dust/air emissions	Contractor	Operation phase	Site inspection; Review of air pollution control measures;	Fuel emission from vehicles; Air pollution mitigation measures followed; and Number of complaints received.	Regularly
3.6	Odour	Use of herbal sanitizer and deodorizer for control of odour that is generated during plant operations, waste turning, operations and shifting of waste.	Contractor	Operation phase	Site inspection and review of odour control measures,	Odour mitigation measures followed; and	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
						Number of complaints received.	
3.7	Water Quality (Ground and surface water)	Installation of leachate Treatment plant for collection and treatment of leachate generated during biomining operations so that the leachate generated from waste biomining operations doesn't pollute the ground and surface water nearby. Preparation of spill response plans, particularly for fuel and oil storage areas. The waste water generated from vehicle, plant and machinery washing shall be collected & treated separately in nearby STP or shall be diverted to Leachate Treatment plant to ensure proper treatment and disposal.	Contractor	Operation phase	Site inspection; functioning of leachate treatment plant and Review of spillage control measures.	Fuel or lubricant spillage; and Output parameters of treated leachate from Leachate Treatment Plant	Regularly
3.8	Protection of lakes/ water bodies	Contractor shall ensure that all vehicle / machinery and equipment operation, maintenance and refueling will be carried out in such a manner that spillage of fuels and lubricants will not contaminate the nearby water bodies ; Contractor shall ensure that the leachate generated from the biomining operations is collected and treated in Leachate Management system with 100% scientific disposal in compliance with relevant rules	Contractor	Operation phase	Site inspection; functioning of leachate treatment plant and Review of spillage control measures.	Fuel or lubricant spillage; and Output parameters of treated leachate from Leachate Treatment Plant Underground water pollution mitigation measures followed.	Regularly

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		and regulations in order to prevent contamination of water bodies nearby.					
3.9	Safety of workforce	Adequate precautions shall be taken to prevent the accidents from the biomining plant and machineries. All machines shall confirm to the relevant Indian Standards Code and shall be regularly inspected for its working condition; The workers and contractors involved in the operation activities will be trained on the necessary precaution and safety practices prior to commencement of works and during operations; Ensure availability and mandatory use of PPEs at the site; Ensure sufficient quantity of all PPEs, necessary safety appliances such as safety goggles, helmets, boots, safety belts, ear plugs, mask, etc. to workers and staffs; First Aid centers with facilities to be provided near the biomining plant area and at various biomining project locations; Emergency Preparedness plans shall be prepared and implemented for all manpower working centres and its field extension centres.	Contractor, GCC/PMC	Operation phase	Site inspection; and Observation of workers with PPE and safety measures while working on work site.	Quantity and timely supply of PPEs; Awareness level about the use of PPEs; and Incidence of injury, accident, infirmity.	Everyday

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		An Environment Health & Safety policy shall be prepared and implemented throughout the activities area; Routine inspections, housekeeping and maintenance will be carried out at regular intervals; The site should be provided with ambulance and should contain the number of nearby hospital phone number; Provision of fire extinguishers, fire hydrant system, fire engine to be provided at site in case of emergency and all the staff should be trained on how to handle in case of fire accidents; Proper retro reflective warning signage will be installed at various locations of Biomining plant and at waste storage/disposal locations. plant machinery and vehicles. Hazard Identification & Risk Assessment analysis shall be prepared for all activities; The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO)and applicable laws of India and Tamil Nadu state as applicable.					

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
3.10	Work-zone safety Management	Temporary barricades shall be provided to delineate project activity area as well material stacking areas. The project activity site and the labour facility shall be appropriately barricaded to prevent entry and accidental tress-passing of workers, staff and others; All operational areas shall be access controlled. Watch and ward facilities at all times shall be provided by the contractor; Proper retro reflective warning signage will be installed on the access road next to the construction site about movement of plant machinery and vehicles. There shall be adequate lighting arrangement at night and adequate barricading to prevent mishaps after construction activity ceases for the day. A readily available first aid unit with necessary supplies, drinking water, resting shed, sanitation etc shall be made available in every work zone.	Contractor, GCC/PMC	Operation phase	Site inspection	Availability of safety measures Absence of safety Incidents	Everyday
3.11	Exposure to electrical equipment	The Contractor shall take all required precautions to prevent danger from electrical equipments that are involved in biomining plant and machinery and it the electricity supply location at biomining plant;	Contractor, PIU/PMC	Operation phase	Site inspection; Observation of power supply system; and Electricity safety precaution taken by workers while	Incidence of current shock, injury, electrocution	Daily

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		All electrical devices to be marked with warning signs. Use the symbol of danger as warning of high electricity voltage or current flow on cable boxes or where required to avoid any incidence of current shock or electrocution; and Provision of specialized electrical safety training to those workers working with or around exposed components of electric circuits.			working on work site.		
3.12	Fire Safety	Ensure that no smoking is permitted on the working site; Ensure that sufficient and certified firefighting equipment are placed and maintained on the site; Equip all fuel stores and waste storage areas with fire extinguishers; Provision of fire extinguishers, fire hydrant system, fire engine to be provided at site in case of emergency and all the staff should be trained on how to handle in case of fire accidents. Ensure that all workforce and staff on site are aware of the location of firefighting equipment on the site; and Conduct training program on use of	Contractor	Operation phase	Inspect Attendance register for firefighting training conducted; and Observation of fire extinguishers and certificate at the sites.	Number of Fire incidents; Certified extinguishers in appropriate locations; and Workers knowledge to operate the fire extinguisher	Periodically

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
		extinguishers, sand, etc for fire-fighting and ensure that they are trained in its operations.					
3.13	Emergency response to manage cyclone and other disaster conditions	Contractor shall ensure efficient communication system in place which will be required during occurrence of any natural hazard; Evacuation plan shall be in place for the site; Evacuation plan or route is displayed clearly through signs or picture at prominent places within the sites; Ensure effective coordination within the workforce and concerned departments and display contact number of concerned persons at prominent places; and Earmarking of assembly points. Conduct training program and mock drills to workers to deal with the disaster situations due to occurrence of cyclones and tsunami.	Contractor, GCC/ PMC	Operation Phase	Inspect attendance register for training program; and Inspect fire extinguishers and certificate	DMP in place; Communication system in existence; Display of evacuation route; Capacity of workers to manage; and Disaster and emergency situations	When required
3.14	Access to Ragpickers in fresh waste disposal areas	Contractor, Registered Body/ Society of Ragpickers & GCC shall ensure a streamlined process for identification of ragpickers and giving them access to the fresh waste disposal areas within project site	Contractor, Registered Body/ Society of Ragpickers & GCC	Pre-Operation & Operation Phase	As per approved LTRIP/ RAP No. of Ragpickers given access	As per approved LTRIP/ RAP	As per approved LTRIP/ RAP
3.Decommissioning phase							

S. No.	Aspect	Mitigation measures	Responsibility	phase	Monitoring method	Monitoring indicator	Frequency
3.1	Site clearance and rehabilitation/ Post-construction clean-up	Remove all construction equipment, vehicles, surplus materials, site office facilities, temporary fencing, structures and other items from the project site including plant and machinery; Clean up and remove any spills and contaminated soil in the appropriate manner; Level the disturbed area and restore to a condition of existing road level inside the site; and Ensure site is fully clean and tidy before the exit and prior to its handover to the officer of GCC and other authorized persons.	Contractor	After completion of construction phase and operation phase	Site inspection; and Review of record of activities upon completion of construction phase and commissioning phase	Restoration of construction sites in original condition; and Sites are fully rehabilitated prior to commissioning of project	Weekly

7.2 ENVIRONMENTAL MONITORING PLAN FOR THE PROPOSED PROJECT

Environment Monitoring Plan is detection of any potential impacts of project on the groundwater, surface water and ambient air in the vicinity of site. This is required to evaluate the performance of project site and to monitor potential environmental impacts and public health and safety risks from any contaminant release during the construction and operation stage. The different types of Environmental Monitoring considered for project is given below

7.2.1 BASELINE ENVIRONMENTAL MONITORING

The base line environmental monitoring will be done in order to set the present baseline standards of all the environmental parameters with respect to air, water, noise etc. These values will act as base value for monitoring and evaluation during construction and operation phase of biomining. The various monitoring to be done are given below

Project Stage: Pre-Construction : Baseline Air Quality Monitoring

A	Parameter	PM10, PM2.5, SO2, NOx, CO and Pb etc as per CPCB guidelines
B	Sampling Method	Use method specified by CPCB for analysis
C	Standards	National Ambient Air Quality Standards 2009, Air (Prevention and Control of Pollution) Act,1981 Or relevant CPCB standards/guidelines
D	Frequency	Before Preconstruction
E	Duration	As per CPCB guidelines for monitoring
F	Location	Minimum 6 locations (Within site and outside site) one in upwind, one in cross wind and 2 in downwind direction and 2 outside site nearby 500m radius of site and DG set if any.
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC & GCC

Project Stage: Pre-Construction : Baseline Water Quality Monitoring (Ground and Surface Water)

A	Parameter	IS 10500:2012 drinking water parameters for both ground and surface water
B	Sampling Method	Grab sample to be collected and analysis as per Standard Methods for Examination of water and Wastewater.
C	Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,2012) Or relevant CPCB standards / guidelines
D	Frequency	Before Preconstruction
E	Duration	--
F	Location	Minimum 4 locations-ground water from the nearest tube well or bore well near 50m periphery of site and within site from monitoring bore wells for ground water & Minimum 4 locations-Surface water within 2 km radius of site periphery
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC/GCC

Project Stage: Pre-Construction : Baseline Noise level Monitoring

A	Parameter	Noise Levels on dB (A) scale
B	Sampling Method	Free field at 1 m from the equipment whose noise level are being measured Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
C	Standards	National Ambient Air Quality Standards in respect of Noise, Noise Pollution (Regulation and Control) Rules, 2000
D	Frequency	Preconstruction phase
E	Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour and then average out for analysis
F	Location	Minimum 10 locations-Within Site (DG set, Plant site, waste excavation is) and outside habitation which is nearby 500 m radius of site
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC/GCC

Project Stage: Pre-Construction : Baseline Odour level Monitoring

A	Parameter	H2S level within and next PS
B	Sampling Method	Use method specified by CPCB for analysis
C	Standards	National Ambient Air Quality Standards 2009, Air (Prevention and Control of Pollution) Act,1981 Or relevant CPCB standards/guidelines
D	Frequency	Pre construction
E	Duration	As per CPCB guidelines for monitoring
F	Location	Plant area. Minimum 2 locations and outside minimum 5 locations with 100 m radius
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC/GCC

7.2.2 ENVIRONMENTAL MONITORING DURING CONSTRUCTION AND OPERATION PHASE

Project Stage: Construction & Operation Phase : Air Quality Monitoring

A	Parameter	PM10, PM2.5, SO2, NOx, CO and Pb etc as per CPCB guidelines
B	Sampling Method	Use method specified by CPCB for analysis
C	Standards	National Ambient Air Quality Standards 2009, Air (Prevention and Control of Pollution) Act,1981 Or relevant CPCB standards/guidelines
D	Frequency	Monthly
E	Duration	As per CPCB guidelines for monitoring
F	Location	Minimum 6 locations (Within site and outside site) one in upwind, one in cross wind and 2 in downwind direction and 2 outside site nearby 500m radius of site and DG set if any.
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC & GCC

Project Stage: Construction & Operation Phase : Water Quality Monitoring (Ground and Surface Water)

A	Parameter	IS 10500:2012 drinking water parameters for both ground and surface water
B	Sampling Method	Grab sample to be collected and analysis as per Standard Methods for Examination of water and Wastewater.
C	Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,2012) Or relevant CPCB standards / guidelines
D	Frequency	Monthly
E	Duration	--
F	Location	Minimum 4 locations-ground water from the nearest tube well or bore well near 50m periphery of site and within site from monitoring bore wells for ground water & Minimum 4 locations-Surface water within 2 km radius of site periphery
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC/GCC

Project Stage: Construction & Operation Phase : Noise level Monitoring

A	Parameter	Noise Levels on dB (A) scale
B	Sampling Method	Free field at 1 m from the equipment whose noise level are being measured Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement
C	Standards	National Ambient Air Quality Standards in respect of Noise, Noise Pollution (Regulation and Control) Rules, 2000
D	Frequency	Monthly
E	Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour and then average out for analysis
F	Location	Minimum 10 locations-Within Site (DG set, Plant site, waste excavation is) and outside habitation which is nearby 500 m radius of site
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC/GCC

Project Stage: Construction & Operation Phase : Odour level Monitoring

A	Parameter	H2S level within and next PS
B	Sampling Method	Use method specified by CPCB for analysis
C	Standards	National Ambient Air Quality Standards 2009, Air (Prevention and Control of Pollution) Act,1981 Or relevant CPCB standards/guidelines
D	Frequency	Pre construction
E	Duration	As per CPCB guidelines for monitoring
F	Location	Plant area. Minimum 2 locations and outside minimum 5 locations with 100 m radius
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC/GCC

Project Stage: Construction & Operation Phase : Leachate

A	Parameter	As per treated leachate standards specified in SWM rules 2016
B	Sampling Method	Use method specified by CPCB for analysis
C	Standards	CPCB standards/guidelines
D	Frequency	Monthly
E	Duration	As per CPCB guidelines for monitoring
F	Location	At inlet & oulet of Leachate Management system with 100% scientific disposal in compliance with relevant rules and regulations
G	Implementation	Contractor through NABET Accredited Labs
H	Supervision	PMC/GCC

7.3 DISASTER MANAGEMENT PLAN:

(a) The Disaster Management Plan (DMP) is aimed to ensure safety of life, protection of environment, protection of installation, restoration of production and salvage operations in this same order of priorities. For effective implementation of DMP, it should be widely circulated, and a personnel training is to be provided through rehearsals/drills. To tackle the consequences of a major emergency inside the plant or immediate vicinity of the plant, a DMP has to be formulated and this planned emergency document is called DMP. The objective of the DMP is to make use of the combined resources of the plant and the outside services to achieve the following:

(i) To localize the emergency and if possible, eliminate it;

(ii) To minimize the effects of the accident on people and property;

(iii) Effect the rescue and medical treatment of casualties;

(iv) Safeguard other people;

(v) Evacuate people to safe areas;

(vi) Informing and collaborating with statutory authorities;

(vii) Provide authoritative information to news media;

(viii) Initially contain and ultimately bring the incident under control;

(ix) Preserve relevant records and equipment for the subsequent enquiry into the cause and circumstances of the emergency;

(x) Investigating and taking steps to prevent reoccurrence

(xi) In effect, it is to optimize operational efficiency to rescue rehabilitation and render medical help and to restore normalcy. The following components of DMP include the following:

7.3.1 EMERGENCY PREPAREDNESS PLAN

(a) Emergency Preparedness Plan for operational period of proposed plant is also crucial ensuring accident free and minimized occupational hazard approach for staff deployed in operations.

(b) The proposed emergency preparedness plan shall be designed, prepared and implemented by Manager- Safety, Health & Quality of Environmental management department following the National Environmental Emergency Plan and OSHA guidelines and the plant operations shall be certified for ISO management system by third party or accredited agency.

(c) Any emergency starts as a small incident that may become a major accident if not controlled in time. At the initial stages, the incident organization chart (would be prepared separately for each facility) shall need to be put into action. If the incident goes beyond control, the Main Incident Controller will need to actuate the on-site plan at the appropriate stage as considered necessary. During idle shift/ holidays, the security personnel will combat the incident as per the organization chart and at the same time inform various emergency controllers for guidance and control the situation

(d) Response operations should always cover these four phases:

(i) Discovery and alarm

(ii) Evaluation, notification and plan invocation

(iii) Containment and counter measures

(iv) Clean up and disposal

(e) The site controller will maintain a list of emergency handling equipment including details of fire extinguishers, first aid kit, public information, protective clothing, and personal protective equipment for emergency handlers etc. Details of fire management services of Chennai city and neighbouring hospitals & necessary emergency provisions applicable to the handling, treatment or disposal of certain pollutants will be available with site controller in his operating checklist. Crane, ambulance, fire tender, soil, tippers etc may be used.

7.3.2 EMERGENCY RESPONSE

(a) Various units within the project facility are always subjected to accidents and incidents of many a kind. Therefore, a survey of potential incidents and accidents is to be carried out. Based on this, a plan for response to incidents, injuries and emergencies should be prepared.

(b) The exposure of workers should be limited as much as possible during the operation.

(c) With regard to dangerous spills, associated cleanup and firefighting operations should be carried out by specially allocated and trained personnel & limited impact on the environment at the extent possible

(d) Firefighting personnel working in or close to un-ignited vapour clouds or close to fire, must be protected continuously by water spray, fire entry suit, water jet blanket etc.

(e) Written procedures for different types of emergencies should be prepared and the entire workforce should be trained in emergency response. All relevant emergency response equipment should also be readily available and arrange to inform the leader/ senior representative regarding, location, extent, callers name and number.

(f) Security on duty co-ordinators will

(i) Respond to the scene of incident

(ii) Arrange to send the necessary firefighting equipment to the scene of the incident

(iii) Extinguish the fire with the available equipment

(g) Security Officer will

(i) Sound the Siren as per the Siren Code

(ii) Inform the Site Main / Incident Controller and act as per his instructions

(iii) To ensure closure of gates immediately to regulate traffic in such a way that free movement of outside assistance like fire tenders, ambulance etc. is available.

(h) All Other Management / Asst./ Labour Staff on hearing the siren, should STOP their operations/ work, switch off lights, fans, engines, air conditioners etc., close all doors, pipeline valves and line up in front of their working places and meet at a pre-arranged location. These people will assist in evacuating the residents if necessary.

7.3.3 RESPONSE TO INJURIES

(a) Based on a survey of possible injuries, a procedure for response to injuries or exposure to hazardous substances should be established. All staff should have minimum training to such response and the procedure ought to include the following:

(i) Immediate first aid, such as eye splashing, cleansing of wounds and skin, and bandaging

(ii) Immediate reporting to a responsible designated person

(iii) If possible, retention of the item and details of its source for identification of possible hazards

(iv) Rapid additional medical care from medical personnel

(v) Medical surveillance

(vi) Recording of the incident

(vii) Early warning system

(viii) Investigation, determination and implementation of remedial action

(ix) Document in electronic form the assessment results, recommendations, and mitigation measures implemented

(b) It is vital that incident reporting should be straightforward so that reporting is actually carried out.

7.3.4 EMERGENCY COMMUNICATION

(a) Whoever notices an emergency situation such as fire, natural disaster, equipment failure, leakage, etc. would inform his immediate superior and Emergency Control Centre. The person on duty in the Emergency Control Centre, would appraise the Site Controller. Site Controller verifies the situation from the Incident Controller of that area or the Shift In charge and takes a decision about an impending On-site Emergency. This would be communicated to all the Incident Controllers, Emergency Coordinators. Simultaneously, the emergency warning system would be activated on the instructions of the Site Controller.

7.3.5 EARLY WARNING / ALARM SYSTEM

(a) An audible electric alarm (siren) should be located in the main gate. The different sounds that should be generated by the alarm are:

Sl. No.	Incident Type	Alarm
1	Small Fire	No Siren
2	Major Fire	A wailing Siren for two minutes. Sirens will be sounded three times for thirty seconds with an interval of 15 seconds in between
3	Emergency	Same type of Siren as in case of major fire but the same will be sounded for three times at the interval of two minutes.
4	All Clear (For Fire)	Straight Run Siren for two minutes

7.3.6 EMERGENCY FACILITIES

(a) Emergency Control Centre – with access to important personnel, telephone, fax, telex facility, safe contained breathing apparatus, hand tools, emergency shut down procedures, duties and contact details of key personnel and government agencies, emergency equipments, etc.

(b) Early Warning System – to help communities in determining appropriate management options in advance of a disaster. A plan identifying cost-effective disaster waste management options and resources can save money, increase control over waste management and improve administrative efficiency as per SDMA.

(c) Assembly Point – with minimum facilities for safety and rescue

(d) Emergency Power Supply – connected with diesel generator, flame proof emergency lamps, etc.

(e) Fire Fighting Facilities – first aid firefighting equipments, fire alarms, etc.

(f) Location of wind Stock – located at appropriate location to indicate the direction of wind for emergency escape

(g) Emergency Medical Facilities – Stretchers, gas masks, general first aid, emergency control room, breathing apparatus, other emergency medical equipment, ambulance

(h) Periodic Mock Drills - will be conducted periodically for ensuring its efficiency during emergency as well as for refinement and updation

7.4 COST ESTIMATES FOR ENVIRONMENTAL MONITORING PLAN

(a) For arriving at the Environmental Monitoring cost, quotations were received from three different vendors (quotations attached in Annexure-16) and the average of the three has been considered for costing. Since the biomining Package is divided into six packages, all the six packages contractor will do the Environmental monitoring for its package individually. The cost of Environmental monitoring is tabulated below

Table 22 Cost of Environmental Monitoring per Package

S.no	Type of Monitoring	Total number of samples	Average cost/sampling (Rs)	Overall cost in Rs
1	Ambient Air Quality Monitoring	6	4,233	25,400
2	DG stack Monitoring	1	2,067	2,067
3	Ground Water Monitoring	4	4,667	18,667
4	Surface Water Monitoring	4	4,667	18,667
5	Leachate Monitoring	2	4,500	9,000
6	Noise Monitoring	10	650	6,500
7	Landfill Gases & odour	7	4,333	30,333
8	Soil Quality testing	2	3,267	6,533
9	Sample collection charges	lumpsum	2,500	2,500
	Total cost per package/ month			**119667**
	Total Number of Packages			6
	Overall cost/month			7,18,002
	Duration of Biomining (months)			24
Overall cost of Environmental Monitoring for entire project				**17,232,048**

7.5 ENVIRONMENTAL & SOCIAL COST OF THE PROJECT

(a) In this project, the environmental cost will be borne by GCC and Contractor.

(b) Since the biomining project is being divided into six packages the cost of controlling air pollution till land clearance biomining will be borne by GCC in the areas which is common for

all the packages. The common area mostly contains the roads where GCC will control the air emissions.

(c) For controlling air emissions quantity per day three water tankers are required. The capacity of the water tankers is 6KL, so per day 18 KL water is required. The required water can be sourced from nearby STP. The CMWSSB rate is Rs.475 per 6KL of water supply. So, per day the cost of water tankers is Rs.1425.00/day. For a year it is Rs.5,20,125.00. it is envisaged that the biomining activity will take place for at least two years. So the cost of ESMP for GCC is Rs.10,40,250.00

(d) Overall the leachate generation is 30KLD is estimated to be generated from the project. Each Biomining Operator will install and operate individual Leachate Management system with 100% scientific disposal in compliance with relevant rules and regulations within his project area premises.

(e) During the process of Biomining, all the six packages biomining operators has to do the Environmental Monitoring at their project area packages. This has to be done in order to check whether the Biomining activity is causing any damage or effects to the already existing environment or not. Monthly monitoring has to be done for all the packages till the biomining activity is completed.

(f) The environmental costs like Cost of Environmental safety officer, cost of fire extinguishers, firefighting system and green belt etc are already embedded into the Biomining Fee payable to the Contractor.

Table 23 Environmental Costs that are already included in the Biomining fee

S.no	Type of Environmental activity	Cost per Annum (In Rs. Lakhs)
1	Salary of Environmental and Safety Officer	4.62
2	Cost of Fire Extinguisher and safety items like gloves, mask, first aid kit, signage boards etc	8.50
3	Fire Fighting system and Green belt	10.00

(g) After excluding the already included environmental costs in the Biomining Fee Payable to the contractor, the overall Environmental cost of the project is tabulated below

Table 24 Total Environmental cost of the Project

Sl. No	Environmental Cost	Remarks	Cost in Rs Lakhs
Cost to GCC			
1	Water for Controlling air emissions	*Cost of tankers.*	Rs. 10,40,250.00
Cost to Concessionaire			

1	Environmental monitoring cost	*Environmental monitoring inside and outside KDG during biomining process*.	Rs. 17,232,048.00
2	Leachate Treatment Plant (5KLD per package total 30KLD)	*Leachate treatment Plant*	Rs. 36,798,000.00
3	Capacity Building, Training and Public Awareness	*Lump sum*	Rs.10,00,000.00
	Total Cost		**Rs. 56,070,298.00**

(h) The IEC cost for the project has been calculated at Rupees 1.95 crore and has been approved by the Government of Tamil Nadu

(i) Hence total ESIA Cost of the Project is given in the table below.

Sl. No	details	Remarks	Cost in Rs Lakhs
		Cost to GCC	
1	Water for Controlling air emissions	*Cost of tankers.*	Rs. 10,40,250.00
2	IEC activities cost of the Project	*Cost of conducting IEC working during biomining project*	Rs. 1,95,02,720.00
		Cost to Concessionaire	
1	Environmental monitoring cost	*Environmental monitoring inside and outside KDG during biomining process*.	Rs. 17,232,048.00
2	Leachate Treatment Plant (5KLD per package total 30KLD)	*Leachate treatment Plant*	Rs. 36,798,000.00
3	Capacity Building, Training and Public Awareness	*Lump sum*	Rs.10,00,000.00
	Total Cost		**Rs. 7,55,73,018.00**

8 IMPLEMENTATION ARRANGEMENT AND INSTITUTIONAL MECHANISM

8.1 IMPLEMENTATION AND INSTITUTIONAL ARRANGEMENTS

(a) The estimated cost of the Project is Rs.648.38 crores. The Biomining project will be implemented through EPC (Turnkey Model) in compliance with KFW procurement guidelines and Tamil Nadu Transparency in Tenders Act. 1998.

(b) The environmental and social management plan identified for the proposed project will be included in the bid documents for ensuring implementation of the environmental and social safeguards. Implementation of the management measures by the contractor will be ensured by GCC and the Project Management Consultant appointed by GCC.

8.2 MONITORING AND EVALUATION

(a) The E&S experts of the PMC will review the updated ESMP and sub-plans submitted by the contractor and will ensure that such plans are in line with the applicable laws and regulations as well as ESHS requirements as per ESMF. The experts will supervise the implementation of plans and will report on the E&S safeguard status and performance under the project. The internal monitoring reports will at minimum include, but may not be limited to the following:

(i) Reporting period and context;

(ii) Summary of project status;

(iii) Regulatory compliance;

(iv) Institutional set up and manpower management status;

(v) Environmental, social, health and safety of workers and local communities;

(vi) Implementation status of ESMP, SEP, WMP;

(vii) Monitoring of waste disposal and management;

(viii) Monitoring of environmental attributes (air, water, noise) and social mitigation measures

(ix) Complaints and grievances redressal; and

(x) Stakeholder engagement and community development activities.

8.3 GRIEVANCE REDRESSAL MECHANISM

(a) A common GRM will be in place to redress social, environmental or any other project related grievances. A Two tier GRM shall be constituted.

(b) Grievance Redress Committee (GRC) shall comprise of the following**:**

(i) 1st level grievance redress: Comprises of

- PIU/ULB supervision personnel
- PMC supervision personnel
- Contractors site engineer & ESO. To resolve issues on-site in consultation with each other.

(ii) 2nd Level grievance redress: The Project level GRC shall be constituted with a minimum of three persons with (preferably one of them as woman).

- Commissioner of the ULB
- Executive Engineer of the Implementing Agency
- Representatives from PMC (TL, E&S Safeguards specialists)
- Others may be nominated, as required

(c) The GRC shall

- Convene meetings of the committee as necessary at such place or places in the PIA as he/she considers appropriate; and
- Conduct the proceedings in an informal manner as he/she considers appropriate with the object to bring an amicable settlement between the parties.

(d) Step by step approach will be followed for redressing grievances. First, the aggrieved person to approach the GRC in the first stage and the grievance committee will look into the grievances and resolve the issues. The proceedings of GRC will be documented.

(e) In addition to the project level GRC, redressal of grievances relating to Land Acquisition will be as per the RTFCTLARR Act, 2013.

(f) Recordkeeping. Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were effected and final outcome will be kept by PIU (with the support of Project Management Consultants) and submitted to PMU

(g) Information dissemination methods of the GRM. The PIU, assisted by experts will be responsible for information dissemination to affected persons and general public in the project area on GRM. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per this resettlement framework including contact details of officials/members of GRC, whom to contact, and when, where/ how to register grievance, various stages of grievance redress process, time likely to be taken for redress of minor and major grievances, etc. Grievances received and responses provided will be documented and reported back to the affected persons. The number of grievances recorded and resolved, and the outcomes will be reported in the Annual environmental and social performance report (AESPR) to KFW. A Sample Grievance Registration Form has been attached in Appendix 9.

(f) Periodic review and documentation of lessons earned. TNUIFSL will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PIU's ability to prevent and address grievances.

(g) All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the respective ULB/PIU.

(h) It is further clarified that the proposed registered body/ society of ragpickers which shall be established in Phase 1 of LTRIP/ / RAP shall be responsible for implementation including a dedicated GRM for ragpickers.

(i) Contractors for the Biomining project shall bear no responsibility for the integration of Ragpickers. Their sole responsibility shall be to allow access to the ragpickers in the incoming fresh waste sites.

(j) GCC shall bear the responsibility for the long term integration through preparation and implementation of LTRIP/ / RAP in a phased manner.

9 STAKEHOLDER ENGAGEMENT PLAN

Stakeholders' engagement is an integral part of developing an understanding about the project and the associated risks and impacts as perceived by the public. It helps in planning and setting up priorities for project management. SEP has been prepared and is provided in Section 9.6

9.1 PUBLIC DISCLOSURE

(a) Public disclosure is aimed at making information accessible to interested and affected persons. Communicating such information in a manner that is understandable to stakeholders is an important first step in the process of stakeholder engagement. All activities in the process from consultation and informed participation to negotiation and resolution of grievances will be more constructive if stakeholders have accurate and timely information about the project.

(b) Information disclosure demonstrates the fact that transparency and accountability are being upheld in the planning and development of a proposed project and general public is aware of it. This would create awareness among the local people and instil the participation and public involvement in the project management.

(c) The project information will be disclosed in the public domain through the website of GCC and the PMC will upload the project progress on its website timely. Subsequently, the Municipal Administration and Water Supply Department will issue Government Order in this regard. The hoardings indicating about the project details, period of construction work, budget, name and contact number of the Convenor, contractor, etc will be placed at prominent public places by the Contractor.

(d) The awareness for the benefits of biomining of legacy waste and reclamation of 260macres of land at the Kodungaiyur site shall be created by the PIU/ PMC and contractor among the beneficiaries, potential temporary economic impacts and other stakeholders in the project area. Also, the details related to project impacts and assistance and safety measures during construction shall be made available to the affected population through meetings and distribution of pamphlets in local language.

9.2 PUBLIC CONSULTATION

(a) Public consultation is a continuous process throughout the project planning, preparation, implementation, and monitoring stages. The sustainability of any infrastructure development project depends on the participatory planning in which public consultation plays a major role. Experiences indicate that environmental and social impacts, particularly the involuntary resettlement generally causes numerous problems for the affected population. Such problems may be reduced to a great extent if people are properly informed and consulted about the project, its impacts, mitigation measures and potential temporary economic impacts allowed to make meaningful choices or preferences. This helps to reduce the sense of insecurity and opposition of potential temporary economic impacts to the project which otherwise are likely to occur

during project implementation. The overall objective of the consultation process and SEP is to minimize, mitigate or offset negative impact of the project and make people aware about the rationale and positive impacts of the impact.

(b) The practical measures will be taken through consultative process to make the stakeholders as partners in project planning, implementation and monitoring stages. One way to help satisfy stakeholder concerns and promote transparency is to involve project affected stakeholders in monitoring the implementation of mitigation measures or other environmental and social impact related activities. The stakeholders will be informed about relevant policies, laws, types and severity of impacts, entitlements for compensation and mitigation measures through the proper communication channel, verbally or distribution of pamphlets in local language with required details. Once consultations have taken place, stakeholders will want to know which of their suggestions have been taken on board, what risk or impact mitigation measures will be put in place to address their concerns. Such information will be disseminated in time and regularly. The consultations shall be arranged with the beneficiaries, potential temporary economic impacts and other stakeholders to understand and solicit their views about risk and impact due to the project at the pre-construction stage.

9.3 GRIEVANCE REDRESS MECHANISM (GRM)

(a) The Grievance Redressal Mechanism will be established for the entire project cycle. The details for GRM has been provided in the previous chapter.

9.4 STAKEHOLDER ENGAGEMENT PLAN

During Construction, the engagement with the project stakeholders will be continued as required during the project implementation and the strategy is provided as below.

Stakeholder Engagement and Information Disclosure Strategy				
Project : Reclamation of Kodungaiyur Dumping Ground via Biomining				
Target stakeholders	**Information to be disclosed**	**Proposed engagement & disclosure method**	**Timing of Engagement**	**Responsible Parties**
Project Affected Persons- Ragpickers	• Project design details, planned timelines and their impacts • Design and site alternatives explored for impact minimization • LTRIP/ RAP post KfW approval • If applicable, Communication on final rehabilitation/ compensation approved by govt. • Grievance mechanism in place	• FGDs and small group consultations • Print-Newspaper, Newsletter / leaflets/ Pamphlet • Radio information capsules • Internal department communication • Disclosure in GCC website	• Twice between signing of the contract and start date of project construction • Once every quarter during project construction • Once every quarter post project completion till completion of the Long Term Ragpickers Integration Program	• PMC/ GCC • Contractor • Registered body/ society of Ragpickers established in phase 1 of LTRIP
• Households / people residing within 5 km radius of the Project Site • Resident Welfare Associations (RWAs) within 5 km radius • Civil Society Organisations • Print and Tele Media	• Project design details, planned timelines and their impacts • Design and site alternatives explored for impact minimization • Accidents and road safety/ traffic management issues and measures planned to be in place; • Information on likely disruptions to services and arrangement during construction including its duration and likely timings	• Newsletters/ pamphlets/ flyers • Focus group discussions • TV-Radio-Print- Digital based information dissemination • Helpline/ Toll-free numbers displayed at project locations and prominently accessed areas	• Continuous, as required in construction stage • One week prior to start of construction in the respective packages	• PMC/ GCC • Contractor

Stakeholder Engagement and Information Disclosure Strategy				
Project : Reclamation of Kodungaiyur Dumping Ground via Biomining				
Target stakeholders	**Information to be disclosed**	**Proposed engagement & disclosure method**	**Timing of Engagement**	**Responsible Parties**
	• Management of air and noise pollution; Disruption to services and arrangement during construction • Community and Occupational Safety measures planned for; • Biomined fractions disposal plans • Labour management plans • Grievance mechanism process	• Suggestion boxes at site offices • Disclosure in GCC website		
Line Departments/ Agencies: • Municipal Council • Staff of Line departments • Service providers and duty bearers • Staff of Municipal Corporation • CMWSSB • Regulatory agencies	• Project design details, planned timelines and their impacts • Design and site alternatives explored for impact minimization • Accidents and road safety/ traffic management issues and measures planned to be in place; • Information on likely disruptions to services and arrangement during construction including its duration and likely timings • Community and Occupational Safety measures planned; • Biomined fractions disposal plans • Labour management plans • Grievance mechanism process • Utilities shifting if applicable	• One-on-one meetings • Formal Small group meetings • Open forums and Town-hall meetings for RWAs and ERs • Formal presentations to closed groups like regulators, service providers and duty bearers	• Continuous, as and when required during construction	• PMC/ GCC • Contractor

Stakeholder Engagement and Information Disclosure Strategy				
Project : Reclamation of Kodungaiyur Dumping Ground via Biomining				
Target stakeholders	**Information to be disclosed**	**Proposed engagement & disclosure method**	**Timing of Engagement**	**Responsible Parties**
Contractor, staff & subcontractors	• Project design details, alternatives, planned alignments and their impacts • Baseline information on environmental and social aspects • Project's induced environmental and social risk • Accidents & road safety/ traffic management measures planned • Orientation on EHS provisions • Sexual harassment provisions and requirements • Labor Management Procedures • ESIA requirements and measures proposed • Grievance mechanism proposed under the project, requirements • Feedback on consultant/ contractor implementation and supervision reports	• Provisions in Bid/ contract documents • One-on-One and formal small group meetings/ discussions • Formal presentations/ training to contractor's project management team	• Once, at the time of contract signing and orientation during pre- construction phase • Periodic briefings and orientation at site • Feedback as and when required on site and monitoring reports	• PMC/ GCC • Contractor

9.5 STAKEHOLDERS CONSULTATIONS HELD DURING PREPARATION STAGE

(a) During the Feasibility Assessment, stakeholders' consultations were held with the following groups: Informal Waste Workers/ Ragpickers, GCC workers at site and Resident Welfare Associations.

(b) The stakeholder consultations were held on the following dates:

Table 25: Timeline of Stakeholders Consultations

Sl. No.	Target Group	Date
1	Stakeholders Consultations with Ragpickers	26.03.2022
2	Stakeholders Consultations with GCC Workers	26.03.2022
3	Stakeholders Consultations with RWAs	30.04.2022

(c) The details of the stakeholders' consultations are provided in Social Annexure 2

9.6 KEY FINDINGS OF STAKEHOLDER CONSULTATIONS

(a) **Stakeholders Consultations with Ragpickers on 26.03.2022**

(i) The ragpickers are welcoming of the proposed project but apprehensive about their future.

(ii) Some are willing to be engaged in biomining operations if possible.

(iii) Some are willing to be engaged in MRFs & RRCs post reclamation.

(iv) Majority of the ragpickers feels that income from ragpicking is inadequate.

(v) The ragpickers are interested in accessing government welfare schemes intended for them.

(vi) The ragpickers are open to establishing cooperatives for better negotiation power.

(b) **Stakeholders Consultations with GCC Workers on 26.03.22**

(i) Majority of GCC workers feels that reclamation of Kodungaiyur site is necessary due to the health hazards faced by workers, ragpickers & nearby residents.

(ii) GCC workers opined that dumping of unsegregated waste at KDG needs to be minimized.

(iii) According to GCC workers, Biomining seems to be the most feasible option for reclamation given Perungudi experience.

(iv) GCC workers stressed that adequate space must be allocated for incoming fresh waste during project implementation.

(v) Further job security of existing GCC workers must be ensured

(vi) Nearby residents must be brought into loop via IEC activities by both GCC & Contractor

(c) **Stakeholders Consultations with RWAs on 30.04.2022**

(i) Welcoming of the proposed project but apprehensive about project impact on their health and environment.

(ii) Dumping of unsegregated waste at KDG needs to be minimized.

(iii) Biomining seems to be the most feasible option for reclamation given Perungudi experience.

(iv) Adequate preparations must be taken by GCC for traffic management.

(v) Environmental & Social safeguards must be strictly adhered to.

(vi) The reclaimed land should be kept free from waste dumping.

(vii) All nearby RWAs and relevant NGOs must be roped in for ensuring minimal public opposition to the project

(d) The relevant details of the Stakeholders Consultations are provided in Annexure 2

KFW Assisted SMIF -TN III Program

Reclamation of Kodungaiyur Dumping Ground for Greater Chennai Corporation - Environmental and Social Impact Assessment Report

Annexures

February 2023

1 ANNEXURE 1: ENVIRONMENTAL AND SOCIAL SCREENING FORMAT

Environmental and Social Screening Format

Date:_____ **Contact Person:_____**

Name of ULB: Greater Chennai Corporation.

Background and Objective: Suggest to add a few brief sentences on the objective of this Screening and how it will be used.

<table>
<tr><th colspan="3">Project Details</th></tr>
<tr><th>Sl.no</th><th>Components</th><th>Details</th></tr>
<tr><td>1</td><td>Project Objective and components</td><td>The objective of the Project is to reclaim the existing dumpsite at Kodungaiyur to maximum possible extent through the process of Biomining.
<table>
<tr><th>S. No.</th><th>Proposed Packages at Kodungaiyur Dump Site</th><th>Waste Volume (cubic metres)</th><th>Waste Quantity (MT) @ density of 900 kg/cubic meter</th><th>Area (Acres)</th></tr>
<tr><td>1</td><td>Package 1</td><td>23,55,656.40</td><td>21,20,090.76</td><td>60.31</td></tr>
<tr><td>2</td><td>Package 2</td><td>4,60,236.76</td><td>4,14,213.08</td><td>17.99</td></tr>
<tr><td>3</td><td>Package 3</td><td>12,61,529.50</td><td>11,35,376.55</td><td>44.04</td></tr>
<tr><td>4</td><td>Package 4</td><td>4,90,225.50</td><td>4,41,202.95</td><td>30.09</td></tr>
<tr><td>5</td><td>Package 5</td><td>20,39,115.76</td><td>18,35,204.18</td><td>78.15</td></tr>
<tr><td>6</td><td>Package 6</td><td>7,84,909.06</td><td>7,06,418.15</td><td>21.32</td></tr>
<tr><td></td><td>Total</td><td>73,91,672.98</td><td>66,52,505.68</td><td>251.90</td></tr>
</table></td></tr>
<tr><td>2</td><td>Details of Alignment / Components (main components including construction activities)</td><td>The Biomining plant will have stabilization area, waste feeding area with hopper, conveyors, magnetic separators, blowers, shredders, products storage and disposal area, admin area, and Leachate Treatment Plant (LTP).</td></tr>
<tr><td>3</td><td>Location of the Project Sites (all sites including alignment of networks, other structures like pumping stations; offices, locations where treated waste water, sludge & C&D wastes will be disposed/reused directly, any other)

Current Land use (Provide information for all sites involved in</td><td>• The site is operational from early 1980. The site receives waste from Zones 1-8 of the GCC area.
• Kodungaiyur Canal is situated inside the site, having canal length with the site as 1.07 km.
• Kodungaiyur Sewage Treatment Plant (STP) is situated adjacent to the site on the western side of side.
• Total Area of site to be reclaimed is around 252.00 acres.
• Ezhil Nagar is situated at distance of 40m from eastern side waste boundary.</td></tr>
</table>

	the project), any historic land use (related to heritage, or contamination) Site Survey No:/s (with ownership), Geographical coordinates of the site	• Susila Nagar at distance of 30 m from southern side. • Tondiarpet highroad is the main road leading to dumpsite is on the southern side of the site. • Buckingham canal runs parallel to site on eastern side. • The current land use pattern of the site is "Institutional" • Ownership of land is with GCC as per GCC information. • Survey no: • GPS Coordinates: 13° 08'10.36" N; 80°16'06.29" E

Proposed Resource Use

<table>
<tr><th colspan="5">Resource Use</th></tr>
<tr><th>Sl.no</th><th>Proposed Resources</th><th>Area/ Quantity</th><th>Unit</th><th>Details</th></tr>
<tr><td>(i).</td><td>Land Area proposed to be used: Location wise (in sq km / sq m)</td><td>251.90</td><td>acres</td><td>
<table>
<tr><th>S. No.</th><th>Proposed Packages at Kodungaiyur Dump Site</th><th>Area (Acres)</th></tr>
<tr><td>1</td><td>Package 1</td><td>60.31</td></tr>
<tr><td>2</td><td>Package 2</td><td>17.99</td></tr>
<tr><td>3</td><td>Package 3</td><td>44.04</td></tr>
<tr><td>4</td><td>Package 4</td><td>30.09</td></tr>
<tr><td>5</td><td>Package 5</td><td>78.15</td></tr>
<tr><td>6</td><td>Package 6</td><td>21.32</td></tr>
<tr><td></td><td>Total</td><td>251.90</td></tr>
</table>
</td></tr>
<tr><td>(ii).</td><td>Estimated energy consumption for the project activities – Source wise</td><td>20.25</td><td>MW/ day</td><td></td></tr>
<tr><td>(iii).</td><td>Estimated usage of water quantity for the project: Ground Water and Surface water?</td><td>70</td><td>KLD</td><td>The water requirement shall be met out from the nearby STP treated water for Project operations.</td></tr>
</table>

Baseline Environmental Conditions

Sl.no	Environmental Aspects	Yes	No	Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)

1	Is the project site located on or adjacent to any of the following (Provide information for all sites and alignment of the project components/subcomponents, associated activities; mention distance to these features in meters/kilometres)			
i)	Critically Vulnerable Coastal Areas, Eco sensitive Areas		✓	
ii)	Cultural Heritage site, Protected monuments		✓	
iii)	Natural Forests / Protected Areas Is the project in an eco- sensitive or adjoining an eco-sensitive area or its demarcated buffers? If Yes, provide details.		✓	No. 1. Pallikarnai Marsh : 20 KMs (SW) 2. Guindy National Park: 14.4 (SW)
iv)	Any other Wetlands/ Mangrove/ Estuarine Region?		✓	No. Ennore Creek: 12.2 KMs (NE)
v)	Any Natural Habitat areas, areas with natural features such as the Coasts, Lakes/ other water bodies?		✓	No. 1. Puzhal lake: 8.3 km 2. Retteri Lake: 5.3 km
vi)	Any other Sensitive Environmental Components?		✓	
vii)	Any Residences, schools, hospitals, sensitive receptors?	✓		GHS School, Patel Nagar: 110 m (NE)
viii)	Any culturally – socially important paths, areas/religious occupancies, sacred groves, burial grounds, tourist or pilgrim congregation areas, borders, etc?	✓		Saibaba Temple: 100 m Nagathamman temple: 230m Caramel Church of God: 110 m Quarishiya Masjid: 220 m
ix)	Any Drinking water source, upstream and downstream uses of rivers, etc which may be impacted by proposed discharge of treated sewage / sludge from water supply or sewage treatment plant?		✓	
x)	Any Low-lying areas prone to flooding/areas of Tidal Influence used as part of the Project or near the project components?		✓	
xi)	Details of Surface water quality at intake point or Disposal point of treated sewage		✓	
xii)	Any areas affected by other disasters?		✓	

2	Groundwater: Is the site in Critical / Over Exploited condition?		✓	
3	Is the area disaster-prone? If yes; list all disaster zone categories applicable		✓	
4	Describe the soil and vegetation on site			
5	Is the site area and condition suitable for proposed development?	✓		
6	Describe existing pollution/contamination or degradation in the site(s)	✓		Ground water and surface water is polluted.
7	Near Dams, Barrages		✓	
8	Any other remark on baseline condition?		✓	

Anticipated Environmental Impacts: Impacts on Land, Geology and Soils

Sl.no	**Impacts**	**Yes/ May create**	**No**	**Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)**
8.	Will the proposed project cause the following on Land / Soil?			
i)	Impact on Surrounding Environmental Conditions including Occupation on Low lying lands/flood plains	✓		Temporary impacts during construction and operational phase of projects shall be caused which can be mitigated by ESMP. No adverse impacts caused in long term conditions.
ii)	Substantial removal of Top Soil (mention area in sqm)		✓	
iii)	Any degradation of land / eco-systems expected due to the project?		✓	
iv)	Loss or impacts on Cultural/heritage properties/precincts, features		✓	
v)	Does the project activity involve cutting and filling/ blasting etc?		✓	
vi)	Will the project cause physical changes in the project area (e.g., changes to the topography) due to earth filling, excavation, earthwork or any other activity?	✓		The project site is fully covered the with the waste heaps. This waste shall be biomined and the land shall be reclaimed. These impacts are positive in nature. Overall improvement in quality of surrounding areas including huge

				improvement in environmental parameters.
vii)	Will the project involve any quarrying/ mining etc?		✓	
viii	Will the project / any of its component contaminate or pollute the Land? (for example sludge, disposal of untreated sewage/bypass)	✓		The leachate generated during the biomining project operations may pollute land but can avoided by Installation of Leachate Treatment Plant (LTP)
ix)	Pre-existing contamination on site/s	✓		Ground Water and Surface water is contaminated.

Impacts on Water Environment

Sl.no	Impacts	Yes/ May Create	No	Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)
9	Will the subproject or its components cause any of the following impact on Water sources (Quantity or Quality):			
i)	Will the activities proposed at the site(s) impact water quality (surface or underground) and water resource availability and use? Will this sub-project involve the dredging of water bodies, sea, canals, etc.	✓		The project shall generate leachate which may have adverse impact on the water bodies or groundwater but can be mitigated by establishing Leachate Treatment Plant (LTP).
ii)	Impacts on Water Resources	✓		The project shall generate leachate which may have adverse impact on the water bodies or groundwater but can be mitigated by establishing Leachate Treatment Plant (LTP).
iii)	Pollution of Water bodies/ground water nearby or downstream	✓		The project shall generate leachate which may have adverse impact on the water bodies or groundwater but can be mitigated by establishing Leachate Treatment Plant (LTP).
iv)	Will the project affect the River /cannel flow pattern, stream pattern or any other irrigation canal?		✓	

v)	Will the project result in stagnation of water flow or pondage or weed growth due to increased pollution/siltation		✓	

Impacts on Biodiversity and Host Communities

Sl.no	Environmental Impacts	Yes/ May Create	No	Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)
10	Will the subproject or its components cause any of the following impacts on Biodiversity or the neighbourhood			
i)	Will the project necessitates cutting of? Trees / Loss of Vegetation		✓	
ii)	Will the project result in Health & Safety Risks in the neighbourhood including the release of toxic gases, accident risks	✓		During the site investigations, it was found out that the LFGs was minimal at locations where the fresh waste dumping is stopped and waste is more than 5 years old. All the LFG's would have already released in to the atmosphere. Hence there will be very less impact on LFG's for the project. The other risks such as dust, noise will be mitigated by implementation of ESMP. The risks related to traffic; accidents will be mitigated by traffic management plan developed by the Contractor.
iii)	Potential risk of habitat fragmentation due to the clearing activities? (e.g. Hindrance to the local biodiversity like disturbing the migratory path of animals/ birds etc.)		✓	The Biomining contractors will establish the plant within their site premises which shall have minimal disturbances to surrounding habitats.
iv)	Potential Noise and Light Pollution or disturbance to surrounding habitats/communities	✓		1. The noise pollution shall be monitored/regulated as per Noise Pollution (Regulation and Control) Rules, 2000 2. Light pollution is not envisaged 3. The Biomining contractor will implement the Environmental Management

Sl.no	Environmental Impacts	Yes/ May Create	No	Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)
				and Monitoring plan which shall control the noise pollution on nearby surrounding.
v)	Potential disruption to common property, accessibility, traffic disruptions, conflicts or disruption to the local community within the subproject area?		✓	Typically, throughout the dumpsite, there are 2-3 dumping points for fresh incoming waste and the ragpickers congregate across these points. Every few months these dumping points change owing to height of waste heaps reaching the maximum manageable height and the ragpickers move to the new locations as well. During implementation of this project, there shall be 2 demarcated areas for incoming fresh waste and the ragpickers shall have access to those areas.

Impacts due to Storage and Wastes: Pollution and Hazards

Sl.no	Type	Yes	No	Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)
11	Will the subproject or its components cause any impact due to storage of materials, wastes or pollution due to releases during various project activities			
i)	Will the project use or store dangerous substances (e.g., large quantities of hazardous chemicals/ materials like Chlorine, Diesel, Petroleum products; any other?	✓		Hazardous waste if obtained from Biomining activity will be stored separately and disposed of in TSDF facility in compliance with Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

Sl.no	Type	Yes	No	Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)
				Biomedical waste, if obtained, from Biomining activity will be stored separately and handed over to the authorised agency handling biomedical waste.
ii)	Will the project produce solid or liquid wastes; including construction/demolition wastes (including dredging, de-weeding wastes, muck/silt, dust, sludge, C&D wastes, hazardous wastes (such as asbestos from existing network), e-wastes (from equipment)); polluted liquids?	✓		The project may produce Hazardous waste , Biomedical and C&D waste. which shall be treated and complied with the following rules 1. Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. 2. Bio-Medical Waste Management Rules, 2016 3. E-waste (Management) Rules, 2016 4. C&D Waste management rules 2016
iii)	Will the project cause or increase air pollution or odour nuisance?	✓		The project will cause air pollution and odour nuisance but shall be mitigated by ESMP. The air quality shall comply with Air (Prevention and Control of Pollution) Act, 1981 & National Ambient Air Quality Standards 2009
iv)	Will the project generate or increase noise levels which will impact surrounding biodiversity or communities?	✓		The project may cause noise but shall be mitigated by implementing ESMP. The noise pollution shall be monitored/regulated as per Noise Pollution (Regulation and Control) Rules, 2000
v)	Will the project generate or increase visual blight or light pollution?		✓	
vi)	Will the project cause water pollution? (of waterbodies/ groundwater)?	✓		The project shall not generate the pollutant which will have adverse impact on the water bodies or groundwater which shall be prevented by establishing Leachate Treatment plant (LTP). Before LTP is built and commissioned waste water generated from the Biomining facility may be transferred to nearby Sewage Treatment Plant (STP)

Sl.no	Type	Yes	No	Details (mention distance to these features in meters/kilometres, and quantities in g/kg/T as applicable. Also mention if any project components is excluded / regulated based on location/activities as per National / State regulations & need permits/follow guidance)
				till the Leachate Treatment Plant (LTP) becomes operational.
vii)	Will the project involve dangerous construction activities which may be a safety concern to workers/ host communities	✓		During implementation and operation of the project shall follow the standard Occupational & Community Health & Safety measures as per the approved ESMP.
viii	Is there a potential for release of toxic gases or accident risks (e.g. potential fire outbreaks)	✓		During implementation and operation of the project shall follow the standard Occupational & Community Health & Safety measures as per the approved ESMP.
12	Describe any other features of the project that could influence the ambient environment		✓	There shall not be any adverse impact, rather there shall be improvement in overall environmental conditions.

Baseline Climate Data

13. Project Area Baseline Note: Please provide details for ULB and also site. Please provide quantitative information where relevant.

i)	Agro climatic zone	
ii)	No of Water Bodies in the ULB area	
iii)	Name of the River(s) in the ULB	1. Kosathalaiyar River 2. Cooum River 3. Ennore Creek 4. Adyar River
iv)	Proximity to River (kms)	1. Cooum River: 5.4 km 2. Kosathalaiyar river: 4.5 km 3. Ennore creek: 12.20 km 4. Adyar River: 11.50 km
v)	Proximity to Sea (kms)	2.5 kms
vi)	Proximity to hilly terrains (kms)	n.a
vii)	High Flood Level of the River	n.a
viii)	Flooding Events (Years) (Based on historic data of extreme flood events and future projections based on available analysis)	Attached in Annexure 7
ix)	Flooding hotspots in the ULB	No flooding hotspots in the project site. Attached in Annexure 7
x)	Available Water sources (Surface / ground)	The water needed for construction and operation shall be available from the nearby functioning STP (Treated Water).
xii)	Groundwater Level and potential zone	Groundwater level: 4m from MSL
xiii)	Normal Temperature & long term average; trends in changes in temperature	Degree celsius / Average

Min avg temp	Max avg temp	Avg mean rainfall (mm)	Avg mean no. of rainy days	Hail	Thunder
23.28	33.37	114.73	4.78	0.0083	2.83

Source: IMDB Data

<table>
<tr><td>xiv)</td><td>Rainfall trends & long term average</td><td colspan="3"><table><tr><td colspan="2">Degree celsius</td><td></td><td></td><td colspan="2">Average</td></tr><tr><td>Min avg temp</td><td>Max avg temp</td><td>Avg mean rainfall (mm)</td><td>Avg mean no. of rainy days</td><td>Hail</td><td>Thunder</td></tr><tr><td>23.28</td><td>33.37</td><td>114.73</td><td>4.78</td><td>0.0083</td><td>2.83</td></tr></table>Source: IMDB Data</td></tr>
<tr><td>xv)</td><td>Land Use</td><td colspan="3">CMDA Land use Map is attached in Annexure 3</td></tr>
<tr><td>xvi)</td><td>% of Green Cover in the ULB area</td><td colspan="3"></td></tr>
<tr><td>xvii)</td><td>% of Water Bodies/Rivers</td><td colspan="3"></td></tr>
<tr><td>xviii)</td><td>Seismic Zone</td><td colspan="3">Seismic Zone-III</td></tr>
<tr><td>xix)</td><td>Coverage rain water harvesting structures (in %)</td><td colspan="3"></td></tr>
<tr><td></td><td>a) Residential</td><td colspan="3"></td></tr>
<tr><td></td><td>b) Commercial & Institutional</td><td colspan="3"></td></tr>
<tr><td></td><td>c) Government/ULB</td><td colspan="3"></td></tr>
<tr><td>xx)</td><td>RWH in buildings – Mandating byelaws</td><td colspan="3"></td></tr>
<tr><td>xxi)</td><td>Frequency of drought in study area. Does the area face water scarcity? Please provide details.</td><td colspan="3"></td></tr>
<tr><td>xxii)</td><td>Frequency and intensity of cyclones in study area.</td><td colspan="3">Attached in Annexure 7</td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
<tr><td>14</td><td colspan="2">Climate Change Impacts in project area</td><td></td><td></td><td></td></tr>
<tr><td>(i)</td><td>Climate signal
Please select the relevant signals</td><td>Climate hazard
Please select the relevant hazards</td><td>Yes</td><td>No</td><td>Details</td></tr>
<tr><td></td><td>☐ Sea level rise</td><td>☐ Salt water intrusion</td><td></td><td>✓</td><td></td></tr>
<tr><td></td><td>☐ Frequency of tropical storms</td><td>☐ Flooding of the coast</td><td></td><td>✓</td><td></td></tr>
<tr><td></td><td></td><td>☐ River flood</td><td></td><td>✓</td><td></td></tr>
</table>

	☐ Intensity of tropical storms ☐ Higher precipitation amounts ☐ Shifting seasons ☐ Higher temperatures ☐ Less precipitation ☐ Lower temperatures ☐ Others	☐ Bank erosion (sea/river)		✓	Attached in Annexure 7
		☐ Flash flood (heavy rain)		✓	
		☐Landslides		✓	
		☐ Forest/Bush fires		✓	Attached in Annexure 7
		☐ Water shortage/drought		✓	
		☐ Effects of heat		✓	
		☐ Effects of cold		✓	
		☐ Effects of winds		✓	
		☐ Effects of air quality	✓		During construction and operation phase there will be effect on air quality. Once the project is completed the overall air quality will be enhanced and improved.
		☐ Effects of storm surge		✓	
		☐ Soil quality/land degradation		✓	
		☐ Others			
ii)	Energy consumption for the project? Will the project result in GHG emission?		20.25 ✓	MW	The Project will result in net reduction of 91,89,517.20 MT of C02 overall.
iii)	Will the project affect any other water or other user? (downstream intake points of Water Supply projects, downstream water use by people, animals; irrigation)			✓	No drinking water source is nearby the project site
iv)	Is the project located in exploited ground water block?			✓	
v)	Is the project area vulnerable to temperature fluctuations and drought?			✓	

vi)	Is the site vulnerable to hazards such as Earthquakes, Landslides, Flooding, Storm surge, Severe wind damage, Fire, Explosion, Other (specify)		✓	
vii)	Will the project result in generation of wastes / by-product?	✓		The project will generate RDF, bio-earth, inerts as by product from the Biomining operations.
viii)	Will the project impact the water resource availability (surface/ ground water) and use (effluent/sewage disposal, bypasses from STPs/PS, leachate, runoff, wastes deposition, erosion)		✓	
ix)	Will the project cause flooding of adjoining low-lying areas		✓	
(x)	Will the project impact water quality or quantity in natural/constructed Lakes, or ponds		✓	

Project Environmental Enhancement Measures

S.No	Enhancement Measures	Yes	No	Details
15	Has the subproject design considered environmental enhancement measures?			
i)	Energy conservation measures/ energy recovery options incorporated in subproject design? Quantify the reduction in CO2 emission from the sub-project.	✓		The Project will result in net reduction of 91,89,517.20 MT of C02 overall.
ii)	Has the project considered alternate /renewable energy?	✓		The RDF fraction of waste shall be used in Cement industries as substitute of coal. The RDF is an alternative fuel for coal in cement manufacturing.
iii)	Has the project considered waste minimization (waste reuse/recycle options/circular economy)	✓		Waste recycling shall take place for metal fractions and tyres recovered from waste. The RDF fraction recovered from waste will be used in cement industries as substitute for coal during manufacturing of Cement.

iv)	Rainwater harvesting, water recycling and other water resource enhancement measures proposed in the project?		✓	
v)	Does the project include measures for prevention of wastage of water resource?	✓		
vi)	What waterbody conservation/ drinking water source improvements/drought management options are being proposed?		✓	Not applicable for this project
vii)	Design Considerations for protection of project components from extreme events - flood, drought, other natural disasters	✓		Yes, the project execution shall consider extreme events like drought, flood, natural disasters, and other Force Majeure condition during execution. The project operational risk management measures shall be in force. This shall be clearly detailed in the contract and the concessionaire/ contractor shall adhere to that.
viii)	Greenbelt development proposed for the project?	✓		Greenbelt proposed around the Project Site
ix)	Is the sub-project including design elements to strengthen infrastructure resilience? If so what?	✓		The RDF obtained from biomining operations shall be used as substitute for coal during cement manufacturing. This will help is lesser utilization of natural resources which will in turn strengthen the infrastructure resilience.
x)	Has the project considered nature-based solutions and if so what?		✓	
xi)	Is the sub-project combining infrastructure and nature-based solutions? If so how?		✓	
xii)	What design considerations is the project including to mitigate heat island effect?		✓	
xiii)	What design considerations is the project including to preserve and expand green cover?		✓	Not relevant to this project.
Land Use, Resettlement, and/or Land Acquisition				

Sl.no	Components	Yes	No	Details
1	Does the project involve acquisition of private land?		✓	
2	Alienation of any type of Government land including that owned by Urban Local Body?	✓		Vested with ULB
3	Clearance of encroachment from Government/ Local body Land?		✓	
4	Clearance of squatters/hawkers from Government/ Local Body Land?		✓	
5	Number of structures, both authorized and/or unauthorized to be acquired/ cleared/		✓	
6	Number of households to be displaced?		✓	
7	Village common properties to be alienated Pasture Land (acres) Acquisition / burial ground and others specify?		✓	
8	Existing land uses on and around the project area (e.g., community facilities, agriculture, tourism, private property) will be affected?		✓	Ragpickers shall have continued access to the demarcated areas for incoming fresh waste throughout the project period.
9	Will the project result in construction workers or other people moving into or having access to the area (for a long-time period and in large numbers compared to permanent residents)?		✓	
10	Are financial compensation measures expected to be needed?		✓	

Loss of Crops, Fruit Trees, Household Infrastructure and livelihood

Sl.no	Components	Yes	No	Details
11	Will the project result in the permanent or temporary loss of the following?		✓	
11.1	Crops?		✓	
11.2	Fruit trees? Specify with numbers		✓	
11.3	Petty Shops		✓	
11.4	Vegetable/Fish/Meat vending		✓	

11.5	Cycle repair shop		✓	
11.6	Garage		✓	
11.7	Tea stalls		✓	
11.8	Grazing		✓	
11.9	Loss of access to forest produce		✓	
11.10	Any others - specify		✓	
Welfare, Employment, and Gender				
12	Is the project likely to provide local employment opportunities, including employment opportunities for women?	✓		1500-1600 blue collar jobs and around 100 white collar jobs shall be generated directly
13	Is the project being planned with sufficient attention to local poverty alleviation objectives?	✓		Alternative Employment options and reduction of health hazards for vulnerable HHs
14	Is the project being designed with sufficient local participation (including the participation of women) in the planning, design, and implementation process?	✓		Detailed Stakeholder Consultations and FGDs were held with Ragpickers, RWAs and GCC workers which included significant female representation
Historical, Archaeological, or Cultural Heritage Sites				
15	Historical heritage site(s) require excavation near the same?		✓	
16	Archaeological heritage site(s) require excavation near the same?		✓	
17	Cultural heritage site(s) require excavation near the same?		✓	
18	Graves or sacred locations require excavations near the same?		✓	
Tribal Population/Indigenous People				
19	Does this project involve acquisition / alienation of any land belonging to Tribal people?		✓	
20	Will the project lead to displacement / other adverse impacts on tribal / indigenous peoples ?		✓	
Beneficiaries				

Sl.no	Components	Yes	No	Details
21	Population proposed to be benefitted by the proposed project	Approx. no.:		2022: 2682932 2027: 3151485
22	No. of Females proposed to be benefitted by the proposed project	Approx. no.:		2022: 1274393 2027:1496956
23	Vulnerable households /population to be benefitted[1]	Approx. no.:		327 Ragpicker & 248 ragpicker families
24	No. of Families to be benefitted	Approx. no.:		2022: 596207 HHs 2027: 700330 HHs

Date: _____

Signature and name of the Borrower

Authorised Signatory

Note: This Screening sheet must be completed for each of the proposed subproject along with the DPR and ESIA Report.

[1] Vulnerable PAPs are those living below poverty line, SC / ST families and women headed households, Widows, Physically Challenged persons; Elderly persons above the age of 60 years among the affected families.

2 ANNEXURE 2: STAKEHOLDERS CONSULTATIONS

1) Focus Group Discussion with people involved in collection of waste from Kodungaiyur **dumpsite**

Date 26.03.2022

Place: Kodungaiyur Dump Yard, Chennai

The Focus Group Discussion was conducted among the men and women involved in collection of waste at Kodungaiyur Dump Yard to get information regarding the issues listed below. Participants were informed about the purpose of Focus group discussion by explaining various aspects of the proposed processing waste adopting biomining at the Kodungaiyur solid waste dump yard where the participants depend upon for their livelihoods.

- Existing livelihoods
- Health Issues
- Suggestions to improve their socioeconomic condition
- Willingness to integrate into formal waste management system
- Willing to be trained
- Expectations from GCC

Livelihoods

i. Most of the participants have been involved in collecting waste objects for 10 to 20 years. Some of them collect waste as family and some married couples and children are also engaged in this activity some selected materials such as plastic containers, pieces of aluminium, cables with copper substances, plastic covers, hardboards, glass bottles, steel scraps, and aluminium and copper materials attached with other materials too.
ii. Many of them reported that , previously their parents were also engaged in waste collection 25-30 years ago.
iii. Most of all, the participants are engaged in collecting wastes up to 7-8 hours a day and at least for 25 days a month.
iv. Some waste collectors do collect wastes during daytime, few in the night and few of them collect both during day and night. Interestingly, some of the waste collectors stay at the dump yard itself and collect wastes whenever the trucks unload at site.
v. They have reported that the ideal time for collecting wastes is early morning as the truck loads carry lots of wastes from different places of the city.
vi. They have revealed that most of the wastes are collected at source by other collectors in the streets itself during day time, which in turn would affect them from collecting marketable items. The wastes dumped in the morning would contain lots of saleable goods in the waste loads
vii. Persons earn up to Rs. 300 – 1000 everyday by selling their collection to the neighbouring scrap dealers and stated that the income from wastes is sufficient for their life. They have also informed that there is no need for investment or require loans for this job, they felt satisfied in getting income from wastes.
viii. Few children along with their parents are also involved in this work during holidays but the students hesitate to show their identity
ix. Since they have been involved only in collecting wastes in the site, they were not able to engage themselves in alternative jobs other than collecting wastes.
x. Few of them have got loan from the bank and purchased auto rickshaw, but they could not earn significantly and felt difficult to repay the loan and interest, finally they have sold out the auto and returned to collect wastes. Another person has informed that she has started a petty shop nearby, but none of the customers were willing buy goods from their shop as she was the waste collector previously.
xi. The people collecting wastes were not recognized and accepted by the neighbouring residents for only reason that they have been involved in collecting waste from the garbage/waste dumpsite.
xii. They have revealed that the persons were notoriously uttered as “Rag pickers” by the neighbours and not treat them equally in the community.
xiii. The waste collectors also did not accept their children to take part in their job
xiv. They wanted to provide good education and nutritious food to their children with income from the waste collection
xv. Since this work is non-formal, they go the garbage dumpsite whenever they decide to go to the site.
xvi. The collectors from various parts of Chennai and faraway places do visit this site to collect wastes and find this place as a resourceful location. Since they could collect sufficient waste materials and sell them to the dealers immediately.
xvii. During rainy season, they cannot work in the site due to continuous rain and stagnation of rainwater soaked with raw solid wastes. They hesitate to work at site to avoid affliction of any diseases.
xviii. Aged persons could not find any other jobs and not able to work other than collecting waste, and their co-workers extend support to the aged persons in collecting and selling the wastes.
xix. Persons collect waste in this site feel safe and secured except for a few accidents that took place in the site. Some of them used to sleep at site and sometimes unknowingly trucks dump loads on them.
xx. Most of the valuable wastes were picked from the primary source dust bins and they collect only the wastes available in the dump site.
xxi. Almost all of them have borrowed money from money lenders for 10% interest for their unexpected expenditures. Most of them have borrowed during rainy seasons and during lockdown due to COVID when they cannot go for collecting wastes and lost income.

Health

i. They go to Government hospitals for minor ailments and go to Stanley medical college hospital for major diseases
ii. They were afflicted with asthma, respiratory infections, skin diseases, cut wounds caused by steel nails, broken glass pieces, sharp plastic materials and metals.

iii. Besides, persons have affected by dog biting, attack by cows and bulls graze in the site,
iv. Few of them wear safety gears such as hand gloves, shoes during colleting wastes

Security

i. Most of them are aware of health and other insurance facilities, but none of them have availed insurance.
ii. Aged persons said that they could not avail insurance facilities because of their age.
iii. None of them were recognized for old age pension

Expectations from the GCC

i. They have requested to provide employment opportunity in the proposed biomining and processing project.
ii. They want to be mainstreamed by way of getting proper training and be employed in the proposed processing facility project.
iii. Their experience in segregation of wastes could be utilized properly in the proposed project.
iv. The waste collectors requested to continue collection of wastes in the dump yard during implementation and in future as the dumping would be used to dump wastes in the site.

2) Focus Group Discussion with Housing Welfare Association – Kodungaiyur

A Focus Group Discussion was conducted among the members of Residents' Welfare Associations, the members of which are from the proximity of Kodungaiyur solid waste dump yard. The FGD was conducted to obtain the views and suggestions of the Association members on treatment of solid wastes through biomining.

Date	30.04.2022
Venue	Kodungaiyur solid waste dump yard, Chennai
Participants	1. Artisan's Housing Welfare Association 2. Thangam Housing Welfare Association
Welcome Address	Mr. Avinash
FGD Conducted by	Dr. R. Rajkumar, Social Development Specialist
Coordinated by	Mr. Avinash Mr. Jyotirmoy Mr. PTR. Alagupandiarajan Mr. P. Senthil Kumar

A 30-minute video about already implemented Bio-mining projects at Perungudi dump yard, Chennai, Kumbakonam dump yard and Noida was presented to make the members comprehend about the project proposed to be implemented at Kodungaiyur. Various stages of bio mining processes were explained to the participants during the video show. After completion of the show, the discussion with participants was held, the responses of the participants are given hereunder.

Excerpts of the Focus group Discussion

Dr. R. Rajkumar explained about the current situation of the dump yard, livelihood of waste collectors, pollution due to storage of wastes and the importance of Bio mining project at Kodungaiyur. As part of the discussion, members were asked to disclose the problems faced by the residents around dump yard.

Mr. S.A. Deivamani, President and Mr. P. Sekar, Secretary, Artisan's Housing Welfare Association and Mr. Selvaraj, Secretary, Mr. T.M. Raman member, Thangam Housing Welfare Association reported the issues, concerns and recommendations for improving the site.

Problems faced by Residents inhabiting the vicinity of Kodungaiyur Dump Yard

- Obnoxious odour from the dump yard spreads up to one-to-two-kilometer radius throughout the year, which make many persons suffocate and breathing problem.
- The rotting wastes create infection and many illnesses among the residents.
- Lots of waste fallen on roads near all residential and commercial areas while transporting the wastes from various places from the city to dump yard make the roads dirty.
- The fallen wastes on roads create lots of road accidents by slipping of vehicles and pedestrians
- Bad odour in the dump yard increases manifold during rainy and winter seasons as the waste are not cleared properly.
- The contaminated water from dump yard mixes with drinking water supply and drainage in roadsides turns the situation worse and spreading of diseases during rainy days
- Menace of multiplying Mosquitoes have increased, and the hazard exists throughout the year because of the dump yard
- Many health problems like respiratory diseases, dengue and malaria incidents have become prevalent among the residents nearby.
- Fire accident happened during summer season at dump yard, the smoke from the yard irritates all the households in the neighbourhood around Kodungaiyur.
- Few persons involved in waste picking have met with accidents during fire at dump yard and dumping of waste from the lorries.
- Residents fear the infiltration of contaminated water from the dump yard in the ground water and eventually used by the households would affect the health of public.

Suggestion about removal of dump yard adopting Biomining process to the residents

- Awareness should be created to the public about the project before and during the implementation by distributing pamphlets, creating WhatsApp group and local media especially televisions
- Awareness through conducting Association meetings among the residents in the location.

Suggestions of members about the effective usage of vacant place after processing

The members were explained that the volume of wastes would be reduced after processing, hence the place occupied currently would be reduced and the unused vacant land will be increased. Members were asked to explore the ways to utilize the space for other purposes useful for the society. The suggestions given by the members are given hereunder

- Tree plantation – timber tree or fruit bearing trees could be developed
- Thematic Park with Walking facility for public
- Playground with fitness center
- New Bus terminal could be established to connect various parts of Chennai and neighbouring states
- Market with Permanent Shops for the local residents interested in enterprises

Overall expectation of public

- The proposed Project should be completed as early as possible before rainy season
- The waste collectors could be given employment opportunity in the processing activities and as the dumpsite is continued to be used, the waste collectors may be permitted to collect wastes to continue their livelihoods.

Outcome of FGD

Members have expressed that the project proposed by the Government is very much useful for the environment and public. They have assured that the residents would cooperate for implementation of biomining project.

Attendance Sheets

Attendance Sheet for the Focus Group Discussion with RWA held for proposed Reclamation of the Kodungaiyur Dumping Ground

Name of the RWA: ARTISAN RESIDENTS WELFARE ASSOCIATION
Distance of RWA residence from Kodungaiyur Dumping Ground: 2.Kms
Location of FGD: KDG OFFICE
Date: 30.04.2022
Time: 11:00 am to 12:00 pm
Name of GCC Official present: ~~Mr. T. Velchamy~~ K.P.KUMARAN
Designation: ~~Executive~~ ASSISTANT Engineer
Signature:
FGD conducted by the JV of Sandhya Strategic Investment & Advisory and Pollucare Engineers Private Limited.

Sl. No.	Name	Designation	Contact No.	Age	Gender (M/F/O)	Signature
1	SADEIVAMANIE	PRESIDENT ARTISAN RESIDENTS WEL. ASSN	9884490027	80	M	
2.	B.SEKAR.	SECY. ARTISAN RES. WEL. ASSN	9444934741	63	M	
3/	P. Muthu		9600139310	39.	M.	
4,	M.Anand		9941883677	40.	M.	
5	M.Anand	helper	63	39	M.	M.ANANDAN
6	R. Rajaram	Sweet stall	7305911708	42	M	R. Raja
7	Nagaraj	Super Market	9710608891	46	M.	

1

Sl. No.	Name	Designation	Contact No.	Age	Gender (M/F/O)	Signature
7.	M.Suresh	Labour.	9025017748	28.	M.	
8.	R.Viswanathan	Labour.	9962116492	42	M.	
9.	M.Kaniappan	Labour	9094691614	50	M.	
10.	J.VENKatesh		8144779862	26	M	
11	P. Senthil kumar.	Heaven. Coo	6379897312	51	M.	
12	PTR. Alagar Ramakrishnan	Heavens. Team	8012410771	42	M	
13.	J. SELVAM	CONSULTANT SSIA	7397516783	35	M	
14	Sandeep Singh.	Consultant SSIA	9386065220	31	M	
15.	D. Arivarasu Kumar	Consult SSIA	9442034515	33	M	
16	Dr. R. Rajaman	Consultant	9443424298	53	M	

Attendance Sheet for the Focus Group Discussion with RWA held for proposed Reclamation of the Kodungaiyur Dumping Ground

Name of the RWA: Golden ~~Coo~~ Residents welfare association
Distance of RWA residence from Kodungaiyur Dumping Ground: 1 Kms
Location of FGD: Gandhi Colony M.I.C.D New Chm-39,
Date: 30.04.2022
Time: 12:30 am to 01:30 pm
Name of GCC Official present: ~~Mr. T. Velchamy~~ K.P.KUMARAN
Designation: ~~Executive~~ ASSISTANT Engineer
Signature:
FGD conducted by the JV of Sandhya Strategic Investment & Advisory and Pollucare Engineers Private Limited.

Sl. No.	Name	Designation	Contact No.	Age	Gender (M/F/O)	Signature
1	R.VELU	Sukha Ra	9444102092	44	m	
2	Sankara	Jk Sukha	7550137961	58	m	
3	Ramesh.	Pu	9710952353	66	m	
4	T.N.Raman	. cm	J8160 88387	55	M.	
5.	R. Kala	~~Watchman~~ HOTEL	99413 20413	40	M	KA
6.	Dharma Sekar.	Driver	.	29,	M.	
7.	P.R. Ravi Chandran	Engineer.	9788923840	52	M	

Sl. No.	Name	Designation	Contact No.	Age	Gender (M/F/O)	Signature
8	RAJKUMAR. A	Engineer	9500681115	27	M	
9	K. Chandrasekaran	Engineer	90927 12388	46	M	
10	Raja. G	Engineer	98407 89323	36	M	
11.	Gopinath	Engineer	9442189042	36	M	
12	J. SIRCAR	CONSULTANT SSIA	27975 16783	35	M	
13	Sandeep Singh.	Consultant SSIA	9386065220	31	M	
14.	D. Avinash kumar	"	9442034515	33	M	
15	Dr. R. Rajkumar	Consultant	9443424298	53	M	
16	P. Senthil kumar.	Geeven	6379 89 7312	52	M	
17	PJR. Alagunandhiya Rajan	Team Leader	8012410771	42	M	

Annexure 3: Land Use Map

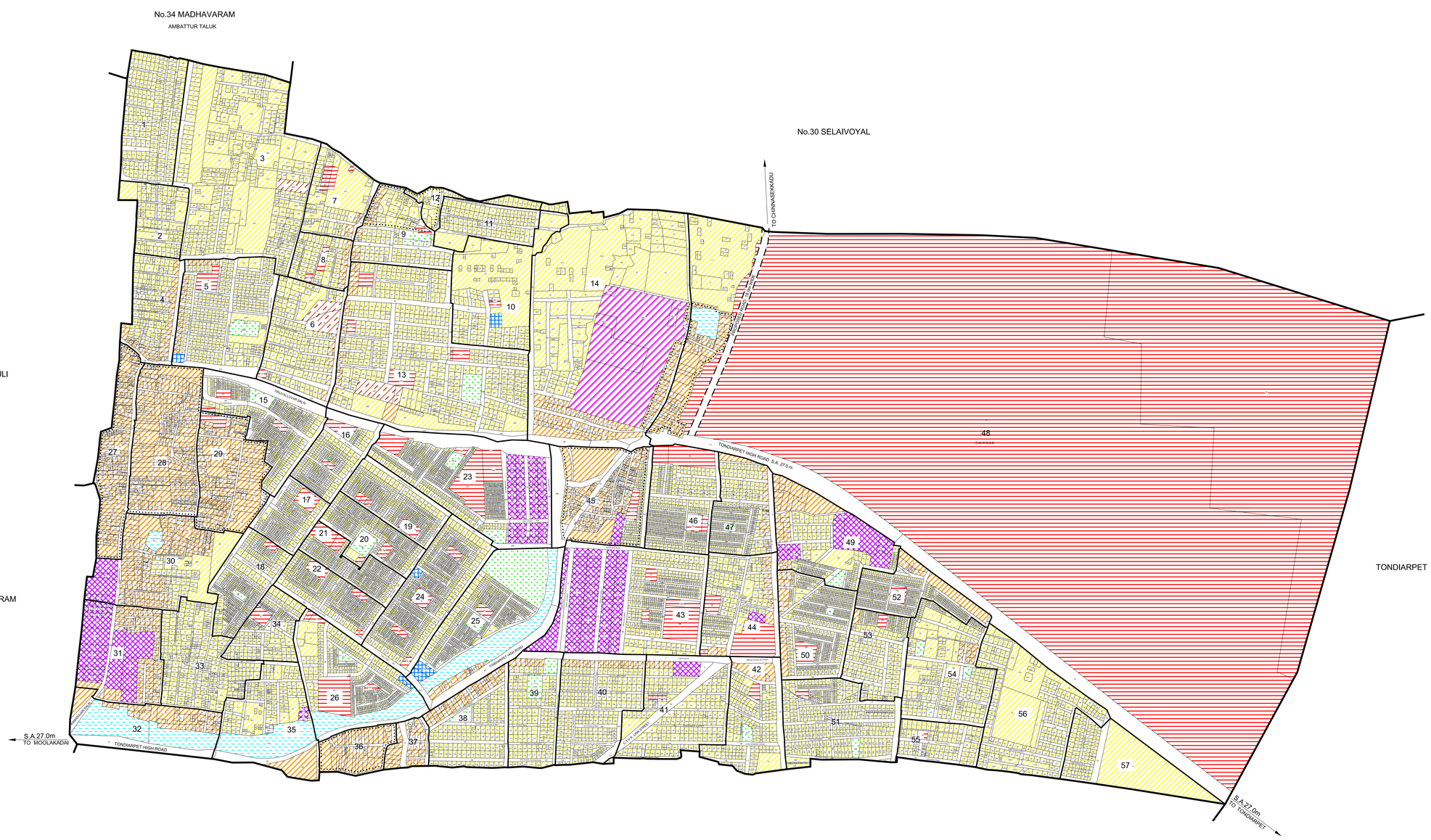
KODUNGAIYUR

VILLAGE NO. 31

FORT-TONDIARPET TALUK

CHENNAI DISTRICT

CORPORATION OF CHENNAI



LEGEND

- PRIMARY RESIDENTIAL
- MIXED RESIDENTIAL
- COMMERCIAL
- INSTITUTIONAL
- INDUSTRIAL
- SPECIAL AND HAZARDOUS INDUSTRIAL
- OPEN SPACE & RECREATIONAL
- URBANISABLE
- NON URBAN
- WATER BODY
- RESERVED FOREST
- AGRICULTURAL
- CONTINUOUS BUILDING AREA
- EWS AREA

NOTE

1. Street Alignment 27.0 m for Moolakadai - Tondiarpet Road.
2. Proposed 18.0 m wide Kodungaiyur - Chinnasekkadu Road.

MAP No. MP-II / CITY 5 / 2008

DIGITIZED BY	M.S.SANTOSH KUMAR	SENIOR PLANNER	Sd/- ..... S. Chithra
CHECKED BY		CHIEF PLANNER	Sd/- ..... C. Palanivelu
ASSISTANT PLANNER	Sd/- ..... C.R. Vimala		

Sd/- 19.9.2008
Vikram Kapur, I.A.S.
MEMBER SECRETARY
CHENNAI METROPOLITAN DEVELOPMENT AUTHORITY

FEET
264 132 0 264 528
METRES
80 40 0 80 160

MASTER PLAN FOR CMA - 2026

Kodungaiyur

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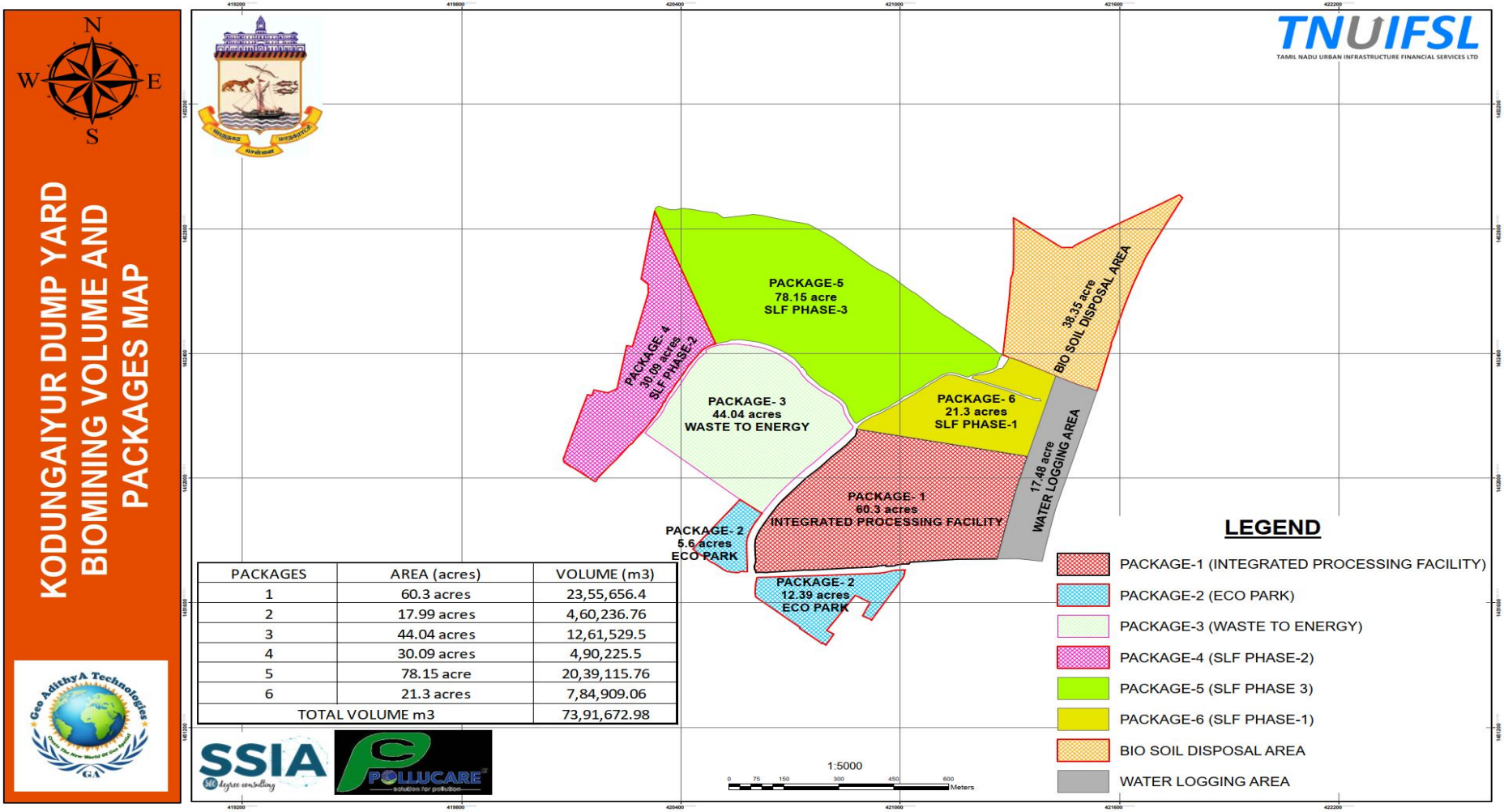
4 ANNEXURE 4: PROPOSED PROJECT LAYOUT



PACKAGES	AREA (acres)	VOLUME (m3)
1	60.3 acres	23,55,656.4
2	17.99 acres	4,60,236.76
3	44.04 acres	12,61,529.5
4	30.09 acres	4,90,225.5
5	78.15 acre	20,39,115.76
6	21.3 acres	7,84,909.06
TOTAL VOLUME m3		73,91,672.98

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5 ANNEXURE 5: TRAFFIC MANAGEMENT PLAN

TRAFFIC MANAGEMENT PLAN

(a) The indicative traffic management plan is given below.

(i) The incoming fresh waste will be routed through the second entrance gate available at site near the existing C&D waste processing plant. The fresh waste will unload waste at the particular earmarked location and then use the same route through the second gate entrance. The red marked route is proposed for fresh waste vehicle movement. Further packages 4&5 waste quantity is not high when compared to package 1, 3 & 6 so the vehicle requirement and for biomining operations will be less. So there will be less traffic management issue with respect to fresh waste movement.

(ii) For biomining activity during construction and operations phase the main gate entrance route which has two-way carriage will be utilized for biomining waste shifting operations, RDF, inerts disposal etc. fresh waste vehicle entry will not be through this route. The route indicate in yellow will be followed for entire biomining operations.

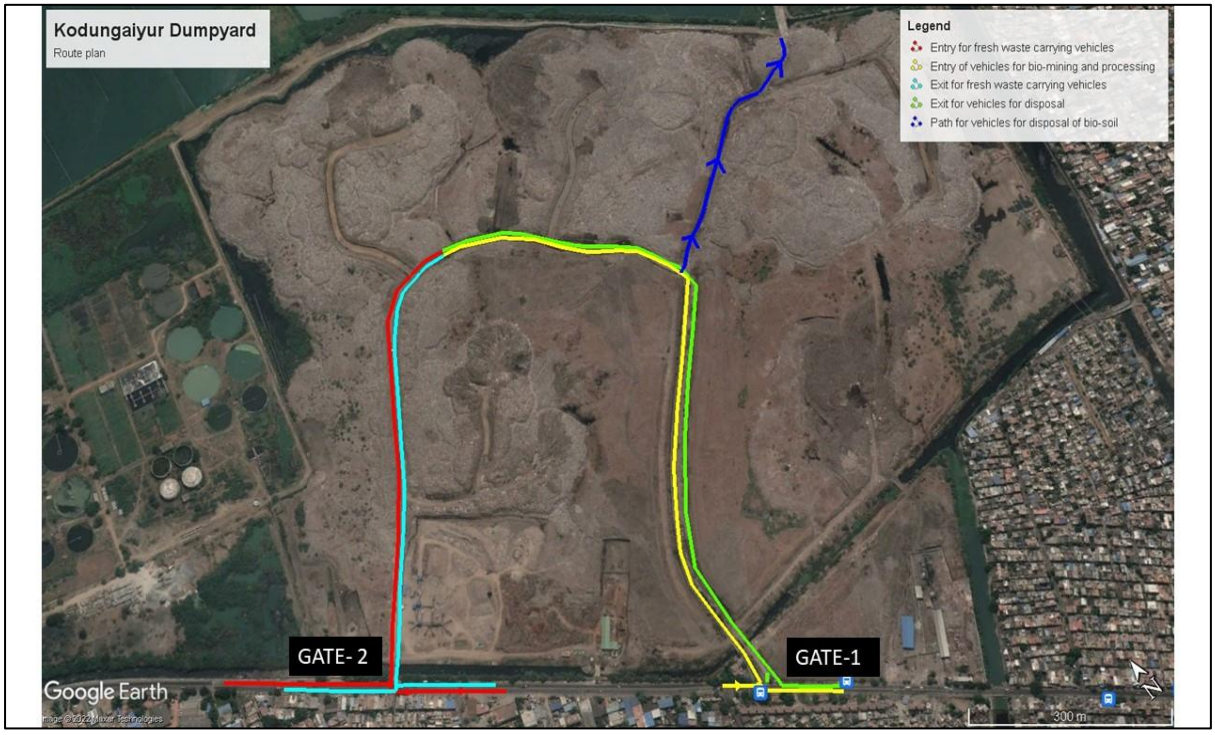
(iii) For bio-earth disposal within the site will follow the route highlighted in blue.

(iv) By doing all the above the traffic movement within this site will be managed.

(v) For outside traffic management, coordination with traffic department shall be done in order to manage the traffic outside site during peak hours.

(b) The above traffic management plant is indicative in nature. The detailed traffic management plan will be submitted by the Biomining contractors during preparation of DPR/Project Implementation and Operation Plan (PIOP).

Figure 1: Proposed Traffic Management



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6 ANNEXURE 6: LIST OF RAG PICKERS

Table 1: PAP Details

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
1	Nagaraj	07.10.1990	32	Male	Yes	Self	Nageswara Rav	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	414780728526	276, G Block, RR Nagar, Kodungaiyur, Chennai.
2	S.Mahalakshmi	Nil	20	Female	No	Wife	S.Samuvel	Hindu	Tamil	SC	39	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
3	S.Samuvel	Nil	39	Male	Yes	Self	Selvaraj	Hindu	Tamil	SC	39	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
4	R.Parvathi	09.09.1970	47	Female	No	Wife	Ramesh	Hindu	Tamil	SC	47	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	232980849567	141,88 Kathpada Main Road, Wesermenpet, Chennai.
5	V.Ramesh	10.10.1960	49	Male	Yes	Self	Vinayagam	Hindu	Tamil	SC	49	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	933721354572	141,88 Kathpada Main Road, Wesermenpet, Chennai.
6	P.Gopi	01.02.1980	42	Male	Yes	Self	Palani	Hindu	Tamil	BC	40	Yes	Yes	No	Yes	No	No	No	Aadhar Card	928048398166	27, Rajarathina nagar, Kodungaiyur, Chennai.
7	G. Indhira	01.01.1981	39	Female	No	Wife	P.Gopi	Hindu	Tamil	BC	40	Yes	Yes	No	Yes	No	No	No	Aadhar Card	375371964715	27, Rajarathina nagar, Kodungaiyur, Chennai.
8	M.Vanitha	01.01.1987	35	Female	No	Wife	Mathankumar	Hindu	Tamil	SC	40	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	915114119102	10th Street,PP Amman Kovil ,Moolakothalam, Vannarapettai.
9	M.Lakshmi	Nil	60	Female	No	Wife	Mari	Hindu	Tamil	SC	48	No	Yes	No	No	No	No	No	Aadhar Card	Nil	Nil
10	K.Chandra	Nil	53	Female	No	Wife	Karuna	Hindu	Tamil	SC	48	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
11	S.Kamatchi	Nil	60	Female	No	Wife	Selvam	Hindu	Tamil	BC	40	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
12	C.Yosotha	Nil	65	Female	No	Wife	Chithirai	Hindu	Tamil	SC	60	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
13	A.Vijayakumar	Nil	50	Male	No	Son	A.Arul	Hindu	Tamil	SC	4	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
14	R.Ammu	Nil	18	Female	No	Wife	Ramu	Hindu	Tamil	SC	8	No	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
15	P.Amulu	Nil	49	Female	Yes	Self	Palani	Hindu	Tamil	BC	40	No	No	No	No	No	No	No	Nil	Nil	Nil

[2] As per the census survey conducted in 2022, only 2 out of 327 ragpickers are below the age of 18 (one aged 17 and the other aged 14). The ragpicker aged 17 will turn 18 in 2023 and may be allowed to continue in this occupation. The ragpicker aged 14 shall be rehabilitated under the National Child Labour Project (NCLP) Scheme for rehabilitation of child labourers through District Project Societies under the chairmanship of the District Magistrate.

[3] *The information pertaining to the last three columns of this table shall not be subject to public disclosure owing to privacy concerns.*

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
16	V.Dhanush	Nil	20	Male	Yes	Self	Vinoth	Hindu	Tamil	SC	20	No	No	No	No	No	No	No	Nil	Nil	Nil
17	D.Nagavalli	Nil	29	Female	No	Wife	V.Dhanush	Hindu	Tamil	SC	20	No	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
18	P.Vasanthi	12.07.1984	38	Female	No	Wife	Pannerselvam	Christian	Tamil	BC	40	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	630527789943	No 788th Street, MGR Nagar, Kodungaiyur.
19	N.Tirumalai	31.07.1990	32	Male	Yes	Self	Nagendran	Hindu	Tamil	SC	32	Yes	Yes	No	Yes	No	No	No	Aadhar Card	898225307634	11/21, 2nd Street, Kodungaiyur, Chennai 600118.
20	T.Chitra	Nil	30	Female	No	Wife	N.Tirumalai	Hindu	Tamil	SC	32	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
21	S.Dhanasekaran	Nil	52	Male	Yes	Self	Sahadevan	Hindu	Tamil	BC	52	No	No	No	Yes	No	No	No	Aadhar Card	255574103844	MGR Nagar, 3rd Street, Kodungaiyur
22	D.Maheshwari	Nil	30	Female	No	Daughter	S.Dhanasekaran	Hindu	Tamil	BC	30	No	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
23	P.Kala	Nil	40	Female	Yes	Self	Pachapan	Hindu	Tamil	SC	40	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
24	B.Chandrasekar	Nil	35	Male	Yes	Self	Balasubramaniyan	Hindu	Tamil	SC	35	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
25	R.Gopi	Nil	42	Male	Yes	Self	Rangarav	Hindu	Tamil	SC	42	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
26	G.Devi	Nil	34	Female	No	Wife	Gopi	Hindu	Tamil	SC	34	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
27	G.Kamala	Nil	32	Female	Yes	Self	Gopal (late)	Hindu	Tamil	BC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
28	G.Murlai	Nil	25	Male	No	Sister	Gopal (late)	Hindu	Tamil	BC	22	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
29	G.Ravi	Nil	21	Male	No	Sister	Mari	Hindu	Tamil	BC	21	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
30	R.Ravi	Nil	20	Male	Yes	Self	Raji (Late)	Hindu	Tamil	SC	15	No	No	No	No	No	No	No	Nil	Nil	Nil
31	K.Baskar	Nil	52	Male	Yes	Self	Kullan	Hindu	Tamil	ST	40	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
32	P.Arul	Nil	37	Male	Yes	Self	Pachaiyapan	Hindu	Tamil	BC	30	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
33	B.Lakshmi	Nil	40	Female	No	Wife	Baskar (late)	Hindu	Tamil	BC	40	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
34	R.Bala	Nil	25	Male	No	Wife	Ravi	Hindu	Tamil	BC	25	No	No	No	No	No	No	No	Nil	Nil	Nil
35	G.Seenuvasan	Nil	68	Male	Yes	Self	Gurusamy	Hindu	Tamil	MBC	68	No	No	No	No	No	No	No	Nil	Nil	Nil
36	J.Amutha	Nil	52	Female	No	Wife	Jeyabal	Hindu	Tamil	SC	40	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
37	Ramesh	Nil	45	Male	Yes	Self	Nil	Hindu	Tamil	SC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
38	R.Rajeshwari	Nil	40	Female	No	Wife	Ramesh	Hindu	Tamil	SC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
39	R.Priya	Nil	25	Female	No	Wife	Manikandan	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
40	S.Ebinezar	01.01.1984	38	Male	Yes	Self	Selvaraj	Hindu	Tamil	SC	4	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
41	E.Bavani	Nil	22	Female	No	Self	S.Ebinezar	Hindu	Tamil	SC	4	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
42	A.Ganga	Nil	22	Female	No	Wife	N.Annamalai	Hindu	Telugu	SC	28	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
43	N.Annamalai	Nil	28	Male	Yes	Self	Narayanan	Hindu	Telugu	SC	28	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
44	M.Vinoth	Nil	25	Male	Yes	Self	Munusamy	Hindu	Tamil	SC	21	No	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
45	V.Mery	Nil	21	Female	No	Wife	Vinoth	Hindu	Tamil	SC	21	No	No	No	No	No	No	No	Nil	Nil	Nil
46	Kaliammal	Nil	42	Female	Yes	Self	Selvaraj (late)	Christian	Tamil	MBC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	22, 9 th Street, Bharathiyar Nagar, Korrukupettai.
47	Karthik	Nil	32	Male	Yes	Self	Moorthy (late)	Hindu	Tamil	MBC	25	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	Dump yard Kodungaiyur
48	Ravi	Nil	36	Male	Yes	Self	Mari	Hindu	Tamil	ST	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	33 Bagavathi amman Kovil Street
49	R.Kanniyammal	Nil	26	Female	No	Wife	Ravi	Hindu	Tamil	ST	7	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	33 Bagavathi amman Kovil Street
50	Madhan Kumar	Nil	47	Male	Yes	Self	Dhamu	Christian	Tamil	SC	25	Yes	No	Yes	No	No	No	No	Aadhar Card	Nil	623, Housing board, Kodungaiyur
51	Manoj	Nil	19	Male	No	Son	Madhankumar	Christian	Tamil	SC	9	Yes	No	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
52	Appu	Nil	55	Male	No	Grandson	Ramesh	Hindu	Tamil	SC	8	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	Housing Board, Kodungaiyur
53	Jothi	Nil	55	Female	Yes	Self	Munusamy (late)	Hindu	Tamil	SC	40	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Housing Board, Kodungaiyur
54	Vela	Nil	19	Male	No	Grandson	Annakumar	Hindu	Tamil	SC	8	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	Housing Board, Kodungaiyur
55	B.Karuppu Samy	Nil	14	Male	No	Grandson	Babu (late)	Hindu	Tamil	SC	5	Yes	No	No	No	No	No	No	Aadhar Card	Nil	Housing Board, Kodungaiyur
56	R.Mekala	Nil	26	Female	Yes	Self	Rajesh	Hindu	Tamil	BC	5	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	MGR Nagar, 3rd Street, Kodungaiyur
57	Rajesh	Nil	28	Male	No	Husband	Raman	Hindu	Tamil	BC	10	No	No	No	Yes	No	No	No	Aadhar Card	Nil	3rd Street, MGR Nagar, Kodungaiyur.
58	R.Priya	Nil	30	Female	No	Daughter	Rajesh	Hindu	Tamil	BC	2	No	No	No	No	No	No	No	Nil	Nil	3rd Street, MGR Nagar, Kodungaiyur.
59	D.Charles	Nil	31	Male	No	Brother	Doss	Christian	Tamil	SC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	RR Nagar, Kodungaiyur.
60	D.Lawrance	Nil	33	Male	Yes	Self	Doss	Christian	Tamil	SC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	RR Nagar, Kodungaiyur.
61	D. Vijaya	Nil	55	Female	No	Mother	Doss	Christian	Tamil	SC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	RR Nagar, Kodungaiyur.
62	D.Jayakumar	Nil	29	Male	No	Brother	Doss	Christian	Tamil	SC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	RR Nagar, Kodungaiyur.
63	S.Ganeshan	Nil	38	Male	No	Self	Sambagairaman	Hindu	Tamil	SC	25	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	175, RR Nagar, Kodungaiyur , Chennai.

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
64	Sambooranam	Nil	65	Female	No	Mother	Sambagairaman	Hindu	Tamil	SC	20	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	175, RR Nagar, Kodungaiyur , Chennai.
65	Gowri	Nil	22	Female	No	Daughter	Ganesan	Hindu	Tamil	SC	10	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	175, RR Nagar, Kodungaiyur , Chennai.
66	I.Subramaniyan	04.10.1960	70	Male	Yes	Self	Ayyapan	Hindu	Tamil	SC	25	Yes	Yes	No	Yes	No	No	No	Aadhar Card	4180733990442	Rajarathinam Street, 4th Street, Kodungaiyur.
67	Subha	01.01.1991	31	Female	No	Daughter	Subramani	Hindu	Tamil	SC	5	No	Yes	No	Yes	No	No	No	Aadhar Card	571872425213	4th Street, Rajarathinam Nagar, Kodungaiyur.
68	A.Kannaki	Nil	70	Female	No	Wife	Subramani	Hindu	Tamil	SC	20	Yes	Yes	Yes	No	Yes	No	No	Aadhar Card	Nil	4th Street, Rajarathinam Nagar, Kodungaiyur.
69	Kanmani	Nil	32	Female	Yes	Self	Srininvasan	Hindu	Tamil	ST	8	Yes	Yes	Yes	Yes	No	No	No	Pan Card	Nil	Irular Colony, KK Nagar, Chennai.
70	Srinivasan	Nil	51	Male	No	Husband	Nil	Hindu	Tamil	ST	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Irular Colony, KK Nagar, Chennai.
71	Gowri Shankar	Nil	27	Male	Yes	Self	Nil	Hindu	Tamil	SC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	3rd Main Road, Rajarathinam Street.
72	Gowri	Nil	22	Female	No	Wife	Shankar	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	3rd Main Road, Rajarathinam Street.
73	A.Kanniyappan	Nil	60	Male	Yes	Self	Arumugam	Hindu	Tamil	SC	25	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	45, Bharathi Nagar, 6th Street,Konikkupettai
74	S.Ganesan	Nil	50	Male	Yes	Self	Siva Perumal	Hindu	Tamil	BC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	9 A, Bharthiyar Main Street, Kurukupettai.
75	M.Surya	Nil	32	Male	Yes	Self	Murugan	Christian	Tamil	SC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	82, Housing Board
76	S.Ishwarya	Nil	24	Female	No	Wife	Surya	Christian	Tamil	SC	5	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	82, Housing Board
77	S.Samuvel	Nil	36	Male	Yes	Self	Seenu	Christian	Tamil	SC	25	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	MGr Nagar, Korrukupettai.
78	Amutha	Nil	30	Female	No	Wife	S.Samuvel	Christian	Tamil	SC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	MGr Nagar, Korrukupettai.
79	K.Srinivasan	Nil	30	Male	No	Son	K.Kesavan	Hindu	Tamil	MBC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	9 th Street, B Block
80	R.Kesavan	Nil	50	Male	Yes	Self	Ragavan	Hindu	Tamil	MBC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	9th Street, B Block, Ezil Nagar, Kodungaiyur
81	K.Ravi	Nil	42	Male	Yes	Self	Kumar	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	6th Street, Meenamba Nagar, Korrukkupettai
82	R.Uma	Nil	40	Female	No	Wife	Ravi	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	6th Street, Meenamba Nagar, Korrukkupettai
83	Prabhakaran	Nil	23	Male	No	Son	Ravi	Hindu	Tamil	SC	5	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	6th Street, Meenamba Nagar, Korrukkupettai
84	A.Rajesh	Nil	24	Male	No	Self	Arumugam	Hindu	Tamil	MBC	9	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	MGR Nagar, 3 Rd Street, Kodungaiyur.

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
85	R.Sembi	Nil	24	Female	No	Wife	Rajesh	Hindu	Tamil	MBC	5	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	3rd Street, MGR Nagar, Kodungaiyur.
86	C.Suresh	Nil	39	Male	Yes	Self	Chinnapayan	Hindu	Tamil	ST	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	JJ Nagar, Pallavakkam
87	S.Revathi	Nil	33	Female	No	Wife	Suresh	Hindu	Tamil	ST	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	JJ Nagar, Pallavakkam
88	E.Shanmugam	Nil	53	Male	Yes	Self	Ekambaram	Hindu	Tamil	ST	30	Yes	Yes	No	No	No	No	No	Family Card	Nil	4th Street, Deva Nagar
89	Chitra	Nil	37	Female	No	Wife	Shanmugam	Hindu	Tamil	ST	20	Yes	Yes	No	No	No	No	No	Family Card	Nil	4th Street, Deva Nagar
90	Jaganathan	Nil	40	Male	Yes	Self	Veerapan	Hindu	Tamil	SC	25	No	No	Yes	Yes	No	No	No	Nil	Nil	JJ Block, Raja Rathina Nagar, Kodungaiyur
91	Premkumar	Nil	18	Male	No	Son	Jaganathan	Hindu	Tamil	SC	7	No	No	Yes	Yes	No	No	No	Family Card	Nil	JJ Block, Raja Rathina Nagar, Kodungaiyur
92	K.Shankar	Nil	35	Male	Yes	Self	Krishnan	Hindu	Tamil	ST	20	Yes	Yes	Yes	Yes	No	No	No	Family Card	Nil	Mariyamman Nagar, Meenjiyur
93	S.Shanthi	Nil	35	Female	No	Wife	Shankar	Hindu	Tamil	ST	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Mariyamman Nagar, Meenjiyur
94	V.Mari	Nil	55	Male	Yes	Self	Varadhan	Hindu	Tamil	MBC	20	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Sathya Nagar, 2/4 Ezhil Nagar
95	M.Latha	Nil	48	Female	No	Wife	Mari	Hindu	Tamil	MBC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Sathya Nagar, 2/4 Ezhil Nagar
96	N.Nani	Nil	24	Male	Yes	Self	Nageshwara Rav	Hindu	Tamil	SC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	105 Housing Board, Kodungaiyur
97	N.Meena	Nil	22	Female	No	Wife	Nani	Hindu	Tamil	SC	8	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	105 Housing Board, Kodungaiyur
98	S.Seeralan	Nil	49	Male	Yes	Self	Subburayan	Hindu	Tamil	SC	20	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	112 B Block Housing unit
99	Sarasu	Nil	38	Female	No	Wife	Seeralan	Hindu	Tamil	SC	25	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	112 B Block Housing unit
100	Vicky	Nil	18	Male	No	Son	Seeralan	Hindu	Tamil	SC	10	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	112 B Block Housing unit
101	Nagappan	Nil	65	Male	Yes	Self	GnanaPrakasam	Hindu	Tamil	SC	20	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	9th Street,MGR Nagar, Ezil Nagar, Kodungaiyur
102	N.Vasantha	Nil	55	Female	No	Wife	Nagappan	Hindu	Tamil	SC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	9th Street,MGR Nagar, Ezil Nagar, Kodungaiyur
103	S.Pushpam	Nil	66	Female	Yes	Self	Subramani	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	891, Hosuing board, Ezhil Nagar, Kodungaiyur
104	Vijay	Nil	27	Male	No	Son	Pushpam	Hindu	Tamil	SC	17	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	891, Hosuing board, Ezhil Nagar, Kodungaiyur
105	Ajith	Nil	20	Male	No	Son	Pushpam	Hindu	Tamil	SC	5	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	891, Hosuing board, Ezhil Nagar, Kodungaiyur
106	Sivakami	Nil	50	Female	Yes	Self	Murugesh	Hindu	Tamil	MBC	15	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	16/31 2nd Street, Chandrasekar Nagar, Kodungaiyur.

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
107	Murugesh	Nil	55	Male	No	Husband	Veerapan	Hindu	Tamil	MBC	24	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	16/31 2nd Street, Chandrasekar Nagar, Kodungaiyur.
108	Mohana	Nil	20	Female	Yes	Self	Dinesh	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	1 st Chandrasekar Nagar, Kodungaiyur
109	Dinesh	Nil	26	Male	No	Husband	Prakash (late)	Hindu	Tamil	SC	13	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	1 st Chandrasekar Nagar, Kodungaiyur
110	Arun	Nil	20	Male	Yes	Self	Muthu	Hindu	Tamil	BC	5	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	35/36 MGR Nagar, Kodungaiyur.
111	Janaki	Nil	38	Female	No	Wife	Mari	Hindu	Tamil	SC	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	A Block, Ezhil Nagar, Kodungaiyur.
112	Kandan	Nil	42	Male	Yes	Self	Varadhan (late)	Hindu	Tamil	MBC	20	Yes	Yes	No	Yes	No	No	No	Aadhar Card	308319882207	Periyar Silai, Annai Sathya Nagar, Ezhil Nagar, Kodungaiyur.
113	Prema	Nil	39	Female	No	Wife	Kandhan	Hindu	Tamil	MBC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	386153679456	Annai Sathya Nagar, Periyar Silai.
114	Manikandan	Nil	22	Male	No	Son	Kandhan	Hindu	Tamil	MBC	8	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Periyar Silai, Annai Sathya Nagar, Ezhil Nagar, Kodungaiyur.
115	Ganesha	Nil	20	Male	No	Son	Kandhan	Hindu	Tamil	MBC	5	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Periyar Silai, Annai Sathya Nagar, Ezhil Nagar, Kodungaiyur.
116	Rejeshwari	7.11.1977	44	Female	No	Self	Krishnan	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	570861713372	No 156 C PPAK 10 th Street, Basinbridge, Washermenpet, Chennai 600021.
117	Renuka	Nil	29	Female	No	Daughter	Vinayagam	Hindu	Tamil	SC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Moola Korharam, 10 th Street, Korrukkupettai.
118	Sathyavani	Nil	27	Female	No	Daughter	Mani Barathi	Hindu	Tamil	SC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Moola Korharam, 10 th Street, Korrukkupettai.
119	Muthu mari	Nil	25	Female	No	Son	Krishnan (Late)	Hindu	Tamil	SC	6	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Moola Korharam, 10 th Street, Korrukkupettai.
120	Vinoth	Nil	26	Male	Yes	Self	Selvam	Christian	Tamil	SC	1	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	8, Chinsamman Kovil Street, Medhur, Mullai Nagar.
121	Bhavani	Nil	46	Female	No	Wife	Shankar	Christian	Tamil	SC	13	Yes	Yes	Yes	No	No	No	No	Aadhar Card	Nil	2nd Street, RR Nagar, Kodungaiyur.
122	Shankar	Nil	47	Male	Yes	Self	Mani	Christian	Tamil	SC	18	Yes	Yes	Yes	No	No	No	No	Family Card	Nil	2nd Street, RR Nagar, Kodungaiyur.
123	Mariyappan	Nil	56	Male	Yes	Self	Vellaiappa Nayakkar	Hindu	Tamil	BC	4	Yes	Yes	No	Yes	No	No	No	Family Card	Nil	139 Tamilan Nagar, Main Street, Tondaiyar Pet.
124	M.Nirmala	Nil	54	Female	Yes	Wife	Mariappan	Hindu	Tamil	BC	4	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	139 Tamilan Nagar, Main Street, Tondaiyar Pet.
125	Mohamed Kasim	Nil	64	Male	Yes	Self	Mohamed Yusuf	Muslim	Tamil	MBC	5	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	40 / 66 9th Street, MGR Nagar.

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126	Madhan Kumar	Nil	42	Male	Yes	Self	Damodharan	Hindu	Tamil	SC	20	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
127	Ajith	Nil	18	Male	Yes	Self	Dharman	Christian	Tamil	SC	18	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	148, Housing board, Kodungaiyur.
128	Tamilselvan	Nil	26	Male	Yes	Self	Renganathan	Hindu	Tamil	SC	8	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	VOC Nagar, New Wasermen pet.
129	Kathavarayan	Nil	32	Male	Yes	Self	Govindasamy	Hindu	Tamil	SC	2	Yes	Yes	Yes	Yes	No	No	No	Family Card	Nil	32, Nethaji Nagar, 118 th Block, Ennore
130	Mariammal	Nil	65	Female	Yes	Self	Sankar	Christian	Tamil	MBC	40	Yes	No	No	No	No	No	No	Aadhar Card	Nil	65 Street, Barathiyar Nagar, Korrukkupettai.
131	Selvam	Nil	42	Male	Yes	Self	Muniyan	Hindu	Tamil	MBC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	B Block, 3rd Street, Ezhil Nagar.
132	J.Suresh	Nil	45	Male	Yes	Self	Joseph	Christian	Tamil	SC	1	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nehru Nagar, Korrkku Pettai
133	M. Priya	Nil	22	Female	No	Wife	Manikandan	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	1, Rk Nagar,Chandra Sekar Nagar, 2 nd Street.
134	Parameshwari	Nil	32	Female	No	Self	Selvam	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	MGR Nagar, 3rd Street.
135	Saraswathi	Nil	40	Female	Yes	Self	Rajendiran	Hindu	Tamil	MBC	40	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	MGR Nagar, 7 rd Street.
136	P.Sivalingam	Nil	36	Male	Yes	Self	K.Purusothaman	Hindu	Tamil	MBC	10	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Chandra Sekar Nagar, Kodungaiyur.
137	Madhan Kumar	Nil	35	Male	Yes	Self	Sudharson	Hindu	Tamil	MBC	15	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	JJ Nagar, Main Street.
138	Ayyanar	21.03.2022	36	Male	Yes	Self	Subramaniyan	Hindu	Tamil	MBC	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	4, Ezhil Nagar, Block 10th Street, Chennai -118.
139	Dhanaskear	06.03.1963	52	Male	Yes	Self	Sahadevan	Hindu	Tamil	MBC	47	Yes	No	No	Yes	Yes	No	No	Aadhar Card	255574103844	118, 5th Pank Street, MGR Nagar
140	Selvam	Nil	52	Male	Yes	Self	Mani	Hindu	Tamil	ST	2	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Medur Ponneri
141	Parvathi	Nil	49	Female	Yes	Self	Muthukumaran (late)	Hindu	Tamil	OC	30	No	No	No	No	No	No	No	Nil	Nil	JJ Nagar, Korrukupettai.
142	J.Nazeer	Nil	65	Male	Yes	Self	Jaleel (Late)	Muslim	Tamil	MBC	15	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	2nd Street, Anna Nagar.
143	Moorthy	Nil	56	Male	Yes	Self	Ponnuvel	Hindu	Tamil	ST	20	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	647783883845	13 th Street, Ezhil Nagar.
144	Marimuthu	Nil	75	Male	Yes	Self	Pavadai	Hindu	Tamil	MBC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	8th Block, Kamaniyan Kovil Street.
145	Mahava Basha	Nil	56	Male	Yes	Self	Bada Sharif	Christian	Tamil	MBC	10	Yes	Yes	No	Yes	No	No	No	Voter ID	LQD1385749	Ambethkar Nagar, Permambudur.
146	Jayanthi	Nil	36	Female	No	Wife	Appu	Hindu	Tamil	BC	32	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Muthamil Nagar
147	Vinoth Kumar	22.12.1992	29	Male	Yes	Self	Velu	Hindu	Tamil	MBC	20	Yes	No	No	No	No	No	No	Aadhar Card	Nil	Korrukku Pettai
148	Raja Sekar	Nil	48	Male	Yes	Self	Subramani	Hindu	Tamil	SC	28	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	RR Nagar, Kodungaiyur.

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149	Nandagopal	Nil	48	Male	Yes	Self	Krishnamoorthy	Hindu	Tamil	BC	30	No	Yes	No	No	No	No	No	Aadhar Card	Nil	JJ Nagar, C Block, Korrukkupettai.
150	D. Minnale	Nil	60	Female	Yes	Self	Durai Samy (Late)	Hindu	Tamil	SC	40	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	2nd Street, Jeeva Nagar, Korrukkupettai.
151	S.Valli	01.01.1992	30	Female	Yes	Self	Saravanan	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	288797038629	6 th Street, Block, Ezhil Nagar.
152	V.Saravanan	1995	30	Male	Yes	Self	Vengatesan	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	450784251432	6th Street, B Block, Ezil Nagar, Kodungaiyur.
153	Mari	01.01.1968	45	Male	Yes	Self	Varadhan	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	934170379106	A Block, Ezhil Nagar, Kodungaiyur.
154	Karpagam	Nil	41	Male	Yes	Self	Murugan	Hindu	Tamil	SC	25	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	155, Housing Board, Kodungaiyur
155	Pattu	Nil	58	Female	Yes	Self	Sekar	Hindu	Tamil	MBC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	8th Street, Bharathi Nagar, Korrupettai.
156	Selvam	Nil	32	Male	Yes	Self	Annamalai	Hindu	Tamil	MBC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	143, Housing Board, Kodungaiyur.
157	Rukmani	Nil	68	Female	Yes	Self	Durai Samy (Late)	Hindu	Tamil	MBC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	48, B Block Rajarathinam Nagar, Kodungaiyur.
158	Jayakumar	Nil	45	Male	Yes	Self	M. S Mani	Hindu	Tamil	SC	20	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	907 , Rajarathinam Nagar, Kodungaiyur.
159	Poongavanam	Nil	45	Female	No	Wife	Shanmugam	Hindu	Tamil	MBC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	36, MGR Nagar, 4th Street
160	Vijaya	01.06.1975	48	Female	No	Wife	Renganathan	Hindu	Tamil	SC	4	Yes	Yes	No	Yes	No	No	No	Aadhar Card	428919123104	3rd Street, Near to Bus Sand
161	Renganathan	Nil	48	Male	Yes	Self	Thoppolan	Hindu	Tamil	SC	5	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	3rd Street, Near to Bus Sand
162	M.Marimuthu	09.10.1990	31	Male	Yes	Self	Murugesan	Hindu	Tamil	MBC	22	Yes	Yes	No	Yes	No	No	No	Aadhar Card	634557331462	5th Street, Ezil Nagar
163	Esakkiammal	10.05.1955	65	Female	Yes	Self	Nambi	Hindu	Tamil	MBC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	458369842643	9th Street, M G R Nagar, Kodungaiyur
164	Muthulakshmi	Nil	48	Female	Yes	Self	Datchinamoorthy	Hindu	Tamil	MBC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	A Block 2nd Street, Ezil Nagar
165	Poongodi	03.01.1994	28	Female	No	Daughter	Muthulaxmi	Hindu	Tamil	MBC	5	Yes	Yes	No	Yes	No	No	No	Aadhar Card	679829345707	7th Street, Ezhil Nagar A Block
166	Maheshwari	Nil	44	Female	Yes	Self	Manohar	Hindu	Tamil	MBC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	N 8, RR Nagar, Kodungaiyur.
167	Lashmi	Nil	46	Female	Yes	Self	Vengatesh	Hindu	Tamil	BC	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	627, Meenama Nagar, Kodungaiyur
168	Jothi	Nil	51	Female	Yes	Self	Manohar	Hindu	Tamil	MBC	18	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Sivashanmugapuram, B Block 4th Street
169	Vijay	Nil	26	Male	Yes	Self	Babu	Hindu	Tamil	MBC	20	Yes	No	No	No	No	No	No	Aadhar Card	Nil	Kuppai Medu, Kodungaiyur
170	Chira	Nil	23	Female	No	Self	Anil Raj	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	1, Chandra Sekar Nagar, 2nd Street
171	Rani	Nil	28	Female	No	Wife	Naveen Kumar	Hindu	Tamil	SC	3	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
172	Mani Vel	21.02.1982	40	Male	Yes	Self	Sundaram	Hindu	Tamil	SC	30	No	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil

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173	Mohan	Nil	47	Male	Yes	Self	Narayanasamy	Hindu	Tamil	BC	37	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	8/4, Sandra sekar nagar
174	Balaji	01.01.1978	41	Male	Yes	Self	Natarajan	Hindu	Tamil	MBC	20	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	783883970595	28, MGR Nagar, 4th Street
175	Lashmi	30.07.1985	36	Female	No	Wife	Deenadayalan	Hindu	Tamil	SC	25	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
176	Kuduvammal	01.01.1984	32	Female	No	Wife	Sulaiman	Muslim	Tamil	BC	20	No	Yes	Yes	Yes	No	No	No	Aadhar Card	635891729016	1, Kudisai Pakudhi
177	Boominathan	Nil	35	Male	Yes	Self	Seethrasu	Hindu	Tamil	SC	1	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
178	Krishna	Nil	70	Male	Yes	Self	Elumalai	Hindu	Tamil	SC	50	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
179	Muri Kayi	Nil	57	Female	Yes	Self	Maliappa Choudary	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	59/60, MGR Nagr, 3rd Street
180	Saram	Nil	32	Female	No	Wife	Suresh Kumar	Hindu	Tamil	SC	15	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	62/40, Ezil Nagar
181	Ravi	Nil	49	Male	Yes	Self	Chanrasekaren	Hindu	Tamil	SC	15	Yes	Yes	No	No	No	No	No	Aadhar Card	Nil	Nil
182	Appu	Nil	45	Male	Yes	Self	Shanmugam	Hindu	Tamil	SC	35	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	No 5 MGR nagar 14 street ,B Block
183	Dhanalakshmi	Nil	35	Female	No	Wife	Appu	Hindu	Tamil	SC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	No 5 MGR nagar 14 street ,B Block
184	R.Prabakaran	Nil	45	Male	Yes	Self	Raj	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	No 88 C block RR nagar housing board
185	P.Venkadasen	Nil	50	Male	Yes	Self	Perumal	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	No 29 RR Street , Bharathi Nagar
186	A.Selvam	Nil	34	Male	Yes	Self	Annamalai	Hindu	Tamil	SC	1	No	No	No	Yes	No	No	No	Aadhar Card	Nil	143 B Block House board
187	R.Inthira	25.5.1973	49	Female	Yes	Self	Ramadas	Hindu	Tamil	BC	25	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	374172493020	No 8 Chandasekar nagar 1st street
188	Nani.N	Nil	25	Male	Yes	Self	Magaeshwaran	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	104 Block C House board
189	Kali amma.S	Nil	65	Female	Yes	Self	Selavaraj	Hindu	Tamil	SC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
190	Naveen Kumar.M	Nil	27	Male	Yes	Self	Muthu lingam	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	500538927983	Pilliyar Kovil Street, Tiruvallur
191	Kumar.C	Nil	42	Male	Yes	Self	Srinivasan	Hindu	Tamil	MBC	27	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
192	M.Suresh kumar	Nil	36	Male	Yes	Self	Murthi	Hindu	Tamil	SC	25	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
193	Mary.V	Nil	46	Female	Yes	Self	Venkadesh	Christian	Telugu	BC	20	Yes	No	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
194	Anand.S	Nil	22	Male	Yes	Self	Subramani	Hindu	Tamil	SC	15	No	No	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
195	Anathi.K	Nil	38	Female	No	Wife	Kalaiarasan	Christian	Tamil	BC	20	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
196	Kalyana sundar.R	Nil	32	Male	Yes	Self	Ravi	Hindu	Tamil	MBC	20	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
197	Yadavalli Mariyamma.R	Nil	53	Female	Yes	Self	Rathanam	Christian	Telugu	BC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	416155427475	37 Lingasamuthirum street

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198	Devi.M	Nil	38	Female	No	Wife	Muthu kumar	Hindu	Tamil	BC	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
199	Chinna Tambi.M	Nil	25	Male	Yes	Self	Muthu	Hindu	Tamil	ST	15	No	No	No	No	No	No	No	Nil	Nil	Nil
200	Uma.M	Nil	35	Female	No	Wife	Mathi	Hindu	Tamil	SC	20	No	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	34 MGR nagar
201	Ranjith.A	05.09.1996	25	Male	Yes	Self	Arumugam	Hindu	Tamil	SC	12	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
202	Mariappan.B	Nil	27	Male	Yes	Self	Babu	Hindu	Tamil	MBC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
203	Dhanigachalam.C	Nil	43	Male	Yes	Self	Chinnadurai	Hindu	Tamil	MBC	20	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
204	Loganayagi.M	01.01.1986	36	Female	No	Wife	Munusamy	Hindu	Tamil	SC	30	No	Yes	Yes	Yes	No	Yes	No	Aadhar Card	86401702435	702 RR Nagar 3rd street kodungaiyur
205	Alima.K	01.01.1970	52	Female	No	Wife	Kulam	Muslim	Tamil	BC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	503820276933	1/1 1st street Ezlil nagar huts kodungaiyur
206	Chandrasekar.N	01.01.1984	42	Male	Yes	Self	Natarajan	Hindu	Tamil	MBC	20	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	694214288193	64/33 MGR Nagar 8th street
207	Garima.B	Nil	35	Female	No	Wife	Basha	Muslim	Tamil	BC	12	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
208	Vasantha.K	Nil	40	Female	Yes	Self	Kulam	Muslim	Tamil	BC	25	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
209	Anand.S	Nil	30	Male	Yes	Self	Srinivasan	Hindu	Tamil	MBC	20	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
210	KalaiMathi.S	Nil	60	Female	Yes	Self	Suryamurthi	Hindu	Tamil	SC	20	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	No 32 MGR nagar
211	Chandra.P	Nil	50	Female	No	Wife	Palani	Hindu	Tamil	SC	20	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
212	Nagavalli.R	Nil	43	Female	No	Wife	Ramu	Hindu	Tamil	SC	20	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
213	Rajalakshmi	01.01.1977	44	Female	No	Wife	Gokula Krishnan	Hindu	Tamil	SC	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
214	Neelavathy.G	Nil	30	Female	No	Wife	Govidhasamy	Hindu	Tamil	MBC	15	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	4724 MGR Nagar 7th street
215	Raji.M	Nil	30	Male	Yes	Self	Manoharan	Hindu	Tamil	SC	2	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	G block rr nagar
216	Pommiamma.S	Nil	61	Female	Yes	Self	Subramani	Hindu	Tamil	SC	20	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
217	Parathiba.A	Nil	28	Female	No	Wife	Appu	Hindu	Tamil	SC	7	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
218	Velu.B	Nil	37	Male	Yes	Self	Babu	Hindu	Tamil	SC	10	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	1026 J Block 2 street R.R nagar
219	Aravamsavida.R	Nil	55	Female	Yes	Self	Ravi	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	25 A Block 9th street
220	Vanilla.J	Nil	25	Female	No	Wife	Jagan	Hindu	Tamil	SC	12	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
221	Neelavathi.R	Nil	38	Female	No	Wife	Raja	Hindu	Tamil	SC	20	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
222	Valli.R	Nil	42	Female	No	Wife	Ravi	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
223	Jayanthi.N	Nil	22	Female	No	Wife	Harish	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	140 D block RR nagar
224	Sasi.B	01.01.1986	24	Female	No	Wife	Babu	Hindu	Tamil	SC	24	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	986660590201	91/3 Tiyaga chetty street korukkupet washemenpet chennai
225	Murithi.T	Nil	36	Male	Yes	Self	Thangavelu	Hindu	Tamil	MBC	15	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	1/1 Ezhil nagar 1st street MGR nagar
226	Neela.M	15.07.1965	56	Female	Yes	Self	Munusamy	Hindu	Tamil	SC	30	No	Yes	Yes	Yes	No	Yes	No	Aadhar Card	446938522979	26 thebar nagar 3rd street Vyasarpadi
227	Arun.M	Nil	21	Male	Yes	Self	Muthu Kumar	Hindu	Tamil	BC	13	No	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
228	Sindhu.N	Nil	24	Female	No	Wife	Nagaraj	Hindu	Tamil	BC	14	No	No	No	Yes	No	No	No	Aadhar Card	Nil	Nil
229	Dharma.S	Nil	22	Male	Yes	Self	Sakkarabani	Hindu	Tamil	SC	10	No	Yes	No	Yes	No	No	No	Aadhar Card	535591974589	83 8th street MGR nagar chennai
230	Nagaraj.C	Nil	19	Male	Yes	Self	Chakkraibani	Hindu	Tamil	SC	10	No	Yes	No	Yes	No	No	No	Aadhar Card	338869889200	8th Street, Kodungaiyur
231	Nirmalkumar.S	Nil	24	Male	Yes	Self	Suresh	Hindu	Tamil	MBC	13	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
232	Anitha.B	Nil	19	Female	No	Wife	Barathi	Hindu	Tamil	SC	8	No	No	No	Yes	No	Yes	No	Aadhar Card	494898460979	78/40, 8th Street, MGR Nagar
233	Parameshwari.C	Nil	39	Female	Yes	Self	chinnaayya	Hindu	Tamil	OC	25	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
234	Selvi	Nil	25	Female	Yes	Self	Kulam	Muslim	Tamil	BC	12	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
235	C.Gopinath	Nil	18	Male	No	Mother	Natarajan	Hindu	Tamil	MBC	10	No	No	Yes	Yes	No	No	No	Aadhar Card	Nil	64/33 MGR Nagar 8th street
236	C.Nanthini	Nil	17	Female	No	Mother	Natarajan	Hindu	Tamil	MBC	10	No	No	Yes	Yes	No	No	No	Aadhar Card	Nil	64/33 MGR Nagar 8th street
237	Munusamy	03.03.1986	39	Male	Yes	Self	Kotteswaran	Hindu	Tamil	SC	35	No	Yes	Yes	Yes	No	Yes	No	Aadhar Card	885960584793	702 RR Nagar 3rd street kodungaiyur
238	Deva.R	Nil	25	Male	Yes	Mother	Ravi	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	25 A Block 9th street
239	Rajesh	Nil	23	Male	Yes	Mother	Ravi	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	25 A Block 9th street
240	Samraj	Nil	20	Male	Yes	Mother	Ravi	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	25 A Block 9th street
241	Ishwaraya	Nil	18	Female	Yes	Mother	Ravi	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	25 A Block 9th street
242	Nadini	Nil	30	Female	No	Wife	Suresh	Hindu	Tamil	SC	20	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
243	Ravi	Nil	45	Male	Yes	Self	Kumar	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
244	Vijay	Nil	20	Male	No	Son	Ravi	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
245	Naragaraj	Nil	34	Male	Yes	Brother	Srinivasan	Hindu	Tamil	MBC	22	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
246	Meenakshi	Nil	36	Female	Yes	Sister	Srinivasan	Hindu	Tamil	MBC	20	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
247	Palani	Nil	55	Male	Yes	Self	Muthu	Hindu	Tamil	SC	30	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
248	Saravanan.P	Nil	32	Male	No	Father	Palani	Hindu	Tamil	SC	20	No	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
249	Senthil kumar.P	Nil	28	Male	No	Father	Palani	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	Nil
250	Jagan	Nil	30	Male	Yes	Self	Ram	Hindu	Tamil	SC	12	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
251	Raja	Nil	38	Male	Yes	Self	Mari	Hindu	Tamil	SC	25	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
252	Vijay	Nil	20	Male	No	Son	Raja	Hindu	Tamil	SC	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
253	Ravi	Nil	45	Male	Yes	Self	Muthu	Hindu	Tamil	SC	35	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Nil
254	Mariyammal	Nil	20	Female	No	Wife	Prakash	Hindu	Tamil	SC	25	No	No	No	Yes	No	No	No	Aadhar Card	Nil	63, Mariyamma Nagar, Kodungaiyur
255	Vimal Raj	Nil	22	Male	No	Father	Venkadeshan	Hindu	Tamil	SC	10	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	21, A Block, Dr. Rajarathina Nagar
256	Prakash	Nil	21	Male	Yes	Self	Nil	Hindu	Tamil	SC	28	No	No	No	Yes	No	No	No	Aadhar Card	Nil	63, Mariyamma Nagar, Kodungaiyur
257	Venkatesh	Nil	50	Male	Yes	Self	Angan	Hindu	Tamil	SC	1	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	377290625898	Irular Colony, Nanchapakkam
258	Vasanthi	Nil	45	Female	No	Wife	Venkatesh	Hindu	Tamil	SC	1	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	343012300921	Irular Colony, Nanchapakkam
259	Santhosh Kumar	Nil	44	Male	Yes	Self	Perumal	Hindu	Tamil	SC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	117, D Block
260	Kumarasen	Nil	21	Male	Yes	Self	Selvam	Hindu	Tamil	SC	10	No	Yes	No	Yes	No	No	No	Aadhar Card	880481371090	95, Irular Nagar
261	Munusamy	Nil	70	Male	Yes	Self	Ramasamy	Hindu	Tamil	SC	20	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	1002, 1st Street, R Nagar
262	Kumar	Nil	30	Male	Yes	Self	Venkatasen	Hindu	Tamil	SC	20	No	Yes	Yes	Yes	No	No	No	Aadhar Card	464727329346	95, Irular Nagar, Nandhikuppam
263	Vijaya	Nil	36	Female	Yes	Self	Raji	Hindu	Tamil	MBC	30	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	40, Alathar Street, Rajji Nagar
264	Kanniyappan	Nil	40	Male	Yes	Self	Parameshwari	Hindu	Tamil	ST	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	17, Annpdhya Nagar, Athipet, Ennore
265	Kavitha	Nil	38	Female	No	Wife	Kanniyappan	Hindu	Tamil	ST	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	17, Annpdhya Nagar, Athipet, Ennore
266	Savithiri	Nil	63	Female	Yes	Self	Kannan late	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Kailasa Street, Thandaiyarpettai
267	Rajesh	Nil	40	Male	Yes	Self	Sundar late	Hindu	Tamil	MBC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	238, F Block, Housing Board, Kodungaiyur
268	Appu	Nil	35	Male	Yes	Self	Venugopal	Hindu	Tamil	SC	5	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	10, 91st Block, ALR Nagar, Tusanami Kudirupu, Ennore
269	Vijaya	Nil	48	Female	Yes	Self	Selvam Late	Hindu	Tamil	MBC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	70, MGR Nagar, 6th Street, Kodungaiyur

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
270	Suganya	Nil	26	Female	Yes	Daughter	Karthik	Hindu	Tamil	MBC	30	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	70, MGR Nagar, 6th Street, Kodungaiyur
271	Karthik	Nil	22	Male	No	Son	Ramesh	Hindu	Tamil	ST	12	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Vivekandha Nagar, Athipet
272	Chitra	Nil	22	Female	No	Wife	Viji	Hindu	Tamil	ST	1	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	681297435210	Neru Street, Athipet
273	Viji	Nil	23	Male	Yes	Self	Venkatesh	Hindu	Tamil	ST	1	Yes	No	Yes	Yes	No	No	No	Aadhar Card	416474478889	Neru Street, Athipet
274	Shiva	Nil	28	Male	Yes	Self	Selvam	Hindu	Tamil	ST	15	No	Yes	Yes	Yes	No	No	No	Aadhar Card	807234474898	Irular Colony, Athipet, Meenjur
275	Ellamma	Nil	25	Female	Wife	Self	Shiva	Hindu	Tamil	ST	5	No	Yes	Yes	Yes	No	No	No	Aadhar Card	710278337075	Irular Colony, Athipet, Meenjur
276	Manikandan	Nil	25	Male	Yes	Self	Govindhasamy	Hindu	Tamil	SC	6	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	96, Tusunami, Kudiyiruppu, Ennore
277	Malar	Nil	40	Female	Yes	Self	Murugan	Hindu	Tamil	SC	30	Yes	No	No	Yes	No	No	No	Aadhar Card	Nil	79, Chandrasekaran Nagar, Kodungaiyur
278	Saravanan	Nil	40	Male	Yes	Self	Sekar	Hindu	Tamil	SC	5	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	39, Samiyar Thottam, Viyasarpadi
279	Parameshwari	Nil	43	Female	Yes	Self	Chinnaiah	Hindu	Tamil	SC	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	604, Housing Board, Kodungaiyur
280	Nagarajan	Nil	36	Male	Yes	Self	Nageshwara Rav	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	127, G Block, Housing Borad
281	Sarswathi	Nil	43	Female	Yes	Self	Raguraman	Hindu	Tamil	MBC	35	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	15/31, Chandrasekara Nagar, 3rd Sheet
282	Vara Lakshmi	Nil	22	Female	Yes	Wife	Ramesh	Hindu	Tamil	MBC	10	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	Nil
283	Gowri Shankar	Nil	27	Male	Yes	Self	K. Raj	Hindu	Tamil	MBC	20	No	No	No	Yes	No	No	No	Aadhar Card	Nil	2, H Block, Housing Board
284	Muniyamma	Nil	60	Female	Yes	Self	Panneer	Hindu	Tamil	SC	40	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	90/88, Periyar Nagar, 3rd Street
285	Barath Kumar	Nil	20	Male	No	Father	Jagan	Hindu	Tamil	Nil	5	No	No	No	Yes	No	No	No	Aadhar Card	519718338749	6th Street, J Block, Kodungaiyur
286	Samuvel	17.04.2002	20	Male	No	Son	Munusamy	Christian	Tamil	SC	4	Yes	Yes	No	No	No	No	No	Aadhar Card	Nil	705, Rajarathina Nagar
287	Chandra	Nil	55	Female	Yes	Self	Karuna	Christian	Tamil	SC	30	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	490, R Nagar 2nd Street
288	Munivel	21.02.1982	40	Male	Yes	Self	Sundharam	Hindu	Tamil	SC	40	Yes	Yes	No	Yes	No	No	No	Aadhar Card	Nil	MGR Nagar, 8th Street, Kodungaiyur
289	Moorthy	1986	36	Male	Yes	Self	Thangavelu	Hindu	Tamil	MBC	30	Yes	Yes	Yes	Yes	No	Yes	No	Aadhar Card	Nil	13/10, Ezhil Nagar, A Block 11th Street
290	Bhavani	Nil	22	Female	No	Wife	Rajendran	Hindu	Tamil	ST	5	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	976427651392	32, Irular Colony, Nanchampakkam
291	Saraswathi	Nil	33	Female	Yes	Self	Abdul Rahman	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	958388293704	15/31, 3rd Street, Chandrasekara Nagar
292	Rajesh Kumar	Nil	23	Male	No	Son	Kumar	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	No	No	Voter ID	TWT3232790	762, H Block, RR Nagar, Kodungaiyur
293	Vijaya Kumar	Nil	22	Male	No	Son	Kumar	Hindu	Tamil	SC	10	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	257453996129	762, H Block, RR Nagar, Kodungaiyur

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
294	Ponni	Nil	33	Female	No	Wife	Marimuthu	Hindu	Tamil	SC	15	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	3rd Street, Irular Colony, Arani
295	Marimuthu	Nil	37	Male	Yes	Self	Velu	Hindu	Tamil	SC	25	Yes	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	3rd Street, Irular Colony, Arani
296	Rajasekar	Nil	42	Male	Yes	Self	Subramani	Hindu	Tamil	SC	30	Yes (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	908 Housing Board
297	Eswari	Nil	21	Female	No	Wife	Dharma	Hindu	Tamil	MBC	10	Yes (Green)	No	No	Yes	No	No	No	Aadhar Card	Nil	No 1 Chandraseakar nagar 1st, Kodungaiyur
298	Selvi.B	Nil	45	Female	Yes	Self	Balu	Hindu	Tamil	MBC	20	Yes (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	A Block Ezhil nagar 2 nd Street
299	Jayanthi	01.01.1979	43	Female	Yes	Self	Kumar (late)	Hindu	Tamil	SC	31	Yes (Green)	Yes	Yes	Yes	No	Yes	No	Aadhar Card	871396500802	702 H block, rr nagar , 3rd lane
300	Rajeshwari	Nil	26	Female	Yes	Self	Vasantha Kumar	Hindu	Tamil	MBC	16	Yes (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Ezil nagar ,Mudnagar 141 st 18/8 Kodungaiyur
301	Thangam	Nil	58	Male	Yes	Wife	Velu	Hindu	Tamil	MBC	30	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	1st Street, Housing Board
302	Shanthi	Nil	40	Female	No	Wife	Sivakumar	Hindu	Tamil	MBC	3	Yes (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	34 Lakshmi nagar A Block
303	Deveraj	Nil	45	Male	Yes	Self	Muthu	Hindu	Tamil	Bc	40	Yes (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	Telugu colony, Arani, preiyapalayam
304	Padmini	Nil	37	Female	No	Wife	Suresh	Hindu	Tamil	SC	15	Yes (Green)	Yes	No	Yes	No	No	No	Aadhar Card	Nil	130, Housing board
305	Karthik	Nil	36	Male	Yes	Self	Chandravel	Hindu	Tamil	MBC	26	Yes (Green)	Yes	No	Yes	No	No	No	Aadhar Card	Nil	10, Chandrasekar nagar, 5th st
306	Babu	Nil	21	Male	No	Son	Ravi	Hindu	Tamil	SC	10	No	No	No	No	No	No	No	Nil	Nil	12 Ezil Nagar A block 7th street
307	Ammu	Nil	19	Female	No	Wife	Ramkumar	Hindu	Tamil	MBC	15	Yes (Green)	No	Yes	Yes	Yes	No	No	Aadhar Card	Nil	6th st Block B Ezil nagar
308	Ganga	Nil	23	Female	No	Wife	Manikandan	Hindu	Tamil	MBC	4	No	No	No	Yes	No	No	No	Aadhar Card	Nil	No 1 Chandraseakar nagar
309	M.Suresh	Nil	37	Male	Yes	Self	Mani	Hindu	Tamil	ST	28	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	130 Hosuing board ,RR nagar
310	Tangaamma	Nil	58	Female	Yes	Self	Velu	Hindu	Tamil	MBC	25	No	Yes	No	Yes	No	No	No	Aadhar Card	Nil	180A RR Nagar, Street
311	Selvi.B	Nil	21	Male	No	Wife	Ajjay	Hindu	Tamil	Bc	1(week)	No	No	No	No	No	No	No	Nil	Nil	Chandrasekar nagar 1st Street
312	Bala	Nil	21	Male	Yes	Self	Ravi	Hindu	Tamil	SC	10	No	No	No	No	No	No	No	Nil	Nil	nil
313	Raja	Nil	47	Male	Yes	Self	Kaliaperumal	Hindu	Tamil	SC	25	No	No	Yes	No	No	No	No	Aadhar Card	Nil	nil
314	Magalakshmi	Nil	21	Female	No	Wife	Samsuel	Hindu	Tamil	SC	7	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	nil
315	Chithra	Nil	22	Female	No	Wife	Anilraj	Hindu	Tamil	SC	8	No	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	nil
316	Sivakumar	Nil	40	Male	Yes	Self	Nambi Achari	Hindu	Tamil	MBC	3	Yes (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	Nil	34 Lakshmi nagar A Block
317	R.Maheswari	15.05.1980	55	Female	No	Wife	Ramesh	Hindu	Tamil	SC	10	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	435380040504	Nil

Sl. No.	Name of the Respondent	DOB	Age[2]	Sex	Head of HH	Relation to HoH	Name of Father/ Husband	Religion	Mother Tongue	Social Category	No. of years living in Chennai	Have a family card	Respondent Having Voter Card	Respondent Having Bank Account	Respondent Having Aadhar Card	Respondent Having Passport Card	Respondent Having PAN Card	Respondent Having MNREGA Card	ID card Type	ID Card Number[3]	Address
318	Murali Chandran	Nil	33	Male	Yes	Self	Toppalan	Hindu	Tamil	Sc	10	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	625215946347	3/248 Water Tank Street
319	Rani	01.01.1992	35	Female	No	Wife	Ravi	Hindu	Tamil	Sc	10	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	293635068836	4142 Block Ezil nagar
320	Chakarabani	16.12.1975	42	Male	Yes	Self	Babu	Hindu	Tamil	Sc	15	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	452865195982	82,8th street MGR Nagar
321	Kuttiamma	01.01.1977	45	Female	Yes	Self	Saravanan	Hindu	Tamil	Sc	15	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	376902715777	58 Govindasamy Nagar
322	Lakshmi	01.01.2004	18	Female	No	Daughter	Chakarabani	Hindu	Tamil	Sc	10	No	Yes	Yes	Yes	No	No	No	Aadhar Card	631990623948	82,8th street MGR Nagar
323	Ponniammal	06.10.1965	57	Female	Yes	Self	Subramani	Hindu	Tamil	MBC	20	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	483872196092	32 Periyat Road ,Anna Sathya Nagar
324	Mabubi	Nil	35	Female	Yes	Self	Nazeer	Muslim	Tamil	BC	15	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	837844142921	5/28 ,6th Street Barathi Nagar
325	Balan	18.09.1970	42	Male	Yes	Self	Krishnan	Hindu	Tamil	BC	25	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	490472465642	6A first Street, Debar Nagar
326	Mani	07.04.1992	20	Male	No	Son	Balan	Hindu	Tamil	BC	5	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	742637567992	6A first Street, Debar Nagar
327	Patchaiammal	18.09.1976	36	Male	No	Wife	Balan	Hindu	Tamil	BC	20	Yes,Antyodaya (Green)	Yes	Yes	Yes	No	No	No	Aadhar Card	399358789287	6A first Street, Debar Nagar

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7 ANNEXURE 7: FREQUENCY & INTENSITY OF TROPICAL STORMS IN CHENNAI AND FLOOD HOTSPOTS

Last 20 Years Chennai Weather (Jan 2004 – Dec 2022)

Chennai	Temperature	Dew Point	Relative Humidity	Wind Speed
Maximum	43	33	100	1003.7
Minimum	17	1	15.48	0
Average	29	23	73	7

Chennai Cyclones in Last 50 years

1972 November Cyclone - Not much rains for Chennai maybe 100 -150 mm, but was a cat 2 off North TN coast. Crossed near Sri harikota Island and the maximum wind was 115 km/hr and gusts upo 170 km/hr.

1984 November Cyclone (Close to Super Cyclone) - Chennai got 400 mm in 2 and half days and similar to 1972 system it was cat 2-3 off North TN coast. Crossed near Sri harikota Island. The maximum wind was over 213 km/hr.

1985 November Cyclone - Chennai got 650 mm in just 3 days and 900 mm in total. It was one of the greatest flood event in Chennai's history. The cyclone crossed near Nellore and the maximum wind was 80-90 km/hr.

1994 November Cyclone - Chennai got 350 mm in just 2 days. After crossing, the eye of storm moved over Chennai by IMD. Its was the last strong cyclone to cross Chennai. The cyclone crossed south of Chennai and the maximum wind was 120 km/hr and gusts upo 140 km/hr.

1996 November Cyclone - Chennai got 150 mm in 3 days. It made loop just like 1985 cyclone. It was Cat 1 at peak intensity. But it was a weakened cyclone due to high shear during landfall over Chennai and the maximum wind was 100 km/hr.

2005 Cyclone Baaz - Chennai got 250 mm in a day. It brought massive flooding to Chennai. The wind speed hardly managed to cross 50 km/hr when making landfall over Chennai.

2006 Cyclone Ogni - Chennai got 300 mm in two days and close to 500 mm overall. It brought massive flooding to Chennai for 4-5 days. The cyclone marched through Chennai coast. It had one of the strangest track. The cyclone intensified after moving away from Chennai. Chennai got 60 km/hr winds and it was windy for 2 days. Keametsite recorded 50km/hr winds.

2010 Cyclone Jal - Chennai got just 70 mm rainfall. It was a weakened cyclone due to high shear during landfall over Chennai and the maximum wind was 70 km/hr. Keametsite recorded 47 km/hr winds.

2012 Cyclone Nilam - Chennai got 120 mm rainfall. It also was a weakened cyclone due to high shear during landfall over Mahabs and the maximum wind was however in chennai at 75 km/hr. Keametsite recorded 72 km/hr winds.

Cyclone Vardah (2016)

A ‘Very Severe’ cyclonic storm Vardah was first formed as a deep depression near Andaman Island and soon became a strong cyclone. It shook the capital of Tamil Nadu, Chennai and thousands of trees were uprooted. A round-the-clock deluge stunned the residents of Chennai who were helpless to do anything. It was estimated that the total monetary loss from Cyclone Vardah was in the tune of over Rs 1,000 crore.

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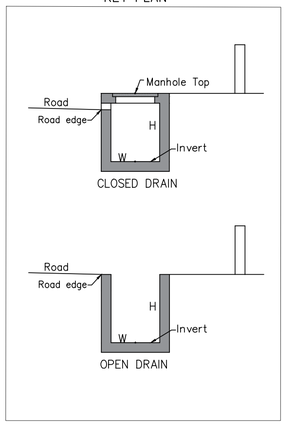
LIST OF POINTS

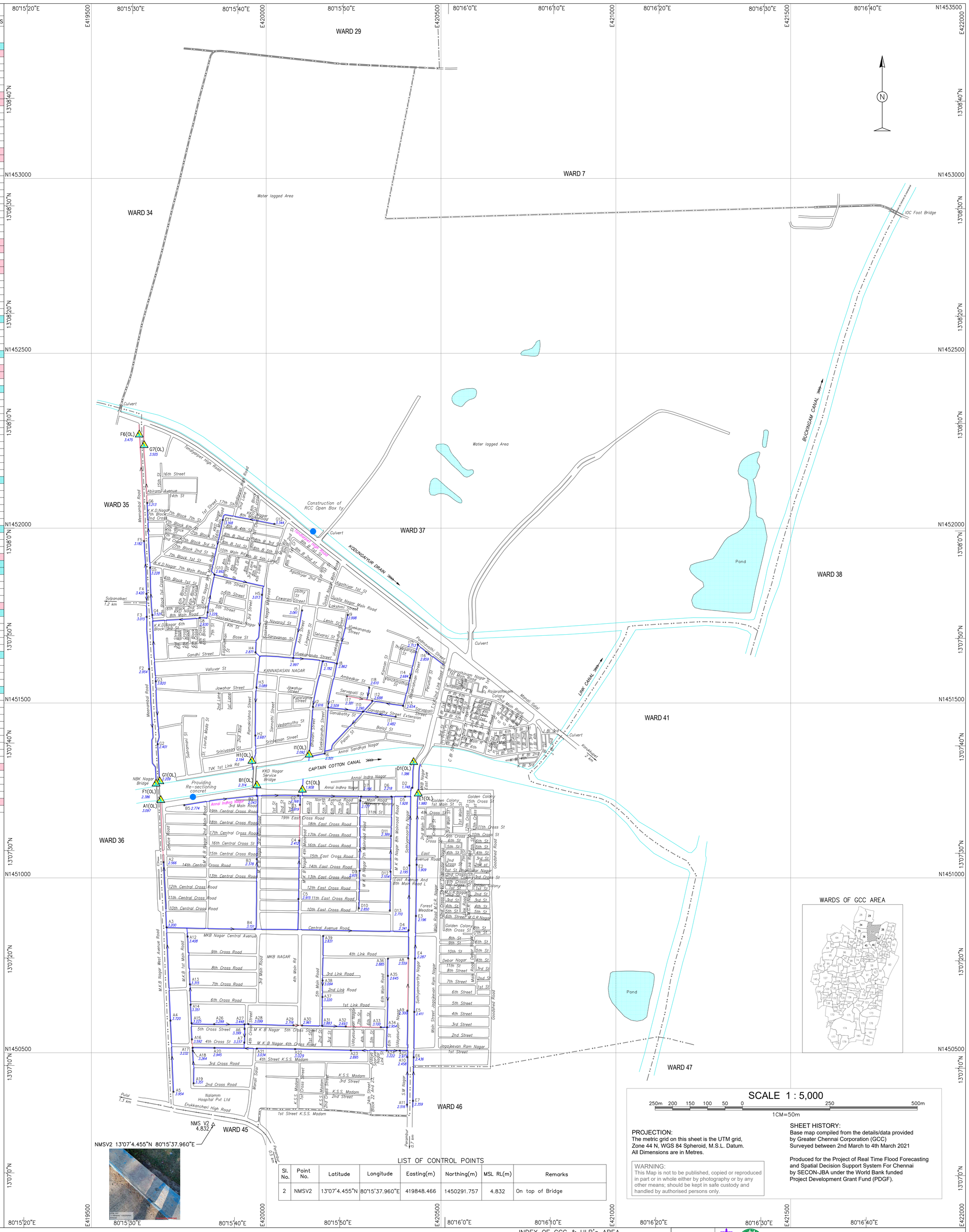
Sl No.	MANHOLE ID	DRAIN Closed(C) /Open(O)	MSL LEVEL			DRAIN DIMENSIONS	
			Drain Top(m)	Invert (m)	Road Edge (m)	Width (m)	Depth (m)
1	A1 (OL)	C	4.497	3.097	3.232	1.600	1.250
2	A2	C	3.766	2.566	3.639	0.900	1.000
3	A3	C	4.470	3.200	4.349	0.900	1.070
4	A4	C	4.820	3.720	4.631	0.900	0.900
5	A5	C	5.054	3.954	4.648	0.950	0.900
6	A6	C	4.099	3.399	3.939	1.000	0.450
7	A7	C	4.187	3.237	4.012	0.800	0.250
8	A8	C	3.839	2.559	3.674	1.200	0.930
9	A9	C	3.650	2.300	3.550	1.250	1.050
10	A10	C	3.838	2.580	3.666	1.250	1.130
11	A11	C	3.816	2.516	3.643	1.200	1.050
12	A12	C	4.108	3.408	3.939	1.100	0.500
13	A13	C	4.115	3.315	4.123	1.000	0.600
14	A14	C	4.151	3.351	4.141	0.800	0.550
15	A15	C	4.205	3.225	4.217	1.200	0.730
16	A16	C	4.242	3.592	4.139	0.800	0.450
17	A17	C	4.332	3.232	4.227	1.100	0.850
18	A18	C	4.414	3.264	4.121	1.200	0.900
19	A19	C	4.451	3.351	4.257	1.200	0.850
20	A20	C	4.095	2.945	4.063	1.200	0.950
21	A21	C	4.184	3.034	4.068	1.100	0.900
22	A22	C	4.129	3.029	3.903	1.100	0.850
23	A23	C	4.145	2.895	3.998	1.000	1.000
24	A24	C	4.042	3.222	4.032	0.900	0.570
25	A25	C	3.977	2.977	3.802	1.200	0.750
26	A26	C	4.249	3.299	4.215	1.000	0.700
27	A27	C	4.148	3.448	4.025	1.000	0.450
28	A28	C	3.979	3.099	3.991	1.000	0.630
29	A29	C	3.816	2.716	3.811	1.200	0.850
30	A30	C	4.111	2.961	3.910	1.000	0.900
31	A31	C	3.983	2.883	3.676	1.200	0.850
32	A32	C	3.873	2.693	3.765	1.020	0.930
33	A33	C	3.817	3.100	3.632	1.200	0.467
34	A34	C	3.800	3.100	3.705	1.200	0.450
35	A35	C	3.695	2.645	3.672	1.000	0.550
36	A36	C	3.785	2.885	3.626	1.000	0.650
37	A37	C	3.920	3.220	3.642	1.200	0.450
38	A38	C	3.894	3.094	3.754	1.200	0.550
39	A39	C	3.831	2.831	3.910	0.800	0.750
40	B1 (OL)	C	3.314	2.314	3.238	1.500	0.750
41	B2	C	3.293	2.043	3.100	1.000	1.050
42	B3	C	3.578	2.378	3.620	1.000	0.950
43	B4	C	4.251	3.151	4.055	1.000	0.900
44	B5	C	3.374	2.774	3.140	1.500	0.400
45	C1 (OL)	C	3.158	1.908	3.075	1.500	1.050
46	C2	C	3.268	2.168	3.113	1.000	0.900
47	C3	C	3.219	2.819	3.262	1.100	0.200
48	C4	C	3.662	2.412	3.501	0.900	1.000
49	C5	C	4.115	2.915	4.127	0.900	1.000
50	D1 (OL)	C	2.886	1.386	2.879	2.000	1.300
51	D2	C	2.948	1.748	2.636	2.000	0.950
52	D3	C	3.295	2.195	3.023	1.000	0.900
53	D4	C	3.444	2.341	3.433	1.100	0.900
54	D5	C	2.828	1.928	2.824	1.200	0.750
55	D6	C	3.218	2.218	3.257	1.100	0.800
56	D7	C	3.056	2.156	3.012	0.100	0.650
57	D8	C	3.087	2.177	3.041	1.100	0.660
58	D9	C	3.401	2.601	3.675	1.100	0.600
59	D10	C	3.670	2.850	3.675	1.100	0.620
60	D11	C	3.389	2.389	3.364	1.200	0.800
61	D12	C	3.504	2.554	3.406	1.100	0.750
62	D13	C	3.610	2.710	3.493	1.100	0.700
63	E1 (OL)	C	3.122	1.980	2.808	2.000	1.170
64	E2	C	3.209	1.909	2.994	1.500	1.100
65	E3	C	3.489	2.196	3.326	1.100	1.093
66	E4	C	3.487	2.287	3.525	1.100	1.000
67	E5	C	3.741	2.411	3.623	1.200	1.080
68	E6	C	3.766	2.436	3.651	1.200	1.080
69	E7	C	3.859	2.359	3.632	1.200	1.000
70	F1 (OL)	C	3.796	2.386	3.390	0.201	1.009
71	F2	C	4.154	2.954	3.979	0.901	0.990
72	F3	C	4.117	3.015	4.047	0.801	0.899
73	F4	C	4.321	3.420	4.060	0.750	0.693
74	F5	C	4.284	3.182	4.251	0.910	0.592
75	F6 (OL)	C	4.583	3.475	4.465	0.920	0.825
76	G1 (OL)	C	3.521	2.209	3.358	1.201	0.707
77	G2	C	3.713	2.401	3.630	1.045	0.817
78	G3	C	4.141	3.820	3.970	0.901	0.116
79	G4	C	4.216	3.521	4.143	0.812	0.485
80	G5	C	4.337	3.228	4.126	0.801	0.519
81	G6	C	4.594	3.213	4.341	0.901	0.798
82	G7 (OL)	C	4.488	3.505	4.430	1.025	0.794
83	G8	C	3.950	2.830	3.976	0.701	0.899
84	G9	C	4.090	3.229	3.940	0.651	0.606
85	G10	C	3.907	2.992	3.805	0.650	0.705
86	G11	C	4.153	3.168	4.147	0.919	0.800
87	G12	C	4.054	3.344	4.021	1.025	0.475
88	H1 (OL)	C	3.606	2.194	3.897	1.015	0.852
89	H2	C	3.570	2.687	3.447	0.908	0.701
90	H3	C	3.781	3.089	3.716	0.953	0.491
91	H4	C	3.789	2.871	3.723	0.920	0.729
92	H5	C	3.904	3.013	3.526	0.901	0.702
93	I1 (OL)	C	3.457	2.092	3.150	1.022	1.160
94	I2	C	3.529	2.616	3.499	0.815	0.653
95	I3	C	3.684	2.782	3.563	0.820	0.694
96	I4	C	3.898	2.997	3.834	0.912	0.713
97	I5	C	3.881	3.061	3.383	0.805	0.610
98	I6	C	3.257	2.501	3.271	0.855	0.571
99	I7	C	3.311	2.509	3.245	0.810	0.551
100	I8	C	3.577	2.862	3.469	0.807	0.434
101	I9	C	3.623	2.998	3.567	0.775	0.285
102	I10	C	3.215	2.290	3.184	0.691	0.574
103	I11	C	3.292	2.482	3.224	0.972	0.625
104	I12	C	3.491	2.688	3.428	0.810	0.602
105	I13	C	3.436	2.654	3.358	0.791	0.467
106	I14	C	3.404	2.684	3.383	0.702	0.504
107	I15	C	3.418	2.713	3.246	0.783	0.454
108	I16	C	3.368	2.859	3.288	0.805	0.281
109	I17	C	3.483	2.381	3.422	0.807	0.500
110	I18	C	3.461	2.610	3.394	0.801	0.543

LEGEND

- Drain Outlet
- Drain With Reverse Gradient
- "–" : Manhole's Inside not Accessible

KEY PLAN




WARD 29
WARD 7
WARD 34
WARD 35
WARD 37
WARD 38
WARD 41
WARD 36
WARD 46
WARD 45
WARD 47
Water lagged Area
Water lagged Area
Pond
Pond
Culvert
Culvert
Culvert
Culvert
Construction of RCC Open Box ty
100 Foot Bridge
KODUNGAIYUR DRAIN
CAPTAIN COTTON CANAL
LINK CANAL
BUCKINGAM CANAL
Providing Re-sectioning concret
KKD Nagar Service Bridge
NBK Nagar Bridge
Culvert
Kondulagam 2 Km
Sulpanalkeri 1.2 km
Pulal 1.3 km
Perambur 0.7 km
Perambur 0.3 km
Meenambal Road
Tondiyarpet High Road
Tondiyarpet High Road
Service Road
Service Road
Annai Indira Nagar
Annai Sandhya Nagar
KANNADASAN NAGAR
MKB NAGAR
Nalamm Hospital Pvt Ltd
Erukkancheri High Road
Manali Salai
Manali Salai
Goodshed Road
Main Road
Main Road
Main

Annexure 8: Analysis of Ambient Air Quality at Kodungaiyur Site

POLLUCARE ENGINEERS INDIA PVT.LTD.,
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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-AAQ-1989	**Report Date**	: 11.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/AAQ-038-04-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 06.04.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 06.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 8'1.392"N	**Longitude**	: 80°15'50.634"E
Sampling Location	: **Near Weigh Bridge**		

Weather Condition	
Ambient Temperature	: 33°C
Relative Humidity	: 71%
Predominent Wind Direction	: E
Climate Condition	: Scattered Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	µg/m^3	IS 5182 (Part 2) 2001 (RA 2017)	10.6	80	50
2	Oxides of Nitrogen (as NO_x)	µg/m^3	IS 5182 (Part 6) 2006 (RA 2017)	19.8	80	40
3	Respirable Particulate Matter (PM_{10})	µg/m^3	IS 5182 (Part 23) 2006 (RA 2017)	91.7	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m^3	IS 5182 (Part 24) 2019	49.1	60	40
5	Ozone (as O_3)	µg/m^3	IS 5182 (Part 9) 1974 (RA 2019)	16.8	180	100
6	Lead (as Pb)	µg/m^3	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m^3	PCEI/SOP/AAQ/003	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	µg/m^3	IS 5182 (Part 25) 2018	9.26	400	100
9	Benzene (as C_6H_6)	µg/m^3	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m^3	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m^3	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m^3	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

..... **End of Report** .....

Verified By

Authorised Signatory

ORIGINAL POLLUCARE ORIGINAL

Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-AAQ-1990	**Report Date**	: 11.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/AAQ-039-04-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 06.04.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 06.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'49.53"N	**Longitude**	: 80°16'1.944"E
Sampling Location	: **Incineration Plant**		

Weather Condition	
Ambient Temperature	: 33°C
Relative Humidity	: 67%
Predominent Wind Direction	: SSW
Climate Condition	: Scattered Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	$\mu g/m^3$	IS 5182 (Part 2) 2001 (RA 2017)	9.74	80	50
2	Oxides of Nitrogen (as NO_x)	$\mu g/m^3$	IS 5182 (Part 6) 2006 (RA 2017)	20.1	80	40
3	Respirable Particulate Matter (PM_{10})	$\mu g/m^3$	IS 5182 (Part 23) 2006 (RA 2017)	117	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	IS 5182 (Part 24) 2019	53.9	60	40
5	Ozone (as O_3)	$\mu g/m^3$	IS 5182 (Part 9) 1974 (RA 2019)	16.8	180	100
6	Lead (as Pb)	$\mu g/m^3$	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m^3	PCEI/SOP/AAQ/003	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	$\mu g/m^3$	IS 5182 (Part 25) 2018	9.26	400	100
9	Benzene (as C_6H_6)	$\mu g/m^3$	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m^3	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m^3	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m^3	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

..... **End of Report** .....

Verified By

Authorised Signatory

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-AAQ-1991	**Report Date**	: 11.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/AAQ-040-04-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 06.04.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 06.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'53.316"N	**Longitude**	: 80°16'2.652"E
Sampling Location	: **C&D Plant**		

Weather Condition	
Ambient Temperature	: 33°C
Relative Humidity	: 62%
Predominent Wind Direction	: ESE
Climate Condition	: Scattered Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	$\mu g/m^3$	IS 5182 (Part 2) 2001 (RA 2017)	11.2	80	50
2	Oxides of Nitrogen (as NO_x)	$\mu g/m^3$	IS 5182 (Part 6) 2006 (RA 2017)	18.9	80	40
3	Respirable Particulate Matter (PM_{10})	$\mu g/m^3$	IS 5182 (Part 23) 2006 (RA 2017)	127	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	IS 5182 (Part 24) 2019	59.1	60	40
5	Ozone (as O_3)	$\mu g/m^3$	IS 5182 (Part 9) 1974 (RA 2019)	17.2	180	100
6	Lead (as Pb)	$\mu g/m^3$	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m^3	PCEI/SOP/AAQ/003	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	$\mu g/m^3$	IS 5182 (Part 25) 2018	10.2	400	100
9	Benzene (as C_6H_6)	$\mu g/m^3$	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m^3	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m^3	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m^3	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-AAQ-1992	**Report Date**	: 11.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/AAQ-041-04-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 06.04.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 06.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'45.066"N	**Longitude**	: 80°16'8.556"E
Sampling Location	: **Near Kodungaiyur Site Office**		

Weather Condition	
Ambient Temperature	: 33°C
Relative Humidity	: 67%
Predominent Wind Direction	: E
Climate Condition	: Passing Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	µg/m³	IS 5182 (Part 2) 2001 (RA 2017)	11.9	80	50
2	Oxides of Nitrogen (as NO_x)	µg/m³	IS 5182 (Part 6) 2006 (RA 2017)	21.4	80	40
3	Respirable Particulate Matter (PM_{10})	µg/m³	IS 5182 (Part 23) 2006 (RA 2017)	102	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m³	IS 5182 (Part 24) 2019	51.4	60	40
5	Ozone (as O_3)	µg/m³	IS 5182 (Part 9) 1974 (RA 2019)	17.6	180	100
6	Lead (as Pb)	µg/m³	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m³	PCEI/SOP/AAQ/003	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	µg/m³	IS 5182 (Part 25) 2018	9.81	400	100
9	Benzene (as C_6H_6)	µg/m³	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m³	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m³	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m³	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-AAQ-1485	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 14.03.2022	**Sample Reference No**	: PCEI/AAQ-280-03-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 15.03.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 15.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13.12458209°	**Longitude**	: 80.25905849°
Sampling Location	: **MKB Nagar Bus Depo**		

Weather Condition	
Ambient Temperature	: 32°C
Relative Humidity	: 62%
Predominent Wind Direction	: SSE
Climate Condition	: Passing Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	$\mu g/m^3$	IS 5182 (Part 2) 2001 (RA 2017)	12.9	80	50
2	Oxides of Nitrogen (as NO_x)	$\mu g/m^3$	IS 5182 (Part 6) 2006 (RA 2017)	25.3	80	40
3	Respirable Particulate Matter (PM_{10})	$\mu g/m^3$	IS 5182 (Part 23) 2006 (RA 2017)	77.2	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	IS 5182 (Part 24) 2019	38.1	60	40
5	Ozone (as O_3)	$\mu g/m^3$	IS 5182 (Part 9) 1974 (RA 2019)	12.7	180	100
6	Lead (as Pb)	$\mu g/m^3$	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m^3	IS 5182 (Part 10) 1999 (RA 2003)	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	$\mu g/m^3$	IS 5182 (Part 25) 2018	6.33	400	100
9	Benzene (as C_6H_6)	$\mu g/m^3$	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m^3	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m^3	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m^3	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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TEST REPORT

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Report No	: PCEI/TR-AAQ-1484	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 14.03.2022	**Sample Reference No**	: PCEI/AAQ-279-03-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 15.03.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 15.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13.14343792°	**Longitude**	: 80.25663797°
Sampling Location	: **Thituthangal Nadar Collage**		

Weather Condition

Ambient Temperature	: 30°C
Relative Humidity	: 67%
Predominent Wind Direction	: WE
Climate Condition	: Passing Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	$\mu g/m^3$	IS 5182 (Part 2) 2001 (RA 2017)	12.4	80	50
2	Oxides of Nitrogen (as NO_x)	$\mu g/m^3$	IS 5182 (Part 6) 2006 (RA 2017)	25.6	80	40
3	Respirable Particulate Matter (PM_{10})	$\mu g/m^3$	IS 5182 (Part 23) 2006 (RA 2017)	71.9	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	IS 5182 (Part 24) 2019	36.0	60	40
5	Ozone (as O_3)	$\mu g/m^3$	IS 5182 (Part 9) 1974 (RA 2019)	13.6	180	100
6	Lead (as Pb)	$\mu g/m^3$	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m^3	IS 5182 (Part 10) 1999 (RA 2003)	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	$\mu g/m^3$	IS 5182 (Part 25) 2018	6.47	400	100
9	Benzene (as C_6H_6)	$\mu g/m^3$	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m^3	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m^3	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m^3	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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Report No	: PCEI/TR-AAQ-1486	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 14.03.2022	**Sample Reference No**	: PCEI/AAQ-281-03-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 15.03.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 15.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13.13641183°	**Longitude**	: 80.25805887°
Sampling Location	: **CMWSS Board Sewage Treatment Plant**		

Weather Condition	
Ambient Temperature	: 30°C
Relative Humidity	: 65%
Predominent Wind Direction	: SSN
Climate Condition	: Passing Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	µg/m³	IS 5182 (Part 2) 2001 (RA 2017)	13.2	80	50
2	Oxides of Nitrogen (as NO_x)	µg/m³	IS 5182 (Part 6) 2006 (RA 2017)	23.7	80	40
3	Respirable Particulate Matter (PM_{10})	µg/m³	IS 5182 (Part 23) 2006 (RA 2017)	73.4	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m³	IS 5182 (Part 24) 2019	35.8	60	40
5	Ozone (as O_3)	µg/m³	IS 5182 (Part 9) 1974 (RA 2019)	13.1	180	100
6	Lead (as Pb)	µg/m³	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m³	IS 5182 (Part 10) 1999 (RA 2003)	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	µg/m³	IS 5182 (Part 25) 2018	5.93	400	100
9	Benzene (as C_6H_6)	µg/m³	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m³	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m³	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m³	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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Report No	: PCEI/TR-AAQ-1604	**Report Date**	: 26.03.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/AAQ-399-03-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 23.03.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 26.03.2022
Latitude	: 13.13366644°	**Longitude**	: 80.26394709°
Sampling Location	: **kodungaiyur Near Landfill Site**		

Weather Condition	
Ambient Temperature	: 30°C
Relative Humidity	: 62%
Predominent Wind Direction	: SSN
Climate Condition	: Passing Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	$\mu g/m^3$	IS 5182 (Part 2) 2001 (RA 2017)	14.2	80	50
2	Oxides of Nitrogen (as NO_x)	$\mu g/m^3$	IS 5182 (Part 6) 2006 (RA 2017)	26.3	80	40
3	Respirable Particulate Matter (PM_{10})	$\mu g/m^3$	IS 5182 (Part 23) 2006 (RA 2017)	76.8	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	IS 5182 (Part 24) 2019	38.4	60	40
5	Ozone (as O_3)	$\mu g/m^3$	IS 5182 (Part 9) 1974 (RA 2019)	14.1	180	100
6	Lead (as Pb)	$\mu g/m^3$	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m^3	IS 5182 (Part 10) 1999 (RA 2003)	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	$\mu g/m^3$	IS 5182 (Part 25) 2018	6.58	400	100
9	Benzene (as C_6H_6)	$\mu g/m^3$	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m^3	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m^3	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m^3	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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TEST REPORT

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Report No	: PCEI/TR-AAQ-1605	**Report Date**	: 26.03.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/AAQ-400-03-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 23.03.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 26.03.2022
Latitude	: 13.14072016°	**Longitude**	: 80.27837482°
Sampling Location	: **Near India Oil Factory**		

Weather Condition	
Ambient Temperature	: 32°C
Relative Humidity	: 55%
Predominent Wind Direction	: W
Climate Condition	: Passing Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	µg/m³	IS 5182 (Part 2) 2001 (RA 2017)	13.5	80	50
2	Oxides of Nitrogen (as NO_x)	µg/m³	IS 5182 (Part 6) 2006 (RA 2017)	24.9	80	40
3	Respirable Particulate Matter (PM_{10})	µg/m³	IS 5182 (Part 23) 2006 (RA 2017)	71.5	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m³	IS 5182 (Part 24) 2019	32.7	60	40
5	Ozone (as O_3)	µg/m³	IS 5182 (Part 9) 1974 (RA 2019)	13.9	180	100
6	Lead (as Pb)	µg/m³	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m³	IS 5182 (Part 10) 1999 (RA 2003)	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	µg/m³	IS 5182 (Part 25) 2018	7.04	400	100
9	Benzene (as C_6H_6)	µg/m³	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m³	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m³	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m³	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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TEST REPORT

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Report No	: PCEI/TR-AAQ-1606	**Report Date**	: 26.03.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/AAQ-401-03-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 23.03.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 26.03.2022
Latitude	: 13.12845898°	**Longitude**	: 80.26900803°
Sampling Location	: **Dump Site Opposite to TNSC**		

Weather Condition	
Ambient Temperature	: 31°C
Relative Humidity	: 59%
Predominent Wind Direction	: N
Climate Condition	: Scattered Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	µg/m³	IS 5182 (Part 2) 2001 (RA 2017)	13.9	80	50
2	Oxides of Nitrogen (as NO_x)	µg/m³	IS 5182 (Part 6) 2006 (RA 2017)	25.6	80	40
3	Respirable Particulate Matter (PM_{10})	µg/m³	IS 5182 (Part 23) 2006 (RA 2017)	72.6	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m³	IS 5182 (Part 24) 2019	34.8	60	40
5	Ozone (as O_3)	µg/m³	IS 5182 (Part 9) 1974 (RA 2019)	13.4	180	100
6	Lead (as Pb)	µg/m³	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m³	IS 5182 (Part 10) 1999 (RA 2003)	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	µg/m³	IS 5182 (Part 25) 2018	6.52	400	100
9	Benzene (as C_6H_6)	µg/m³	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m³	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m³	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m³	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average
BDL - Below Detection Limit ; DL - Detection Limit

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-AAQ-2874	**Report Date**	: 23.05.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 20.05.2022	**Sample Reference No**	: PCEI/AAQ-300-05-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 21.05.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 21.05.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 23.05.2022
Latitude	: 13.1335033N	**Longitude**	: 80.26180231E
Sampling Location	: **K.K.D Nagar**		

Weather Condition	
Ambient Temperature	: 32°C
Relative Humidity	: 65%
Predominent Wind Direction	: WN
Climate Condition	: Scattered Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	$\mu g/m^3$	IS 5182 (Part 2) 2001 (RA 2017)	13.7	80	50
2	Oxides of Nitrogen (as NO_x)	$\mu g/m^3$	IS 5182 (Part 6) 2006 (RA 2017)	24.9	80	40
3	Respirable Particulate Matter (PM_{10})	$\mu g/m^3$	IS 5182 (Part 23) 2006 (RA 2017)	77.8	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	$\mu g/m^3$	IS 5182 (Part 24) 2019	34.2	60	40
5	Ozone (as O_3)	$\mu g/m^3$	IS 5182 (Part 9) 1974 (RA 2019)	15.2	180	100
6	Lead (as Pb)	$\mu g/m^3$	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m^3	PCEI/SOP/AAQ/003	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	$\mu g/m^3$	IS 5182 (Part 25) 2018	10.20	400	100
9	Benzene (as C_6H_6)	$\mu g/m^3$	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m^3	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m^3	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m^3	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average iii) **- TWA for 1 Hour iv) * - TWA for Annual
BDL - Below Detection Limit ; DL - Detection Limit

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TEST REPORT

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Report No	: PCEI/TR-AAQ-2875	**Report Date**	: 23.05.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 5182 (Part 23) 2006 (RA 2017)		
Sampled by	: Laboratory		
Sample Collected Date	: 20.05.2022	**Sample Reference No**	: PCEI/AAQ-301-05-22
Sample Description	: **Ambient Air**	**Sample Received On**	: 21.05.2022
Qty of Sample Received	: Filter Paper & 30ml	**Test Commenced On**	: 21.05.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 23.05.2022
Latitude	: 13.12769082N	**Longitude**	: 80.27100301E
Sampling Location	: **Ezhil Nagar**		

Weather Condition	
Ambient Temperature	: 32°C
Relative Humidity	: 55%
Predominent Wind Direction	: W
Climate Condition	: Passing Clouds

S.No	Parameters	Units	Test Method	Results	NAAQ Standards for Industrial Area	
					TWA -24hrs	TWA -Annual
1	Sulphur dioxide (as SO_2)	µg/m³	IS 5182 (Part 2) 2001 (RA 2017)	14.3	80	50
2	Oxides of Nitrogen (as NO_x)	µg/m³	IS 5182 (Part 6) 2006 (RA 2017)	25.6	80	40
3	Respirable Particulate Matter (PM_{10})	µg/m³	IS 5182 (Part 23) 2006 (RA 2017)	78.1	100	60
4	Respirable Particulate Matter ($PM_{2.5}$)	µg/m³	IS 5182 (Part 24) 2019	31.9	60	40
5	Ozone (as O_3)	µg/m³	IS 5182 (Part 9) 1974 (RA 2019)	15.6	180	100
6	Lead (as Pb)	µg/m³	IS 5182 (Part 22) 2004 (RA 2019)	BDL(DL:0.05)	1	0.5
7	Carbon Monoxide (as CO)	mg/m³	PCEI/SOP/AAQ/003	BDL(DL:1.14)	4	2
8	Ammonia (as NH_3)	µg/m³	IS 5182 (Part 25) 2018	11.70	400	100
9	Benzene (as C_6H_6)	µg/m³	IS 5182 (Part 11) 2006 (RA 2017)	BDL(DL:1.0)	-	5
10	Benzo (a) Pyrene (BaP)	ng/m³	IS 5182 (Part 12) 2004 (RA 2019)	BDL(DL:1.0)	-	1
11	Arsenic (as As)	ng/m³	CPCB/MOEF guidline	BDL(DL:2.0)	-	6
12	Nickel (as Ni)	ng/m³	CPCB/MOEF guidline	BDL(DL:10)	-	20

Note: i) NAAQS - National Ambient Air Quality Standards Issued by CPCB (Central Pollution Control Board) in Nov 2009
ii) TWA - Time Weighted Average iii) **- TWA for 1 Hour iv) * - TWA for Annual
BDL - Below Detection Limit ; DL - Detection Limit

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Annexure 9: Analysis of Surface Water Quality at Kodungaiyur Site

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TEST REPORT

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Report No	: PCEI/TR-W-1982	**Report Date**	:	11.04.2022	
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.				
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)				
Sampled by	: Laboratory				
Sample Collected Date	: 05.04.2022	**Sample Reference No**	:	PCEI/W-031-04-22	
Sample Description	: **Surface Water**	**Sample Received On**	:	05.04.2022	
Qty of Sample Received	: 2 Litre	**Test Commenced On**	:	05.04.2022	
Sample Condition	: Fit for Analysis	**Test Completed On**	:	11.04.2022	
Latitude	: 13° 8'37.75"N	**Longitude**	:	80°16'46.24"E	
Sampling Location	: **B.Canal-1 (D/S)**				

S.No	Parameters	Units	Test Method	Results	Surface water Standard as per IS 2296				
					Class A	Class B	Class C	Class D	Class E
1	Colour	Hazen	IS 3025 (Part 4) 2021	70	10	300	300	-	-
2	Odour	-	IS 3025 (Part 5) 1983 (RA 2018)	Agreeable	Unobj	-	-	-	-
3	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	54.0	-	-	-	-	-
4	pH Value @ 25 °C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.69	8.5	8.5	8.5	8.5	8.5
5	Temperature	°C	IS 3025 (Part 9) 1984 (RA 2017)	28.1	-	-	-	-	-
6	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1810	-	-	-	-	-
7	Bio chemical Oxygen Demand (27°C for 3 days)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	48.9	2	3	3	-	-
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	163	-	-	-	-	-
9	Dissolved Oxygen (DO)	mg/L	IS 3025 (Part 38) 1989 (RA 2019)	BDL(DL:1.0)	6.0	5.0	4	4	-
10	Calcium (as Ca)	mg/L	IS 3025 (Part 40) 1991 (RA 2019)	126	80.1	-	-	-	-
11	Chlorides (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	562	250	-	600	-	600
12	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.06	1.5	-	1.5	-	-
13	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	11.0	0.3	-	50	-	-
14	Magnesium (as Mg)	mg/L	IS 3025 (Part 46) 1994 (RA 2019)	74.0	24.3	-	-	-	-
15	Potassium (as K)	mg/L	IS 3025 (Part 45) 1993 (RA 2019)	41.7	-	-	-	-	-
16	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	12.6	20.0	-	50	-	-

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Report No : PCEI/TR-W-1982 **Report Date** : 11.04.2022

S.No	Parameters	Units	Test Method	Results	Class A	Class B	Class C	Class D	Class E
17	Phenolic Compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.002	0.005	0.005	-	-
18	Sulphates (as SO_4^{-2})	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	155	400	-	400	-	1000
19	Pesticides	mg/L	PCEI/SOP/W/075	BDL(DL:0.001)	-	-	-	-	-
20	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	612	-	-	-	-	-
21	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	620	300	-	-	-	-
22	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.07	15.0	-	15	-	-
23	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	-	0.01	-	-
24	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	0.05	0.05	-	-
25	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	0.41	0.1	-	0.1	-	-
26	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.21	0.001	-	-	-	-
27	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.05	-	-	-	-	-
28	Total Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.05	0.2	0.2	-	-
29	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.24	-	-	-	-	-
Microbiological Parameters									
30	Feacal Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	27	-	-	-	-	-
31	Total Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	90	50	500	5000	-	-

Note: BDL - Below Detection Limit; DL - Detection Limit, Unobj- Unobjectionable

Class A- Drinking water without conventional treatment but after disinfection

Class B- Water for outdoor bathing

Class C- Drinking water with conventional treatment followed by disinfection

Class D- Water for fish culture and wild life propagation

Class E- Water for irrigation, industrial cooling and controlled waste disposal

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TEST REPORT

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Report No	: PCEI/TR-W-1983	**Report Date**	: 11.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/W-032-04-22
Sample Description	: **Surface Water**	**Sample Received On**	: 05.04.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 05.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 8'29.80"N	**Longitude**	: 80°16'42.78"E
Sampling Location	: **B.Canal-2 (U/S)**		

S.No	Parameters	Units	Test Method	Results	Surface water Standard as per IS 2296				
					Class A	Class B	Class C	Class D	Class E
1	Colour	Hazen	IS 3025 (Part 4) 2021	60	10	300	300	-	-
2	Odour	-	IS 3025 (Part 5) 1983 (RA 2018)	Disagreeable	Unobj	-	-	-	-
3	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	38.1	-	-	-	-	-
4	pH Value @ 25 °C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.16	8.5	8.5	8.5	8.5	8.5
5	Temperature	°C	IS 3025 (Part 9) 1984 (RA 2017)	27.6	-	-	-	-	-
6	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1420	-	-	-	-	-
7	Bio chemical Oxygen Demand (27°C for 3 days)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	55.8	2	3	3	-	-
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	185	-	-	-	-	-
9	Dissolved Oxygen (DO)	mg/L	IS 3025 (Part 38) 1989 (RA 2019)	BDL(DL:1.0)	6.0	5.0	4	4	-
10	Calcium (as Ca)	mg/L	IS 3025 (Part 40) 1991 (RA 2019)	117	80.1	-	-	-	-
11	Chlorides (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	429	250	-	600	-	600
12	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.08	1.5	-	1.5	-	-
13	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	6.84	0.3	-	50	-	-
14	Magnesium (as Mg)	mg/L	IS 3025 (Part 46) 1994 (RA 2019)	46	24.3	-	-	-	-
15	Potassium (as K)	mg/L	IS 3025 (Part 45) 1993 (RA 2019)	35.7	-	-	-	-	-
16	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	12.6	20.0	-	50	-	-

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TEST REPORT

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Report No : PCEI/TR-W-1983 **Report Date** : 11.04.2022

S.No	Parameters	Units	Test Method	Results	Class A	Class B	Class C	Class D	Class E
17	Phenolic Compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.002	0.005	0.005	-	-
18	Sulphates (as SO_4^{-2})	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	102	400	-	400	-	1000
19	Pesticides	mg/L	PCEI/SOP/W/075	BDL(DL:0.001)	-	-	-	-	-
20	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	580	-	-	-	-	-
21	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	483	300	-	-	-	-
22	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.10	15.0	-	15	-	-
23	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	-	0.01	-	-
24	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	0.05	0.05	-	-
25	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	49.6	0.1	-	0.1	-	-
26	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.15	0.001	-	-	-	-
27	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.05	-	-	-	-	-
28	Total Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.04	0.05	0.2	0.2	-	-
29	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.12	-	-	-	-	-
Microbiological Parameters									
30	Feacal Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	21	-	-	-	-	-
31	Total Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	80	50	500	5000	-	-

Note: BDL - Below Detection Limit; DL - Detection Limit, Unobj- Unobjectionable

Class A- Drinking water without conventional treatment but after disinfection
Class B- Water for outdoor bathing
Class C- Drinking water with conventional treatment followed by disinfection
Class D- Water for fish culture and wild life propagation
Class E- Water for irrigation, industrial cooling and controlled waste disposal

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-W-1984	**Report Date**	: 11.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/W-033-04-22
Sample Description	: **Surface Water**	**Sample Received On**	: 05.04.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 05.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'59.33"N	**Longitude**	: 80°15'48.35"E
Sampling Location	: **Kodungaiyur Canal-1 (U/S)**		

S.No	Parameters	Units	Test Method	Results	Surface water Standard as per IS 2296				
					Class A	Class B	Class C	Class D	Class E
1	Colour	Hazen	IS 3025 (Part 4) 2021	50	10	300	300	-	-
2	Odour	-	IS 3025 (Part 5) 1983 (RA 2018)	Septic	Unobj	-	-	-	-
3	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	31.3	-	-	-	-	-
4	pH Value @ 25 °C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.14	8.5	8.5	8.5	8.5	8.5
5	Temperature	°C	IS 3025 (Part 9) 1984 (RA 2017)	27.2	-	-	-	-	-
6	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1372	-	-	-	-	-
7	Bio chemical Oxygen Demand (27°C for 3 days)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	69.2	2	3	3	-	-
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	230	-	-	-	-	-
9	Dissolved Oxygen (DO)	mg/L	IS 3025 (Part 38) 1989 (RA 2019)	BDL(DL:1.0)	6.0	5.0	4	4	-
10	Calcium (as Ca)	mg/L	IS 3025 (Part 40) 1991 (RA 2019)	126	80.1	-	-	-	-
11	Chlorides (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	362	250	-	600	-	600
12	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.04	1.5	-	1.5	-	-
13	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	6.37	0.3	-	50	-	-
14	Magnesium (as Mg)	mg/L	IS 3025 (Part 46) 1994 (RA 2019)	48.5	24.3	-	-	-	-
15	Potassium (as K)	mg/L	IS 3025 (Part 45) 1993 (RA 2019)	29.3	-	-	-	-	-
16	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	14.6	20.0	-	50	-	-

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TEST REPORT

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Report No : PCEI/TR-W-1984 **Report Date** : 11.04.2022

S.No	Parameters	Units	Test Method	Results	Class A	Class B	Class C	Class D	Class E
17	Phenolic Compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.002	0.005	0.005	-	-
18	Sulphates (as SO_4^{-2})	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	84.9	400	-	400	-	1000
19	Pesticides	mg/L	PCEI/SOP/W/075	BDL(DL:0.001)	-	-	-	-	-
20	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	612	-	-	-	-	-
21	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	515	300	-	-	-	-
22	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.08	15.0	-	15	-	-
23	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	-	0.01	-	-
24	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	0.05	0.05	-	-
25	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	22.8	0.1	-	0.1	-	-
26	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.03	0.001	-	-	-	-
27	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.04	-	-	-	-	-
28	Total Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.05	0.2	0.2	-	-
29	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.24	-	-	-	-	-
Microbiological Parameters									
30	Feacal Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	40	-	-	-	-	-
31	Total Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	140	50	500	5000	-	-

Note: BDL - Below Detection Limit; DL - Detection Limit, Unobj- Unobjectinable

Class A- Drinking water without conventional treatment but after disinfection

Class B- Water for outdoor bathing

Class C- Drinking water with conventional treatment followed by disinfection

Class D- Water for fish culture and wild life propagation

Class E- Water for irrigation, industrial cooling and controlled waste disposal

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TEST REPORT

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Report No	: PCEI/TR-W-1985	**Report Date**	: 11.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/W-034-04-22
Sample Description	: **Surface Water**	**Sample Received On**	: 05.04.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 05.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'49.95"N	**Longitude**	: 80°16'2.03"E
Sampling Location	: **Kodungaiyur Canal-2 (D/S)**		

S.No	Parameters	Units	Test Method	Results	Surface water Standard as per IS 2296				
					Class A	Class B	Class C	Class D	Class E
1	Colour	Hazen	IS 3025 (Part 4) 2021	50	10	300	300	-	-
2	Odour	-	IS 3025 (Part 5) 1983 (RA 2018)	Septic	Unobj	-	-	-	-
3	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	14.8	-	-	-	-	-
4	pH Value @ 25 °C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.05	8.5	8.5	8.5	8.5	8.5
5	Temperature	°C	IS 3025 (Part 9) 1984 (RA 2017)	27.4	-	-	-	-	-
6	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1391	-	-	-	-	-
7	Bio chemical Oxygen Demand (27°C for 3 days)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	54	2	3	3	-	-
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	177	-	-	-	-	-
9	Dissolved Oxygen (DO)	mg/L	IS 3025 (Part 38) 1989 (RA 2019)	BDL(DL:1.0)	6.0	5.0	4	4	-
10	Calcium (as Ca)	mg/L	IS 3025 (Part 40) 1991 (RA 2019)	122	80.1	-	-	-	-
11	Chlorides (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	327	250	-	600	-	600
12	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.02	1.5	-	1.5	-	-
13	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	3.06	0.3	-	50	-	-
14	Magnesium (as Mg)	mg/L	IS 3025 (Part 46) 1994 (RA 2019)	43.4	24.3	-	-	-	-
15	Potassium (as K)	mg/L	IS 3025 (Part 45) 1993 (RA 2019)	20.6	-	-	-	-	-
16	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	16.3	20.0	-	50	-	-

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Report No : PCEI/TR-W-1985 **Report Date** 11.04.2022

S.No	Parameters	Units	Test Method	Results	Class A	Class B	Class C	Class D	Class E
17	Phenolic Compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.002	0.005	0.005	-	-
18	Sulphates (as SO_4^{-2})	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	66.6	400	-	400	-	1000
19	Pesticides	mg/L	PCEI/SOP/W/075	BDL(DL:0.001)	-	-	-	-	-
20	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	591	-	-	-	-	-
21	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	483	300	-	-	-	-
22	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.03	15.0	-	15	-	-
23	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	-	0.01	-	-
24	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	0.05	0.05	-	-
25	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.1	-	0.1	-	-
26	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.16	0.001	-	-	-	-
27	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.06	-	-	-	-	-
28	Total Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.05	0.05	0.2	0.2	-	-
29	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.27	-	-	-	-	-
Microbiological Parameters									
30	Feacal Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	17	-	-	-	-	-
31	Total Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	80	50	500	5000	-	-

Note: BDL - Below Detection Limit; DL - Detection Limit, Unobj- Unobjectionable

Class A- Drinking water without conventional treatment but after disinfection
Class B- Water for outdoor bathing
Class C- Drinking water with conventional treatment followed by disinfection
Class D- Water for fish culture and wild life propagation
Class E- Water for irrigation, industrial cooling and controlled waste disposal

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TEST REPORT

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Report No	: PCEI/TR-W-1986	**Report Date**	: 11.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/W-035-04-22
Sample Description	: **Surface Water**	**Sample Received On**	: 05.04.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 05.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'38.78"N	**Longitude**	: 80°16'9.35"E
Sampling Location	: **Captain Cotton Canal (U/S)**		

S.No	Parameters	Units	Test Method	Results	Surface water Standard as per IS 2296				
					Class A	Class B	Class C	Class D	Class E
1	Colour	Hazen	IS 3025 (Part 4) 2021	120	10	300	300	-	-
2	Odour	-	IS 3025 (Part 5) 1983 (RA 2018)	Disagreeable	Unobj	-	-	-	-
3	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	162	-	-	-	-	-
4	pH Value @ 25 °C	-	IS 3025 (Part 11) 1983 (RA 2019)	6.68	8.5	8.5	8.5	8.5	8.5
5	Temperature	°C	IS 3025 (Part 9) 1984 (RA 2017)	27.1	-	-	-	-	-
6	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1074	-	-	-	-	-
7	Bio chemical Oxygen Demand (27°C for 3 days)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	173	2	3	3	-	-
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	578	-	-	-	-	-
9	Dissolved Oxygen (DO)	mg/L	IS 3025 (Part 38) 1989 (RA 2019)	BDL(DL:1.0)	6.0	5.0	4	4	-
10	Calcium (as Ca)	mg/L	IS 3025 (Part 40) 1991 (RA 2019)	84.1	80.1	-	-	-	-
11	Chlorides (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	288	250	-	600	-	600
12	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.17	1.5	-	1.5	-	-
13	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	16.9	0.3	-	50	-	-
14	Magnesium (as Mg)	mg/L	IS 3025 (Part 46) 1994 (RA 2019)	38.3	24.3	-	-	-	-
15	Potassium (as K)	mg/L	IS 3025 (Part 45) 1993 (RA 2019)	37.6	-	-	-	-	-
16	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	18.3	20.0	-	50	-	-

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Report No : PCEI/TR-W-1986 **Report Date** 11.04.2022

S.No	Parameters	Units	Test Method	Results	Class A	Class B	Class C	Class D	Class E
17	Phenolic Compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.002	0.005	0.005	-	-
18	Sulphates (as SO_4^{-2})	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	81.6	400	-	400	-	1000
19	Pesticides	mg/L	PCEI/SOP/W/075	BDL(DL:0.001)	-	-	-	-	-
20	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	559	-	-	-	-	-
21	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	368	300	-	-	-	-
22	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.41	15.0	-	15	-	-
23	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	-	0.01	-	-
24	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	0.05	0.05	-	-
25	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	11.9	0.1	-	0.1	-	-
26	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.10	0.001	-	-	-	-
27	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.09	-	-	-	-	-
28	Total Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.03	0.05	0.2	0.2	-	-
29	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.28	-	-	-	-	-
Microbiological Parameters									
30	Feacal Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	27	-	-	-	-	-
31	Total Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	110	50	500	5000	-	-

Note: BDL - Below Detection Limit; DL - Detection Limit, Unobj- Unobjectinable

Class A- Drinking water without conventional treatment but after disinfection

Class B- Water for outdoor bathing

Class C- Drinking water with conventional treatment followed by disinfection

Class D- Water for fish culture and wild life propagation

Class E- Water for irrigation, industrial cooling and controlled waste disposal

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TEST REPORT

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Report No	: PCEI/TR-W-1987	**Report Date**	: 11.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/W-036-04-22
Sample Description	: **Surface Water**	**Sample Received On**	: 05.04.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 05.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'50.76"N	**Longitude**	: 80°16'17.81"E
Sampling Location	: **K.Canal and C.C Canal Joining Location**		

S.No	Parameters	Units	Test Method	Results	Surface water Standard as per IS 2296				
					Class A	Class B	Class C	Class D	Class E
1	Colour	Hazen	IS 3025 (Part 4) 2021	120	10	300	300	-	-
2	Odour	-	IS 3025 (Part 5) 1983 (RA 2018)	Septic	Unobj	-	-	-	-
3	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	660	-	-	-	-	-
4	pH Value @ 25 °C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.09	8.5	8.5	8.5	8.5	8.5
5	Temperature	°C	IS 3025 (Part 9) 1984 (RA 2017)	26.8	-	-	-	-	-
6	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	2166	-	-	-	-	-
7	Bio chemical Oxygen Demand (27°C for 3 days)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	373	2	3	3	-	-
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	1245	-	-	-	-	-
9	Dissolved Oxygen (DO)	mg/L	IS 3025 (Part 38) 1989 (RA 2019)	BDL(DL:1.0)	6.0	5.0	4	4	-
10	Calcium (as Ca)	mg/L	IS 3025 (Part 40) 1991 (RA 2019)	130	80.1	-	-	-	-
11	Chlorides (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	373	250	-	600	-	600
12	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	1.27	1.5	-	1.5	-	-
13	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	62.3	0.3	-	50	-	-
14	Magnesium (as Mg)	mg/L	IS 3025 (Part 46) 1994 (RA 2019)	48.5	24.3	-	-	-	-
15	Potassium (as K)	mg/L	IS 3025 (Part 45) 1993 (RA 2019)	21.8	-	-	-	-	-
16	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	16.5	20.0	-	50	-	-

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Report No : PCEI/TR-W-1987 **Report Date** 11.04.2022

S.No	Parameters	Units	Test Method	Results	Class A	Class B	Class C	Class D	Class E
17	Phenolic Compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.002	0.005	0.005	-	-
18	Sulphates (as SO_4^{-2})	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	187.0	400	-	400	-	1000
19	Pesticides	mg/L	PCEI/SOP/W/075	BDL(DL:0.001)	-	-	-	-	-
20	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	686	-	-	-	-	-
21	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	525	300	-	-	-	-
22	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	1.67	15.0	-	15	-	-
23	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	0.18	0.01	-	0.01	-	-
24	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	0.05	0.05	-	-
25	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	33.8	0.1	-	0.1	-	-
26	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.09	0.001	-	-	-	-
27	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.31	-	-	-	-	-
28	Total Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.06	0.05	0.2	0.2	-	-
29	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	1.90	-	-	-	-	-
Microbiological Parameters									
30	Feacal Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	22	-	-	-	-	-
31	Total Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	130	50	500	5000	-	-

Note: BDL - Below Detection Limit; DL - Detection Limit, Unobj- Unobjectionable

Class A- Drinking water without conventional treatment but after disinfection
Class B- Water for outdoor bathing
Class C- Drinking water with conventional treatment followed by disinfection
Class D- Water for fish culture and wild life propagation
Class E- Water for irrigation, industrial cooling and controlled waste disposal

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TEST REPORT

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Report No	: PCEI/TR-W-1988	**Report Date**	: 11.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 05.04.2022	**Sample Reference No**	: PCEI/W-037-04-22
Sample Description	: **Surface Water**	**Sample Received On**	: 05.04.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 05.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 11.04.2022
Latitude	: 13° 7'51.17"N	**Longitude**	: 80°16'29.99"E
Sampling Location	: **K.Canal, C.C Canal & B.Canal (D/S)**		

S.No	Parameters	Units	Test Method	Results	Surface water Standard as per IS 2296				
					Class A	Class B	Class C	Class D	Class E
1	Colour	Hazen	IS 3025 (Part 4) 2021	90	10	300	300	-	-
2	Odour	-	IS 3025 (Part 5) 1983 (RA 2018)	Septic	Unobj	-	-	-	-
3	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	166	-	-	-	-	-
4	pH Value @ 25 °C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.02	8.5	8.5	8.5	8.5	8.5
5	Temperature	°C	IS 3025 (Part 9) 1984 (RA 2017)	27.3	-	-	-	-	-
6	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1402	-	-	-	-	-
7	Bio chemical Oxygen Demand (27°C for 3 days)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	160	2	3	3	-	-
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	541	-	-	-	-	-
9	Dissolved Oxygen (DO)	mg/L	IS 3025 (Part 38) 1989 (RA 2019)	BDL(DL:1.0)	6.0	5.0	4	4	-
10	Calcium (as Ca)	mg/L	IS 3025 (Part 40) 1991 (RA 2019)	126	80.1	-	-	-	-
11	Chlorides (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	393	250	-	600	-	600
12	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.22	1.5	-	1.5	-	-
13	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	15.7	0.3	-	50	-	-
14	Magnesium (as Mg)	mg/L	IS 3025 (Part 46) 1994 (RA 2019)	56.1	24.3	-	-	-	-
15	Potassium (as K)	mg/L	IS 3025 (Part 45) 1993 (RA 2019)	24.4	-	-	-	-	-
16	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	15.6	20.0	-	50	-	-

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Report No	: PCEI/TR-W-1988	**Report Date**	11.04.2022						
S.No	**Parameters**	**Units**	**Test Method**	**Results**	**Class A**	**Class B**	**Class C**	**Class D**	**Class E**
17	Phenolic Compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.002	0.005	0.005	-	-
18	Sulphates (as SO_4^{-2})	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	93.2	400	-	400	-	1000
19	Pesticides	mg/L	PCEI/SOP/W/075	BDL(DL:0.001)	-	-	-	-	-
20	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	612	-	-	-	-	-
21	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	546	300	-	-	-	-
22	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.23	15.0	-	15	-	-
23	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	-	0.01	-	-
24	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	0.05	0.05	-	-
25	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	22.7	0.1	-	0.1	-	-
26	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.08	0.001	-	-	-	-
27	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.07	-	-	-	-	-
28	Total Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.03	0.05	0.2	0.2	-	-
29	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.41	-	-	-	-	-
Microbiological Parameters									
30	Feacal Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	33	-	-	-	-	-
31	Total Coliform	MPN/100ml	IS 1622:1981 (RA 2014)	110	50	500	5000	-	-

Note: BDL - Below Detection Limit; DL - Detection Limit, Unobj- Unobjectinable

Class A- Drinking water without conventional treatment but after disinfection

Class B- Water for outdoor bathing

Class C- Drinking water with conventional treatment followed by disinfection

Class D- Water for fish culture and wild life propagation

Class E- Water for irrigation, industrial cooling and controlled waste disposal

Class E- Water for irrigation, industrial cooling and controlled waste disposal

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Annexure 10: Analysis of Ground Water Quality at Kodungaiyur Site

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Report No	: PCEI/TR-W-1487	**Report Date**	: 21.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 16.03.2022	**Sample Reference No**	: PCEI/W-282-03-22
Sample Description	: **Water**	**Sample Received On**	: 16.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 16.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 21.03.2022
Latitude	: 13° 8'14.27"N	**Longitude**	: 80°16'5.50"E
Sampling Location	: **Ground Water-1 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	90	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	32.2	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.36	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	266	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	5.22	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	521	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1810	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.03	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	206	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	25.3	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	9.92	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	0.32	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	686	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.03	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	11	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	34	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

..... **End of Report** .....

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Report No	: PCEI/TR-W-1488	**Report Date**	: 21.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 16.03.2022	**Sample Reference No**	: PCEI/W-283-03-22
Sample Description	: **Water**	**Sample Received On**	: 16.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 16.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 21.03.2022
Latitude	: 13° 8'15.77"N	**Longitude**	: 80°15'59.44"E
Sampling Location	: **Ground Water-2 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	150	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	19.6	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.33	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	656	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	1.36	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	1919	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	5500	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.27	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	657	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	142	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	5.78	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	5.68	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.06	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	1751	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.15	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	23	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	90	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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Report No	: PCEI/TR-W-1525	**Report Date**	: 23.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 18.03.2022	**Sample Reference No**	: PCEI/W-320-03-22
Sample Description	: **Water**	**Sample Received On**	: 18.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 18.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 23.03.2022
Latitude	: 13° 8'5.45"N	**Longitude**	: 80°16'7.52"E
Sampling Location	: **Ground Water-IV L-3 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	80	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	31.1	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.15	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	599	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	3.63	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	1521	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	4040	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.03	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	652	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	25.9	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	9.60	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	7.01	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	559	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.02	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	13	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	80	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

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Report No	: PCEI/TR-W-1526	**Report Date**	: 23.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/W-321-03-22
Sample Description	: **Water**	**Sample Received On**	: 19.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 19.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 23.03.2022
Latitude	: 13° 8'3.45"N	**Longitude**	: 80°15'56.88"E
Sampling Location	: **Ground Water L-4 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	90	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	7.6	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.39	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	380	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	1.62	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	1082	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	3032	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	351	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	24.9	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	10.6	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	0.05	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	0.95	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	475	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.02	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	23	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	60	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-W-1603	**Report Date**	: 26.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/W-398-03-22
Sample Description	: **Water**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 26.03.2022
Latitude	: 13° 8'1.52"N	**Longitude**	: 80°15'47.08"E
Sampling Location	: **Ground Water L-5 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	70	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	9.4	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.06	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	827	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	4.23	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	1848	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	4460	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.07	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	769	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	20.2	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	6.40	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	0.14	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	3.97	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.02	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	454	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.03	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	22	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	110	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-W-1795	**Report Date**	: 02.04.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 26.03.2022	**Sample Reference No**	: PCEI/W-590-03-22
Sample Description	: **Water**	**Sample Received On**	: 26.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 26.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 02.04.2022
Latitude	: 13° 8'13.16"N	**Longitude**	: 80°16'21.10"E
Sampling Location	: **Ground Water L-6 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	180	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	23.5	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.11	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	1425	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	4.69	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	2399	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	6430	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	102	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	18.3	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.46	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	0.05	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	1.39	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.02	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	3165	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.10	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	40	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	110	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-W-1796	**Report Date**	: 02.04.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 26.03.2022	**Sample Reference No**	: PCEI/W-591-03-22
Sample Description	: **Water**	**Sample Received On**	: 26.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 26.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 02.04.2022
Latitude	: 13° 7'50.64"N	**Longitude**	: 80°16'5.02"E
Sampling Location	: **Ground Water L-7**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	120	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	12.8	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.01	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	1615	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	6.19	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	3675	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	9752	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.02	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	238	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	24.1	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	0.58	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.03	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	0.07	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	1.17	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.02	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	1736	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.19	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	50	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	170	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-W-1952	**Report Date**	: 02.04.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 27.03.2022	**Sample Reference No**	: PCEI/W-747-03-22
Sample Description	: **Water**	**Sample Received On**	: 28.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 28.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 02.04.2022
Latitude	: 13° 7'52.43"N	**Longitude**	: 80°16'13.32"E
Sampling Location	: **Ground Water L-8 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	160	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	19.6	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.23	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	1386	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	12.4	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	2552	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	6920	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.02	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	272	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	148.0	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	3.79	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.11	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	0.06	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	2532	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.10	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	23	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	90	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-W-1953	**Report Date**	: 02.04.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 28.03.2022	**Sample Reference No**	: PCEI/W-748-03-22
Sample Description	: **Water**	**Sample Received On**	: 29.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 29.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 02.04.2022
Latitude	: 13° 7'49.63"N	**Longitude**	: 80°16'13.06"E
Sampling Location	: **Ground Water L-9 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	250	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	36.8	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.07	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	1785	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	26.1	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	3318	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	9684	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.03	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	293	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	280	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	4.11	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.09	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	0.09	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	4.30	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.04	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	3798	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.18	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	70	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	220	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

..... **End of Report** .....

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-W-1954	**Report Date**	: 04.04.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 30.03.2022	**Sample Reference No**	: PCEI/W-749-03-22
Sample Description	: **Water**	**Sample Received On**	: 31.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 31.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 04.04.2022
Latitude	: 13° 7'53.75"N	**Longitude**	: 80°16'0.06"E
Sampling Location	: **Ground Water L-10 Within site**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	90	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	39	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.38	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	399	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	7.34	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	1174	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	2972	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	307	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	21.8	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	2.52	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.03	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	2.10	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	348	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.02	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	17	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	50	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

..... **End of Report** .....

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-W-1341	**Report Date**	: 15.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 10.03.2022	**Sample Reference No**	: PCEI/W-136-03-22
Sample Description	: **Water**	**Sample Received On**	: 11.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 11.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 15.03.2022
Sampling Location	: **Ground Water-1 (Susila Nagar)**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	80	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	9.5	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.07	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	912	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	2.15	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	444	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1048	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	175	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	20.0	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.02	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	981	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.02	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	13	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	40	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-W-1342	**Report Date**	: 15.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 10.03.2022	**Sample Reference No**	: PCEI/W-137-03-22
Sample Description	: **Water**	**Sample Received On**	: 11.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 11.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 15.03.2022
Sampling Location	: **Ground Water-2 (Abirami Avenue, Kodungaiyur)**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	60	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	30.5	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.03	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	789	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	0.97	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	740	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1580	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	550	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	9.64	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.04	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.04	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	897	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	0.02	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	17	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	70	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-W-1343	**Report Date**	: 15.03.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 10.03.2022	**Sample Reference No**	: PCEI/W-138-03-22
Sample Description	: **Water**	**Sample Received On**	: 11.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 11.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 15.03.2022
Sampling Location	: **Ground Water-3 (Meenambal Street, KKD)**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	10	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	5.7	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	6.79	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	684	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	0.98	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	735	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	1512	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	623	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	5.66	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.06	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.04	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	443	200	600
20	Nickel (as Ni)	mg/l	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	13	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	50	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-W-2878	**Report Date**	: 23.05.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 19.05.2022	**Sample Reference No**	: PCEI/W-304-05-22
Sample Description	: **Water**	**Sample Received On**	: 19.05.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 19.05.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 23.05.2022
Sampling Location	: **K.K.D Nagar - Borewell**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative source
1	Colour	Hazen	IS 3025 (Part 4) 2021	60	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	48.6	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 2022	6.58	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	286	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	4.57	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	128	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	826	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	66.9	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	6.40	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.10	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	338	200	600
20	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.03	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	17	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	20	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-W-2879	**Report Date**	: 23.05.2022
Discipline	: Chemical	**Group**	: Water
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Customer		
Sample Collected Date	: 19.05.2022	**Sample Reference No**	: PCEI/W-305-05-22
Sample Description	: **Water**	**Sample Received On**	: 19.05.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 19.05.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 23.05.2022
Sampling Location	: **Nethaji Nagar - Well Water**		

S.No	Parameters	Units	Test Method	Results	Drinking Water Specification as per IS 10500:2012	
					Requirement (Acceptable Limit)	Permissible Limit in the absence of alternative
1	Colour	Hazen	IS 3025 (Part 4) 2021	52	5	15
2	Turbidity	NTU	IS 3025 (Part 10) 1984 (RA 2017)	6.6	1	5
3	pH Value @ 25°C	-	IS 3025 (Part 11) 2022	6.87	6.5 - 8.5	No Relaxation
4	Total Hardness (as $CaCO_3$)	mg/L	IS 3025 (Part 21) 2009 (RA 2019)	2268	200	600
5	Iron (as Fe)	mg/L	IS 3025 (Part 2) 2004	0.54	0.3	No Relaxation
6	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	3829	250	1000
7	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	10814	500	2000
8	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.05	1.5
9	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	1643	200	400
10	Nitrate (as NO_3)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	11.7	45	No Relaxation
11	Phenolic compound (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.0001)	0.001	0.002
12	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.001	No Relaxation
13	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.001)	0.003	No Relaxation
14	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.12	0.01	0.05
15	Cyanide (as CN)	mg/L	APHA 23rd Edition,4500 CN-B,E:2017	BDL(DL:0.02)	0.05	No Relaxation
16	Chromium (as Cr^{6+})	mg/L	IS 3025 (Part 52) 2003 (RA 2019)	BDL(DL:0.03)	0.05	No Relaxation
17	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.01	No Relaxation
18	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.15	5	15
19	Total Alkalinity (as $CaCO_3$)	mg/L	IS 3025 (Part 23) 1986 (RA 2019)	363	200	600
20	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.03	0.02	No Relaxation
Microbiological Parameters						
21	Feacal Coliform	MPN/100ml	IS 1622 :1981	30	Shall not be detectable in any 100ml of sample	<2
22	Total Coliform	MPN/100ml	IS 1622 :1981	90	Shall not be detectable in any 100ml of sample	<2

Note: BDL - Below Detection Limit; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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Annexure 11: Analysis of Leachate at Kodungaiyur Site

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TEST REPORT

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Report No	: PCEI/TR-WW-1319	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Pollution & Environment
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 09.03.2022	**Sample Reference No**	: PCEI/WW-114-03-22
Sample Description	: **Waste Water**	**Sample Received On**	: 09.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 09.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13° 8'14.57"N	**Longitude**	: 80°16'0.49"E
Sampling Location	: **Leachate -1**		

S.No	Parameters	Units	Test Method	Results	Standards (Mode of Disposal)		
					Inland Surface water	Public Sewers	Land Disposal
1	Total Suspended Solids @ 105°C	mg/L	IS 3025 (Part 17) 1984 (RA 2017)	124	100	600	200
2	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	8520	2100	2100	2100
3	pH @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	8.06	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	597	50	50	-
5	Total Kjehdahl Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1324	100	-	-
6	Total Hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21) 2009 (RA 2019)	2470	-	-	-
7	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	408	30	350	100
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	2267	250	-	-
9	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.2	0.2	0.2
10	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	1.49	0.01	0.01	-
11	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.1	1.0	-
12	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	2.0	1.0	-
13	Acidity (as CaCO3)	mg/l	IS 3025 (Part 22) 1986 (RA 2019)	BDL(DL:0.5)	-	-	-
14	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.25	2.0	2.0	-
15	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.19	3.0	3.0	-
16	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.14	5.0	15.0	-
17	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23) 1986 (RA 2003)	4748	-	-	-
18	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.18	3.0	3.0	
19	Iron (as Fe)	mg/l	IS 3025 (Part 2) 2004	6.72	-	-	-
20	Manganese (as Mn)	mg/l	IS 3025 (Part 2) 2004	0.35	-	-	-
21	Cyanide (as CN)	mg/L	APHA 23rd Edition 4500CN-BE :2017	BDL(DL:0.02)	0.2	2.0	0.2
22	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	2859	1000	1000	600
23	Fluoride (as F)	mg/L	APHA 23rd Edition 4500F⁻ B,D	12.8	2.0	1.5	-
24	Silica (as SiO_2)	mg/L	IS 3025 (Part 35) 1988 (RA 2019)	1.05	-	-	-
25	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	214	-	-	-
26	Phenolic Compounds (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.01)	1.0	5.0	-

Note: BDL - Below Detection Limit ; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

..... **End of Report** .....

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TEST REPORT

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Report No	: PCEI/TR-WW-1320	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Pollution & Environment
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 09.03.2022	**Sample Reference No**	: PCEI/WW-115-03-22
Sample Description	: **Waste Water**	**Sample Received On**	: 09.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 09.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13° 8'12.58"N	**Longitude**	: 80°15'57.61"E
Sampling Location	: **Leachate -2**		

S.No	Parameters	Units	Test Method	Results	Standards (Mode of Disposal)		
					Inland Surface water	Public Sewers	Land Disposal
1	Total Suspended Solids @ 105°C	mg/L	IS 3025 (Part 17) 1984 (RA 2017)	302	100	600	200
2	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	10530	2100	2100	2100
3	pH @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	8.02	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1004	50	50	-
5	Total Kjehdahl Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1763	100	-	-
6	Total Hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21) 2009 (RA 2019)	2755	-	-	-
7	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	733	30	350	100
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	4008	250	-	-
9	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.2	0.2	0.2
10	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	2.33	0.01	0.01	-
11	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	0.03	0.1	1.0	-
12	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	2.0	1.0	-
13	Acidity (as CaCO3)	mg/l	IS 3025 (Part 22) 1986 (RA 2019)	BDL(DL:0.5)	-	-	-
14	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.44	2.0	2.0	-
15	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.28	3.0	3.0	-
16	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.24	5.0	15.0	-
17	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23) 1986 (RA 2003)	5486	-	-	-
18	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.21	3.0	3.0	
19	Iron (as Fe)	mg/l	IS 3025 (Part 2) 2004	8.60	-	-	-
20	Manganese (as Mn)	mg/l	IS 3025 (Part 2) 2004	0.39	-	-	-
21	Cyanide (as CN)	mg/L	APHA 23rd Edition 4500CN-BE :2017	BDL(DL:0.02)	0.2	2.0	0.2
22	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	3063	1000	1000	600
23	Fluoride (as F)	mg/L	APHA 23rd Edition 4500F⁻ B,D	11.7	2.0	1.5	-
24	Silica (as SiO_2)	mg/L	IS 3025 (Part 35) 1988 (RA 2019)	24.1	-	-	-
25	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	349	-	-	-
26	Phenolic Compounds (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.01)	1.0	5.0	-

Note: BDL - Below Detection Limit ; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-WW-1321	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Pollution & Environment
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 09.03.2022	**Sample Reference No**	: PCEI/WW-116-03-22
Sample Description	: **Waste Water**	**Sample Received On**	: 09.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 09.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13° 8'6.43"N	**Longitude**	: 80°15'53.90"E
Sampling Location	: **Leachate -3**		

S.No	Parameters	Units	Test Method	Results	Standards (Mode of Disposal)		
					Inland Surface water	Public Sewers	Land Disposal
1	Total Suspended Solids @ 105°C	mg/L	IS 3025 (Part 17) 1984 (RA 2017)	134	100	600	200
2	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	6865	2100	2100	2100
3	pH @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	8.12	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	620	50	50	-
5	Total Kjehdahl Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1251	100	-	-
6	Total Hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21) 2009 (RA 2019)	2185	-	-	-
7	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	302	30	350	100
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	1741	250	-	-
9	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.2	0.2	0.2
10	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	1.75	0.01	0.01	-
11	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.1	1.0	-
12	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	2.0	1.0	-
13	Acidity (as CaCO3)	mg/l	IS 3025 (Part 22) 1986 (RA 2019)	BDL(DL:0.5)	-	-	-
14	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.17	2.0	2.0	-
15	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.09	3.0	3.0	-
16	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.19	5.0	15.0	-
17	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23) 1986 (RA 2003)	4431	-	-	-
18	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.14	3.0	3.0	
19	Iron (as Fe)	mg/l	IS 3025 (Part 2) 2004	5.09	-	-	-
20	Manganese (as Mn)	mg/l	IS 3025 (Part 2) 2004	0.43	-	-	-
21	Cyanide (as CN)	mg/L	APHA 23rd Edition 4500CN-BE :2017	BDL(DL:0.02)	0.2	2.0	0.2
22	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	1940	1000	1000	600
23	Fluoride (as F)	mg/L	APHA 23rd Edition 4500F⁻ B,D	22.5	2.0	1.5	-
24	Silica (as SiO_2)	mg/L	IS 3025 (Part 35) 1988 (RA 2019)	22.5	-	-	-
25	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	117	-	-	-
26	Phenolic Compounds (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.01)	1.0	5.0	-

Note: BDL - Below Detection Limit ; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-WW-1322	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Pollution & Environment
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 09.03.2022	**Sample Reference No**	: PCEI/WW-117-03-22
Sample Description	: **Waste Water**	**Sample Received On**	: 09.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 09.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13° 8'8.36"N	**Longitude**	: 80°16'15.89"E
Sampling Location	: **Leachate -4**		

S.No	Parameters	Units	Test Method	Results	Standards (Mode of Disposal)		
					Inland Surface water	Public Sewers	Land Disposal
1	Total Suspended Solids @ 105°C	mg/L	IS 3025 (Part 17) 1984 (RA 2017)	1145	100	600	200
2	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	13555	2100	2100	2100
3	pH @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	7.70	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	730	50	50	-
5	Total Kjehdahl Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1616	100	-	-
6	Total Hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21) 2009 (RA 2019)	2945	-	-	-
7	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	1501	30	350	100
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	7934	250	-	-
9	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.07	0.2	0.2	0.2
10	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	3.18	0.01	0.01	-
11	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	0.04	0.1	1.0	-
12	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	2.0	1.0	-
13	Acidity (as CaCO3)	mg/l	IS 3025 (Part 22) 1986 (RA 2019)	BDL(DL:0.5)	-	-	-
14	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.70	2.0	2.0	-
15	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.23	3.0	3.0	-
16	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.37	5.0	15.0	-
17	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23) 1986 (RA 2003)	8968	-	-	-
18	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.24	3.0	3.0	
19	Iron (as Fe)	mg/l	IS 3025 (Part 2) 2004	7.78	-	-	-
20	Manganese (as Mn)	mg/l	IS 3025 (Part 2) 2004	0.50	-	-	-
21	Cyanide (as CN)	mg/L	APHA 23rd Edition 4500CN-BE :2017	BDL(DL:0.02)	0.2	2.0	0.2
22	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	4084	1000	1000	600
23	Fluoride (as F)	mg/L	APHA 23rd Edition 4500F⁻ B,D	5.16	2.0	1.5	-
24	Silica (as SiO_2)	mg/L	IS 3025 (Part 35) 1988 (RA 2019)	80.8	-	-	-
25	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	1365	-	-	-
26	Phenolic Compounds (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.01)	1.0	5.0	-

Note: BDL - Below Detection Limit ; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-WW-1323	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Pollution & Environment
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 09.03.2022	**Sample Reference No**	: PCEI/WW-118-03-22
Sample Description	: **Waste Water**	**Sample Received On**	: 09.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 09.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13° 8'1.81"N	**Longitude**	: 80°16'9.18"E
Sampling Location	: **Leachate -5**		

S.No	Parameters	Units	Test Method	Results	Standards (Mode of Disposal)		
					Inland Surface water	Public Sewers	Land Disposal
1	Total Suspended Solids @ 105°C	mg/L	IS 3025 (Part 17) 1984 (RA 2017)	119	100	600	200
2	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	7175	2100	2100	2100
3	pH @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	8.24	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	555	50	50	-
5	Total Kjehdahl Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1170	100	-	-
6	Total Hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21) 2009 (RA 2019)	2280	-	-	-
7	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	344	30	350	100
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	2024	250	-	-
9	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.2	0.2	0.2
10	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	1.15	0.01	0.01	-
11	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.1	1.0	-
12	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	2.0	1.0	-
13	Acidity (as CaCO3)	mg/l	IS 3025 (Part 22) 1986 (RA 2019)	BDL(DL:0.5)	-	-	-
14	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.18	2.0	2.0	-
15	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.09	3.0	3.0	-
16	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.09	5.0	15.0	-
17	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23) 1986 (RA 2003)	4115	-	-	-
18	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.13	3.0	3.0	
19	Iron (as Fe)	mg/l	IS 3025 (Part 2) 2004	5.02	-	-	-
20	Manganese (as Mn)	mg/l	IS 3025 (Part 2) 2004	0.40	-	-	-
21	Cyanide (as CN)	mg/L	APHA 23rd Edition 4500CN-BE :2017	BDL(DL:0.02)	0.2	2.0	0.2
22	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	2093	1000	1000	600
23	Fluoride (as F)	mg/L	APHA 23rd Edition 4500F⁻ B,D	21.4	2.0	1.5	-
24	Silica (as SiO_2)	mg/L	IS 3025 (Part 35) 1988 (RA 2019)	71.2	-	-	-
25	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	117	-	-	-
26	Phenolic Compounds (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.01)	1.0	5.0	-

Note: BDL - Below Detection Limit ; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-WW-1324	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Pollution & Environment
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 09.03.2022	**Sample Reference No**	: PCEI/WW-119-03-22
Sample Description	: **Waste Water**	**Sample Received On**	: 09.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 09.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13° 7'57.51"N	**Longitude**	: 80°16'5.02"E
Sampling Location	: **Leachate -6**		

S.No	Parameters	Units	Test Method	Results	Standards (Mode of Disposal)		
					Inland Surface water	Public Sewers	Land Disposal
1	Total Suspended Solids @ 105°C	mg/L	IS 3025 (Part 17) 1984 (RA 2017)	610	100	600	200
2	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	7585	2100	2100	2100
3	pH @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	8.03	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1022	50	50	-
5	Total Kjehdahl Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1873	100	-	-
6	Total Hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21) 2009 (RA 2019)	2375	-	-	-
7	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	711	30	350	100
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	3927	250	-	-
9	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.02	0.2	0.2	0.2
10	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	3.43	0.01	0.01	-
11	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	0.04	0.1	1.0	-
12	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	2.0	1.0	-
13	Acidity (as CaCO3)	mg/l	IS 3025 (Part 22) 1986 (RA 2019)	BDL(DL:0.5)	-	-	-
14	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:1.0)	2.0	2.0	-
15	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.22	3.0	3.0	-
16	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.32	5.0	15.0	-
17	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23) 1986 (RA 2003)	5381	-	-	-
18	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.21	3.0	3.0	
19	Iron (as Fe)	mg/l	IS 3025 (Part 2) 2004	10.2	-	-	-
20	Manganese (as Mn)	mg/l	IS 3025 (Part 2) 2004	0.63	-	-	-
21	Cyanide (as CN)	mg/L	APHA 23rd Edition 4500CN-BE :2017	BDL(DL:0.02)	0.2	2.0	0.2
22	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	2552	1000	1000	600
23	Fluoride (as F)	mg/L	APHA 23rd Edition 4500F⁻ B,D	1.41	2.0	1.5	-
24	Silica (as SiO_2)	mg/L	IS 3025 (Part 35) 1988 (RA 2019)	41.0	-	-	-
25	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	452	-	-	-
26	Phenolic Compounds (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.01)	1.0	5.0	-

Note: BDL - Below Detection Limit ; DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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TEST REPORT

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Report No	: PCEI/TR-WW-1325	**Report Date**	: 19.03.2022
Discipline	: Chemical	**Group**	: Pollution & Environment
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 3025 (Part 1) 1987 (RA 2014)		
Sampled by	: Laboratory		
Sample Collected Date	: 09.03.2022	**Sample Reference No**	: PCEI/WW-120-03-22
Sample Description	: **Waste Water**	**Sample Received On**	: 09.03.2022
Qty of Sample Received	: 2 Litre	**Test Commenced On**	: 09.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 19.03.2022
Latitude	: 13° 7'54.83"N	**Longitude**	: 80°16'2.46"E
Sampling Location	: **Leachate -7**		

S.No	Parameters	Units	Test Method	Results	Standards (Mode of Disposal)		
					Inland Surface water	Public Sewers	Land Disposal
1	Total Suspended Solids @ 105°C	mg/L	IS 3025 (Part 17) 1984 (RA 2017)	103	100	600	200
2	Total Dissolved Solids @ 180°C	mg/L	IS 3025 (Part 16) 1984 (RA 2017)	7855	2100	2100	2100
3	pH @ 25°C	-	IS 3025 (Part 11) 1983 (RA 2019)	8.18	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
4	Ammonical Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	626	50	50	-
5	Total Kjehdahl Nitrogen (as N)	mg/L	IS 3025 (Part 34) 1988 (RA 2019)	1318	100	-	-
6	Total Hardness (as $CaCO_3$)	mg/l	IS 3025 (Part 21) 2009 (RA 2019)	2850	-	-	-
7	Biochemical Oxygen Demand (3 days at 27°C)	mg/L	IS 3025 (Part 44) 1993 (RA 2019)	317	30	350	100
8	Chemical Oxygen Demand (COD)	mg/L	IS 3025 (Part 58) 2006 (RA 2017)	1984	250	-	-
9	Arsenic (as As)	mg/L	IS 3025 (Part 2) 2004	0.03	0.2	0.2	0.2
10	Mercury (as Hg)	mg/L	IS 3025 (Part 2) 2004	4.29	0.01	0.01	-
11	Lead (as Pb)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	0.1	1.0	-
12	Cadmium (as Cd)	mg/L	IS 3025 (Part 2) 2004	BDL(DL:0.01)	2.0	1.0	-
13	Acidity (as CaCO3)	mg/l	IS 3025 (Part 22) 1986 (RA 2019)	BDL(DL:0.5)	-	-	-
14	Total Chromium (as Cr)	mg/L	IS 3025 (Part 2) 2004	0.24	2.0	2.0	-
15	Copper (as Cu)	mg/L	IS 3025 (Part 2) 2004	0.09	3.0	3.0	-
16	Zinc (as Zn)	mg/L	IS 3025 (Part 2) 2004	0.09	5.0	15.0	-
17	Total Alkalinity (as $CaCO_3$)	mg/l	IS 3025 (Part 23) 1986 (RA 2003)	4009	-	-	-
18	Nickel (as Ni)	mg/L	IS 3025 (Part 2) 2004	0.15	3.0	3.0	
19	Iron (as Fe)	mg/l	IS 3025 (Part 2) 2004	3.91	-	-	-
20	Manganese (as Mn)	mg/l	IS 3025 (Part 2) 2004	0.41	-	-	-
21	Cyanide (as CN)	mg/L	APHA 23rd Edition 4500CN-BE :2017	BDL(DL:0.02)	0.2	2.0	0.2
22	Chloride (as Cl)	mg/L	IS 3025 (Part 32) 1988 (RA 2019)	2399	1000	1000	600
23	Fluoride (as F)	mg/L	APHA 23rd Edition 4500F B,D	4.69	2.0	1.5	-
24	Silica (as SiO_2)	mg/L	IS 3025 (Part 35) 1988 (RA 2019)	81.3	-	-	-
25	Sulphate (as SO_4)	mg/L	IS 3025 (Part 24) 1986 (RA 2019)	225	-	-	-
26	Phenolic Compounds (as C_6H_5OH)	mg/L	IS 3025 (Part 43) 1992 (RA 2019)	BDL(DL:0.01)	1.0	5.0	-

Note: BDL - Below Detection Limit : DL - Detection Limit
All the above test parameters are carried with the sample's "as received condition"

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Annexure 12: Analysis of Noise at Kodungaiyur Site

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TEST REPORT

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Report No	: PCEI/TR-N-1868	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-663-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13367289°	**Longitude**	: 80.26395473°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	45.0	
07:00 - 08:00	52.6	
08:00 - 09:00	53.1	
09:00 - 10:00	44.0	
10:00 - 11:00	46.0	
11:00 - 12:00	47.0	
12:00 - 13:00	48.1	
13:00 - 14:00	48.4	
14:00 - 15:00	52.7	
15:00 - 16:00	53.0	
16:00 - 17:00	53.6	
17:00 - 18:00	54.1	
18:00 - 19:00	55.6	
19:00 - 20:00	52.7	
20:00 - 21:00	51.2	
21:00 - 22:00	53.1	
22:00 - 23:00	54.5	
23:00 - 00:00	52.8	
00:00 - 01:00		43.2
01:00 - 02:00		41.9
02:00 - 03:00		42.4
03:00 - 04:00		42.9
04:00 - 05:00		43.4
05:00 - 06:00		44.1
Day Time	**Min**	**44.0**
	Max	**55.6**
	Leq	**51.8**
	Day Limit	**55dB(A)**
Night Time	**Min**	**41.9**
	Max	**44.1**
	Leq	**41.8**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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TEST REPORT

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Report No	: PCEI/TR-N-1869	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-664-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Outside		
Latitude	: 13.1407198°	**Longitude**	: 80.27837894°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	44.5	
07:00 - 08:00	52.1	
08:00 - 09:00	52.6	
09:00 - 10:00	43.5	
10:00 - 11:00	45.5	
11:00 - 12:00	46.5	
12:00 - 13:00	47.6	
13:00 - 14:00	47.9	
14:00 - 15:00	52.2	
15:00 - 16:00	52.5	
16:00 - 17:00	53.1	
17:00 - 18:00	53.6	
18:00 - 19:00	55.1	
19:00 - 20:00	52.2	
20:00 - 21:00	50.7	
21:00 - 22:00	52.6	
22:00 - 23:00	54.0	
23:00 - 00:00	52.3	
00:00 - 01:00		43.6
01:00 - 02:00		42.3
02:00 - 03:00		42.8
03:00 - 04:00		43.3
04:00 - 05:00		43.8
05:00 - 06:00		44.5
Day Time	**Min**	**43.5**
	Max	**55.1**
	Leq	**51.3**
	Day Limit	**55dB(A)**
Night Time	**Min**	**42.3**
	Max	**44.5**
	Leq	**42.2**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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Authorised Signatory

Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-N-1870	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-665-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Outside		
Latitude	: 13.12847087°	**Longitude**	: 80.26901719°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	45.2	
07:00 - 08:00	52.8	
08:00 - 09:00	53.3	
09:00 - 10:00	44.2	
10:00 - 11:00	46.2	
11:00 - 12:00	47.2	
12:00 - 13:00	48.3	
13:00 - 14:00	48.6	
14:00 - 15:00	52.9	
15:00 - 16:00	53.2	
16:00 - 17:00	53.8	
17:00 - 18:00	54.3	
18:00 - 19:00	55.8	
19:00 - 20:00	52.9	
20:00 - 21:00	51.4	
21:00 - 22:00	53.3	
22:00 - 23:00	54.7	
23:00 - 00:00	53.0	
00:00 - 01:00		44.5
01:00 - 02:00		43.2
02:00 - 03:00		43.7
03:00 - 04:00		44.2
04:00 - 05:00		44.7
05:00 - 06:00		45.6
Day Time	**Min**	**44.2**
	Max	**55.8**
	Leq	**52.0**
	Day Limit	**55dB(A)**
Night Time	**Min**	**43.2**
	Max	**45.6**
	Leq	**43.1**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-N-1871	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-666-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13716839°	**Longitude**	: 80.26817616°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	44.7	
07:00 - 08:00	52.3	
08:00 - 09:00	52.8	
09:00 - 10:00	43.7	
10:00 - 11:00	45.7	
11:00 - 12:00	46.7	
12:00 - 13:00	47.8	
13:00 - 14:00	48.1	
14:00 - 15:00	52.4	
15:00 - 16:00	52.7	
16:00 - 17:00	53.3	
17:00 - 18:00	53.8	
18:00 - 19:00	55.3	
19:00 - 20:00	52.4	
20:00 - 21:00	50.9	
21:00 - 22:00	52.8	
22:00 - 23:00	54.2	
23:00 - 00:00	52.5	
00:00 - 01:00		44.2
01:00 - 02:00		42.9
02:00 - 03:00		43.4
03:00 - 04:00		43.9
04:00 - 05:00		44.4
05:00 - 06:00		45.3
Day Time	**Min**	**43.7**
	Max	**55.3**
	Leq	**51.5**
	Day Limit	**55dB(A)**
Night Time	**Min**	**42.9**
	Max	**45.3**
	Leq	**42.8**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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TEST REPORT

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Report No	: PCEI/TR-N-1872	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-667-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.1363015°	**Longitude**	: 80.27276337°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	45.6	
07:00 - 08:00	53.2	
08:00 - 09:00	53.7	
09:00 - 10:00	44.6	
10:00 - 11:00	46.6	
11:00 - 12:00	47.6	
12:00 - 13:00	48.7	
13:00 - 14:00	49.0	
14:00 - 15:00	53.3	
15:00 - 16:00	53.6	
16:00 - 17:00	54.2	
17:00 - 18:00	54.7	
18:00 - 19:00	56.2	
19:00 - 20:00	53.3	
20:00 - 21:00	51.8	
21:00 - 22:00	53.7	
22:00 - 23:00	55.1	
23:00 - 00:00	53.4	
00:00 - 01:00		44.9
01:00 - 02:00		43.6
02:00 - 03:00		44.1
03:00 - 04:00		44.6
04:00 - 05:00		45.1
05:00 - 06:00		46.0
Day Time	**Min**	**44.6**
	Max	**56.2**
	Leq	**52.4**
	Day Limit	**55dB(A)**
Night Time	**Min**	**43.6**
	Max	**46.0**
	Leq	**43.5**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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TEST REPORT

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Report No	: PCEI/TR-N-1873	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-668-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13635267°	**Longitude**	: 80.27233434°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	46.5	
07:00 - 08:00	54.1	
08:00 - 09:00	54.6	
09:00 - 10:00	45.5	
10:00 - 11:00	47.5	
11:00 - 12:00	48.5	
12:00 - 13:00	49.6	
13:00 - 14:00	49.9	
14:00 - 15:00	54.2	
15:00 - 16:00	54.5	
16:00 - 17:00	55.1	
17:00 - 18:00	55.6	
18:00 - 19:00	57.1	
19:00 - 20:00	54.2	
20:00 - 21:00	53.7	
21:00 - 22:00	54.6	
22:00 - 23:00	56.0	
23:00 - 00:00	54.3	
00:00 - 01:00		44.0
01:00 - 02:00		42.7
02:00 - 03:00		43.2
03:00 - 04:00		48.1
04:00 - 05:00		44.2
05:00 - 06:00		45.1
Day Time	**Min**	**45.5**
	Max	**57.1**
	Leq	**53.4**
	Day Limit	**55dB(A)**
Night Time	**Min**	**42.7**
	Max	**48.1**
	Leq	**43.7**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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TEST REPORT

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Report No	: PCEI/TR-N-1874	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-669-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13093845°	**Longitude**	: 80.27013687°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	47.1	
07:00 - 08:00	54.7	
08:00 - 09:00	55.2	
09:00 - 10:00	46.1	
10:00 - 11:00	48.0	
11:00 - 12:00	49.1	
12:00 - 13:00	50.2	
13:00 - 14:00	50.5	
14:00 - 15:00	54.8	
15:00 - 16:00	55.1	
16:00 - 17:00	55.7	
17:00 - 18:00	56.2	
18:00 - 19:00	57.7	
19:00 - 20:00	54.8	
20:00 - 21:00	54.3	
21:00 - 22:00	55.2	
22:00 - 23:00	55.6	
23:00 - 00:00	54.9	
00:00 - 01:00		43.3
01:00 - 02:00		42.0
02:00 - 03:00		42.5
03:00 - 04:00		43.0
04:00 - 05:00		43.5
05:00 - 06:00		44.4
Day Time	**Min**	**46.1**
	Max	**57.7**
	Leq	**54.0**
	Day Limit	**55dB(A)**
Night Time	**Min**	**42.0**
	Max	**44.4**
	Leq	**41.9**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

*** End of Report ***

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

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Report No	: PCEI/TR-N-1875	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-670-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13507152°	**Longitude**	: 80.27027059°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	46.0	
07:00 - 08:00	53.6	
08:00 - 09:00	54.1	
09:00 - 10:00	45.1	
10:00 - 11:00	46.9	
11:00 - 12:00	48.0	
12:00 - 13:00	49.1	
13:00 - 14:00	49.4	
14:00 - 15:00	53.7	
15:00 - 16:00	54.0	
16:00 - 17:00	54.6	
17:00 - 18:00	55.1	
18:00 - 19:00	56.6	
19:00 - 20:00	53.7	
20:00 - 21:00	53.2	
21:00 - 22:00	54.1	
22:00 - 23:00	55.5	
23:00 - 00:00	53.8	
00:00 - 01:00		39.6
01:00 - 02:00		38.4
02:00 - 03:00		40.7
03:00 - 04:00		42.2
04:00 - 05:00		42.7
05:00 - 06:00		33.6
Day Time	**Min**	**45.1**
	Max	**56.6**
	Leq	**52.9**
	Day Limit	**55dB(A)**
Night Time	**Min**	**33.6**
	Max	**42.7**
	Leq	**39.1**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

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Report No	: PCEI/TR-N-1876	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-671-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.1352651°	**Longitude**	: 80.26912822°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	45.2	
07:00 - 08:00	52.8	
08:00 - 09:00	53.3	
09:00 - 10:00	44.3	
10:00 - 11:00	46.1	
11:00 - 12:00	47.2	
12:00 - 13:00	48.3	
13:00 - 14:00	48.6	
14:00 - 15:00	52.9	
15:00 - 16:00	53.2	
16:00 - 17:00	53.8	
17:00 - 18:00	54.3	
18:00 - 19:00	55.8	
19:00 - 20:00	52.9	
20:00 - 21:00	52.4	
21:00 - 22:00	53.3	
22:00 - 23:00	54.7	
23:00 - 00:00	53.0	
00:00 - 01:00		40.0
01:00 - 02:00		38.9
02:00 - 03:00		41.2
03:00 - 04:00		42.7
04:00 - 05:00		43.2
05:00 - 06:00		36.9
Day Time	**Min**	**44.3**
	Max	**55.8**
	Leq	**52.1**
	Day Limit	**55dB(A)**
Night Time	**Min**	**36.9**
	Max	**43.2**
	Leq	**39.7**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

ORIGINAL POLLUCARE ORIGINAL

Authorised Signatory

Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-N-1877	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-672-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13562246°	**Longitude**	: 80.26934507°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	44.3	
07:00 - 08:00	51.9	
08:00 - 09:00	52.4	
09:00 - 10:00	43.4	
10:00 - 11:00	45.2	
11:00 - 12:00	46.3	
12:00 - 13:00	47.4	
13:00 - 14:00	47.7	
14:00 - 15:00	52.0	
15:00 - 16:00	52.3	
16:00 - 17:00	52.9	
17:00 - 18:00	53.4	
18:00 - 19:00	54.9	
19:00 - 20:00	52.0	
20:00 - 21:00	51.5	
21:00 - 22:00	52.4	
22:00 - 23:00	53.8	
23:00 - 00:00	52.1	
00:00 - 01:00		39.1
01:00 - 02:00		38.0
02:00 - 03:00		40.3
03:00 - 04:00		41.8
04:00 - 05:00		42.3
05:00 - 06:00		36.0
Day Time	**Min**	**43.4**
	Max	**54.9**
	Leq	**51.2**
	Day Limit	**55dB(A)**
Night Time	**Min**	**36.0**
	Max	**42.3**
	Leq	**38.8**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-N-1878	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-673-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13737558°	**Longitude**	: 80.26670072°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	43.8	
07:00 - 08:00	51.4	
08:00 - 09:00	51.9	
09:00 - 10:00	42.9	
10:00 - 11:00	44.7	
11:00 - 12:00	45.8	
12:00 - 13:00	46.9	
13:00 - 14:00	47.2	
14:00 - 15:00	51.5	
15:00 - 16:00	51.8	
16:00 - 17:00	52.4	
17:00 - 18:00	52.9	
18:00 - 19:00	54.4	
19:00 - 20:00	51.5	
20:00 - 21:00	51.0	
21:00 - 22:00	51.9	
22:00 - 23:00	53.3	
23:00 - 00:00	51.6	
00:00 - 01:00		38.8
01:00 - 02:00		37.7
02:00 - 03:00		40.1
03:00 - 04:00		41.5
04:00 - 05:00		40.8
05:00 - 06:00		39.7
Day Time	**Min**	**42.9**
	Max	**54.4**
	Leq	**50.7**
	Day Limit	**55dB(A)**
Night Time	**Min**	**37.7**
	Max	**41.5**
	Leq	**38.7**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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Report No	: PCEI/TR-N-1879	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-674-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13837092°	**Longitude**	: 80.2661549°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	44.5	
07:00 - 08:00	52.1	
08:00 - 09:00	52.6	
09:00 - 10:00	43.6	
10:00 - 11:00	45.4	
11:00 - 12:00	46.5	
12:00 - 13:00	47.6	
13:00 - 14:00	47.9	
14:00 - 15:00	52.2	
15:00 - 16:00	52.5	
16:00 - 17:00	53.1	
17:00 - 18:00	53.6	
18:00 - 19:00	55.1	
19:00 - 20:00	52.2	
20:00 - 21:00	51.7	
21:00 - 22:00	52.6	
22:00 - 23:00	54.0	
23:00 - 00:00	52.3	
00:00 - 01:00		39.6
01:00 - 02:00		38.5
02:00 - 03:00		40.9
03:00 - 04:00		42.3
04:00 - 05:00		41.6
05:00 - 06:00		40.5
Day Time	**Min**	**43.6**
	Max	**55.1**
	Leq	**51.4**
	Day Limit	**55dB(A)**
Night Time	**Min**	**38.5**
	Max	**42.3**
	Leq	**39.5**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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Report No	: PCEI/TR-N-1880	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-675-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13901049°	**Longitude**	: 80.26637577°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	45.2	
07:00 - 08:00	52.8	
08:00 - 09:00	53.3	
09:00 - 10:00	44.3	
10:00 - 11:00	46.1	
11:00 - 12:00	47.2	
12:00 - 13:00	48.3	
13:00 - 14:00	48.6	
14:00 - 15:00	52.9	
15:00 - 16:00	53.2	
16:00 - 17:00	53.8	
17:00 - 18:00	54.3	
18:00 - 19:00	55.8	
19:00 - 20:00	52.9	
20:00 - 21:00	52.4	
21:00 - 22:00	53.3	
22:00 - 23:00	54.7	
23:00 - 00:00	53.0	
00:00 - 01:00		40.3
01:00 - 02:00		39.2
02:00 - 03:00		41.6
03:00 - 04:00		39.5
04:00 - 05:00		40.3
05:00 - 06:00		39.2
Day Time	**Min**	**44.3**
	Max	**55.8**
	Leq	**52.1**
	Day Limit	**55dB(A)**
Night Time	**Min**	**39.2**
	Max	**41.6**
	Leq	**38.9**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

*** End of Report ***

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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Report No	: PCEI/TR-N-1881	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-676-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13607359°	**Longitude**	: 80.26552302°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	45.9	
07:00 - 08:00	53.5	
08:00 - 09:00	54.0	
09:00 - 10:00	45.0	
10:00 - 11:00	46.8	
11:00 - 12:00	47.9	
12:00 - 13:00	49.0	
13:00 - 14:00	49.3	
14:00 - 15:00	53.6	
15:00 - 16:00	53.9	
16:00 - 17:00	54.5	
17:00 - 18:00	55.0	
18:00 - 19:00	56.5	
19:00 - 20:00	53.6	
20:00 - 21:00	53.1	
21:00 - 22:00	54.0	
22:00 - 23:00	55.4	
23:00 - 00:00	53.7	
00:00 - 01:00		41.2
01:00 - 02:00		40.1
02:00 - 03:00		37.1
03:00 - 04:00		40.4
04:00 - 05:00		41.2
05:00 - 06:00		40.1
Day Time	**Min**	**45.0**
	Max	**56.5**
	Leq	**52.8**
	Day Limit	**55dB(A)**
Night Time	**Min**	**37.1**
	Max	**41.2**
	Leq	**39.0**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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Report No	: PCEI/TR-N-1882	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-677-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13476762°	**Longitude**	: 80.26472917°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	46.2	
07:00 - 08:00	53.8	
08:00 - 09:00	54.3	
09:00 - 10:00	45.3	
10:00 - 11:00	47.1	
11:00 - 12:00	48.2	
12:00 - 13:00	49.3	
13:00 - 14:00	49.6	
14:00 - 15:00	53.9	
15:00 - 16:00	54.2	
16:00 - 17:00	54.8	
17:00 - 18:00	55.3	
18:00 - 19:00	56.8	
19:00 - 20:00	53.9	
20:00 - 21:00	53.4	
21:00 - 22:00	54.3	
22:00 - 23:00	55.7	
23:00 - 00:00	54.0	
00:00 - 01:00		41.8
01:00 - 02:00		40.7
02:00 - 03:00		37.7
03:00 - 04:00		41.0
04:00 - 05:00		41.8
05:00 - 06:00		40.7
Day Time	**Min**	**45.3**
	Max	**56.8**
	Leq	**53.1**
	Day Limit	**55dB(A)**
Night Time	**Min**	**37.7**
	Max	**41.8**
	Leq	**39.6**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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Authorised Signatory

Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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Report No	: PCEI/TR-N-1883	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-678-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13397278°	**Longitude**	: 80.26634573°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	45.5	
07:00 - 08:00	53.1	
08:00 - 09:00	53.6	
09:00 - 10:00	44.6	
10:00 - 11:00	46.4	
11:00 - 12:00	47.5	
12:00 - 13:00	48.6	
13:00 - 14:00	48.9	
14:00 - 15:00	53.2	
15:00 - 16:00	53.5	
16:00 - 17:00	54.1	
17:00 - 18:00	54.6	
18:00 - 19:00	56.1	
19:00 - 20:00	53.2	
20:00 - 21:00	52.7	
21:00 - 22:00	53.6	
22:00 - 23:00	55.0	
23:00 - 00:00	53.3	
00:00 - 01:00		41.1
01:00 - 02:00		40.5
02:00 - 03:00		37.0
03:00 - 04:00		40.3
04:00 - 05:00		41.1
05:00 - 06:00		40.7
Day Time	**Min**	**44.6**
	Max	**56.1**
	Leq	**52.4**
	Day Limit	**55dB(A)**
Night Time	**Min**	**37.0**
	Max	**41.1**
	Leq	**39.1**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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Authorised Signatory

Note: 1.The test results are only to the sample submitted for test. 2.Any Correction of the test report in full or part shall invalidate the report 3.Sample will be retained for 15 days from the date of reporting except in case of regulatory samples or specifically instructed by client. 4.Perishable samples will be discarded immediately after reporting. 5.Under no circumstances lab accepts any liability or loss/damage caused by use or misuse of test report after invoicing or issued of test report

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-N-1884	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-679-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13423591°	**Longitude**	: 80.26562359°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	46.0	
07:00 - 08:00	53.6	
08:00 - 09:00	54.1	
09:00 - 10:00	45.1	
10:00 - 11:00	46.9	
11:00 - 12:00	48.0	
12:00 - 13:00	49.1	
13:00 - 14:00	49.4	
14:00 - 15:00	53.7	
15:00 - 16:00	54.0	
16:00 - 17:00	54.6	
17:00 - 18:00	55.1	
18:00 - 19:00	56.6	
19:00 - 20:00	53.7	
20:00 - 21:00	53.2	
21:00 - 22:00	54.1	
22:00 - 23:00	55.5	
23:00 - 00:00	53.8	
00:00 - 01:00		41.8
01:00 - 02:00		41.2
02:00 - 03:00		37.7
03:00 - 04:00		41.0
04:00 - 05:00		41.8
05:00 - 06:00		41.4
Day Time	**Min**	**45.1**
	Max	**56.6**
	Leq	**52.9**
	Day Limit	**55dB(A)**
Night Time	**Min**	**37.7**
	Max	**41.8**
	Leq	**39.8**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-N-1885	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-680-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13105565°	**Longitude**	: 80.26658094°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	46.8	
07:00 - 08:00	54.0	
08:00 - 09:00	54.5	
09:00 - 10:00	55.5	
10:00 - 11:00	47.3	
11:00 - 12:00	48.4	
12:00 - 13:00	49.5	
13:00 - 14:00	49.8	
14:00 - 15:00	54.1	
15:00 - 16:00	54.4	
16:00 - 17:00	55.0	
17:00 - 18:00	55.5	
18:00 - 19:00	57.0	
19:00 - 20:00	54.1	
20:00 - 21:00	53.6	
21:00 - 22:00	54.5	
22:00 - 23:00	55.9	
23:00 - 00:00	54.2	
00:00 - 01:00		42.4
01:00 - 02:00		41.8
02:00 - 03:00		38.3
03:00 - 04:00		41.6
04:00 - 05:00		42.4
05:00 - 06:00		42.0
Day Time	**Min**	**46.8**
	Max	**57.0**
	Leq	**53.7**
	Day Limit	**55dB(A)**
Night Time	**Min**	**38.3**
	Max	**42.4**
	Leq	**40.4**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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TEST REPORT

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Report No	: PCEI/TR-N-1886	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-681-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Inside		
Latitude	: 13.13173079°	**Longitude**	: 80.26665527°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	47.3	
07:00 - 08:00	54.5	
08:00 - 09:00	55.0	
09:00 - 10:00	56.0	
10:00 - 11:00	47.8	
11:00 - 12:00	48.9	
12:00 - 13:00	50.1	
13:00 - 14:00	50.3	
14:00 - 15:00	54.6	
15:00 - 16:00	54.9	
16:00 - 17:00	55.5	
17:00 - 18:00	56.0	
18:00 - 19:00	57.5	
19:00 - 20:00	54.6	
20:00 - 21:00	54.1	
21:00 - 22:00	55.0	
22:00 - 23:00	56.4	
23:00 - 00:00	54.7	
00:00 - 01:00		41.9
01:00 - 02:00		41.3
02:00 - 03:00		37.8
03:00 - 04:00		41.1
04:00 - 05:00		41.9
05:00 - 06:00		41.5
Day Time	**Min**	**47.3**
	Max	**57.5**
	Leq	**54.2**
	Day Limit	**55dB(A)**
Night Time	**Min**	**37.8**
	Max	**41.9**
	Leq	**39.9**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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TEST REPORT

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Report No	: PCEI/TR-N-2876	**Report Date**	: 23.05.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 19.05.2022		
Sample Description	: **Noise Monitoring**	**Sample Reference No**	: PCEI/N-302-05-22
Sample Condition	: Fit for Analysis	**Sample Received On**	: 20.05.2022
Category of Area	: Commercial Area	**Test Commenced On**	: 20.05.2022
Sampling Location	: **K.K.D Nagar, 4th Street Kodungaiyur**	**Test Completed On**	: 23.05.2022
Latitude	: 13.13352417N	**Longitude**	: 80.26166904E

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	48.2	
07:00 - 08:00	55.8	
08:00 - 09:00	56.3	
09:00 - 10:00	47.2	
10:00 - 11:00	49.2	
11:00 - 12:00	50.2	
12:00 - 13:00	51.3	
13:00 - 14:00	51.6	
14:00 - 15:00	55.9	
15:00 - 16:00	56.2	
16:00 - 17:00	56.8	
17:00 - 18:00	57.3	
18:00 - 19:00	58.8	
19:00 - 20:00	55.9	
20:00 - 21:00	54.4	
21:00 - 22:00	56.3	
22:00 - 23:00	57.7	
23:00 - 00:00	56.1	
00:00 - 01:00		45.5
01:00 - 02:00		44.2
02:00 - 03:00		44.7
03:00 - 04:00		45.2
04:00 - 05:00		45.7
05:00 - 06:00		46.4
Day Time	**Min**	**47.2**
	Max	**58.8**
	Leq	**55.0**
	Day Limit	**65dB(A)**
Night Time	**Min**	**44.2**
	Max	**46.4**
	Leq	**44.1**
	Night Limit	**55dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Commercial Area Daytime 65 dB(A) & Night Time 55 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Commercial Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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TEST REPORT

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Report No	: PCEI/TR-N-2877	**Report Date**	: 23.05.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 19.05.2022		
Sample Description	: **Noise Monitoring**	**Sample Reference No**	: PCEI/N-303-05-22
Sample Condition	: Fit for Analysis	**Sample Received On**	: 20.05.2022
Category of Area	: Residential Area	**Test Commenced On**	: 20.05.2022
Sampling Location	: **Old Washermanpet**	**Test Completed On**	: 23.05.2022
Latitude	: 13.13082745N	**Longitude**	: 80.27514584E

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	47.9	
07:00 - 08:00	55.5	
08:00 - 09:00	56.0	
09:00 - 10:00	46.9	
10:00 - 11:00	48.9	
11:00 - 12:00	49.9	
12:00 - 13:00	51.0	
13:00 - 14:00	51.3	
14:00 - 15:00	55.6	
15:00 - 16:00	55.9	
16:00 - 17:00	56.5	
17:00 - 18:00	57.0	
18:00 - 19:00	58.5	
19:00 - 20:00	55.6	
20:00 - 21:00	54.1	
21:00 - 22:00	56.0	
22:00 - 23:00	57.4	
23:00 - 00:00	55.7	
00:00 - 01:00		46.3
01:00 - 02:00		45.1
02:00 - 03:00		45.5
03:00 - 04:00		46.1
04:00 - 05:00		47.9
05:00 - 06:00		46.5
Day Time	**Min**	**46.9**
	Max	**58.5**
	Leq	**54.7**
	Day Limit	**55dB(A)**
Night Time	**Min**	**45.1**
	Max	**47.9**
	Leq	**45.1**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

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TEST REPORT

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Report No	: PCEI/TR-N-2880	**Report Date**	: 23.05.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 19.05.2022		
Sample Description	: **Noise Monitoring**	**Sample Reference No**	: PCEI/N-306-05-22
Sample Condition	: Fit for Analysis	**Sample Received On**	: 20.05.2022
Category of Area	: Commercial Area	**Test Commenced On**	: 20.05.2022
Sampling Location	: **Opposite to Dump Yard**	**Test Completed On**	: 23.05.2022
Latitude	: 13.13029522N	**Longitude**	: 80.26671523E

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	44.9	
07:00 - 08:00	52.5	
08:00 - 09:00	43.0	
09:00 - 10:00	43.9	
10:00 - 11:00	45.9	
11:00 - 12:00	46.9	
12:00 - 13:00	48.0	
13:00 - 14:00	48.3	
14:00 - 15:00	52.6	
15:00 - 16:00	52.9	
16:00 - 17:00	53.5	
17:00 - 18:00	54.0	
18:00 - 19:00	55.5	
19:00 - 20:00	52.6	
20:00 - 21:00	51.1	
21:00 - 22:00	53.0	
22:00 - 23:00	54.4	
23:00 - 00:00	52.7	
00:00 - 01:00		44.5
01:00 - 02:00		43.2
02:00 - 03:00		43.7
03:00 - 04:00		44.2
04:00 - 05:00		44.9
05:00 - 06:00		45.1
Day Time	**Min**	**43.0**
	Max	**55.5**
	Leq	**51.4**
	Day Limit	**65dB(A)**
Night Time	**Min**	**43.2**
	Max	**45.1**
	Leq	**43.1**
	Night Limit	**55dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Commercial Area Daytime 65 dB(A) & Night Time 55 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Commercial Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

Verified By

ORIGINAL POLLUCARE ORIGINAL

Authorised Signatory

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TEST REPORT

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Report No	: PCEI/TR-N-1887	**Report Date**	: 01.04.2022
Discipline	: Chemical	**Group**	: Atmospheric Pollution
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: IS 9989 – 1981 (RA 2008)		
Sampled by	: Laboratory		
Sample Collected Date	: 22.03.2022	**Sample Reference No**	: PCEI/N-682-03-22
Sample Description	: **Noise Monitoring**	**Sample Received On**	: 23.03.2022
Sample Condition	: Fit for Analysis	**Test Commenced On**	: 23.03.2022
Category of Area	: Residential Area	**Test Completed On**	: 01.04.2022
Sampling Location	: Outside		
Latitude	: 13.1302971°	**Longitude**	: 80.26727683°

Time	Day Time	Night Time
	Readings in dB(A)	Readings in dB(A)
06:00 - 07:00	46.7	
07:00 - 08:00	53.9	
08:00 - 09:00	54.4	
09:00 - 10:00	55.4	
10:00 - 11:00	47.2	
11:00 - 12:00	48.3	
12:00 - 13:00	49.5	
13:00 - 14:00	49.7	
14:00 - 15:00	54.0	
15:00 - 16:00	54.3	
16:00 - 17:00	54.9	
17:00 - 18:00	55.4	
18:00 - 19:00	56.9	
19:00 - 20:00	54.0	
20:00 - 21:00	53.5	
21:00 - 22:00	54.4	
22:00 - 23:00	55.8	
23:00 - 00:00	54.1	
00:00 - 01:00		42.3
01:00 - 02:00		41.7
02:00 - 03:00		38.2
03:00 - 04:00		41.5
04:00 - 05:00		42.3
05:00 - 06:00		41.9
Day Time	**Min**	**46.7**
	Max	**56.9**
	Leq	**53.6**
	Day Limit	**55dB(A)**
Night Time	**Min**	**38.2**
	Max	**42.3**
	Leq	**40.3**
	Night Limit	**45dB(A)**

Note: CPCB Ambient Air Quality Standards in respect of Noise in Residential Area Daytime 55 dB(A) & Night Time 45 dB(A)

***** End of Report *****

INTERPRETATION:

The Noise level were monitored as per IS 9989-1981 and CPCB Protocol for Ambient Noise Level Monitoring, Jul 2015.

In the above Noise results, the Day time and Night time Noise levels meets the NAAQS for Noise levels for Residential Area(THE NOISE POLLUTION (REGULATION AND CONTROL) RULES, 2000)

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Annexure 13: Analysis of Odour at Kodungaiyur Site

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Report No	: PCEI/TR-GS-2340	**Report Date**	: 27.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Laboratory	**Sample Reference No**	: PCEI/GS-389-04-22
Sample Collected Date	: 21.04.2022	**Sample Received On**	: 22.04.2022
Sample Description	: **Ambient Air Quality**	**Test Commenced On**	: 22.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 27.04.2022
Sampling Location	: **Location-1 (Susila Nagar- Opp KDG Site Entrance)**		

S.No	Parameters	Units	Results
1	Hydrogen sulfide (as H_2S)	ppm	BDL(DL:1.0)
2	Carbon monoxide (as CO)	ppm	BDL(DL:1.0)

Note: ppm- parts per million

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Report No	: PCEI/TR-GS-2341	**Report Date**	: 27.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Laboratory	**Sample Reference No**	: PCEI/GS-390-04-22
Sample Collected Date	: 21.04.2022	**Sample Received On**	: 22.04.2022
Sample Description	: **Ambient Air Quality**	**Test Commenced On**	: 22.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 27.04.2022
Sampling Location	: **Location-2 (Susila Nagar- Opp KDG Site Entrance)**		

S.No	Parameters	Units	Results
1	Hydrogen sulfide (as H_2S)	ppm	BDL(DL:1.0)
2	Carbon monoxide (as CO)	ppm	BDL(DL:1.0)

Note: ppm- parts per million

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Report No	: PCEI/TR-GS-2342	**Report Date**	: 27.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Laboratory	**Sample Reference No**	: PCEI/GS-391-04-22
Sample Collected Date	: 21.04.2022	**Sample Received On**	: 22.04.2022
Sample Description	: **Ambient Air Quality**	**Test Commenced On**	: 22.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 27.04.2022
Sampling Location	: **Location-3 (Rajaratnam Colony- Opp KDG Site Entrance)**		

S.No	Parameters	Units	Results
1	Hydrogen sulfide (as H_2S)	ppm	BDL(DL:1.0)
2	Carbon monoxide (as CO)	ppm	BDL(DL:1.0)

Note: ppm- parts per million

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Report No	: PCEI/TR-GS-2343	**Report Date**	: 27.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Laboratory	**Sample Reference No**	: PCEI/GS-392-04-22
Sample Collected Date	: 21.04.2022	**Sample Received On**	: 22.04.2022
Sample Description	: **Ambient Air Quality**	**Test Commenced On**	: 22.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 27.04.2022
Sampling Location	: **Location-4 (MGR Nagar Block-A)**		

S.No	Parameters	Units	Results
1	Hydrogen sulfide (as H_2S)	ppm	BDL(DL:1.0)
2	Carbon monoxide (as CO)	ppm	BDL(DL:1.0)

Note: ppm- parts per million

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Report No	: PCEI/TR-GS-2344	**Report Date**	: 27.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Laboratory	**Sample Reference No**	: PCEI/GS-393-04-22
Sample Collected Date	: 21.04.2022	**Sample Received On**	: 22.04.2022
Sample Description	: **Ambient Air Quality**	**Test Commenced On**	: 22.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 27.04.2022
Sampling Location	: **Location-5 (Thoppai Vinayagar Kovil street)**		

S.No	Parameters	Units	Results
1	Hydrogen sulfide (as H_2S)	ppm	BDL(DL:1.0)
2	Carbon monoxide (as CO)	ppm	BDL(DL:1.0)

Note: ppm- parts per million

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Report No	: PCEI/TR-GS-2345	**Report Date**	: 27.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Laboratory	**Sample Reference No**	: PCEI/GS-394-04-22
Sample Collected Date	: 21.04.2022	**Sample Received On**	: 22.04.2022
Sample Description	: **Ambient Air Quality**	**Test Commenced On**	: 22.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 27.04.2022
Sampling Location	: **Location-6 (Teachers Colony)**		

S.No	Parameters	Units	Results
1	Hydrogen sulfide (as H_2S)	ppm	BDL(DL:1.0)
2	Carbon monoxide (as CO)	ppm	BDL(DL:1.0)

Note: ppm- parts per million

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Report No	: PCEI/TR-GS-2346	**Report Date**	: 27.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampling Method	: -		
Sampled by	: Laboratory	**Sample Reference No**	: PCEI/GS-395-04-22
Sample Collected Date	: 21.04.2022	**Sample Received On**	: 22.04.2022
Sample Description	: **Ambient Air Quality**	**Test Commenced On**	: 22.04.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 27.04.2022
Sampling Location	: **Location-7 (KKD Nagar 10th Main Road)**		

S.No	Parameters	Units	Results
1	Hydrogen sulfide (as H_2S)	ppm	BDL(DL:1.0)
2	Carbon monoxide (as CO)	ppm	BDL(DL:1.0)

Note: ppm- parts per million

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Annexure 14: Old/Legacy Waste Physical and Chemical Analysis Report

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Report No	: PCEI/TR-LW-1527(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-322(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'14.27"N	**Longitude**	: 80°16'5.50"E
Sampling Name	: **Legacy Waste 1**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	19.4
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	0.62
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	0.34
4	Density	Kg/m^3	PCEI/SOP/LW/014	736
5	Moisture Content	%	IS 10158 (1982) RA 2003	32.0
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1649
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1365
8	Ash Content	%	IS 10158 (1982) RA 2003	53.2
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	51.3
10	C/N Ratio	-	PCEI/SOP/LW/011	31.3
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	55.9
	<5.0 µm	%	PCEI/SOP/LW/021	36.4
	<1.0 µm	%	PCEI/SOP/LW/021	7.7
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.19
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	7.87
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.08
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	0.69
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	6.89
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	21.6
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	7.75
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	6.72

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Report No	: PCEI/TR-LW-1528(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-323(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'15.77"N	**Longitude**	: 80°15'59.44"E
Sampling Name	: **Legacy Waste 2**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	20.3
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	1.52
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	1.24
4	Density	Kg/m^3	PCEI/SOP/LW/014	824
5	Moisture Content	%	IS 10158 (1982) RA 2003	41.2
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1887
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1706
8	Ash Content	%	IS 10158 (1982) RA 2003	54.1
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	52.2
10	C/N Ratio	-	PCEI/SOP/LW/011	16.6
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	75.9
	<5.0 µm	%	PCEI/SOP/LW/021	17.3
	<1.0 µm	%	PCEI/SOP/LW/021	6.81
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.24
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	10.10
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.10
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	0.89
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	8.87
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	27.8
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	9.98
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	8.65

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Report No	: PCEI/TR-LW-1529(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-324(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'5.45"N	**Longitude**	: 80°16'7.52"E
Sampling Name	: **Legacy Waste 3**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	25.1
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	0.58
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	0.39
4	Density	Kg/m^3	PCEI/SOP/LW/014	862
5	Moisture Content	%	IS 10158 (1982) RA 2003	38.1
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1745
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1559
8	Ash Content	%	IS 10158 (1982) RA 2003	48.6
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	47.3
10	C/N Ratio	-	PCEI/SOP/LW/011	43.2
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	62.1
	<5.0 µm	%	PCEI/SOP/LW/021	35.6
	<1.0 µm	%	PCEI/SOP/LW/021	2.3
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.22
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	9.34
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.12
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	0.96
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	9.14
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	24.8
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	10.2
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	8.15

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Report No	: PCEI/TR-LW-1530(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-325(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'3.45"N	**Longitude**	: 80°15'56.88"E
Sampling Name	: **Legacy Waste 4**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	24.2
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	0.51
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	0.43
4	Density	Kg/m^3	PCEI/SOP/LW/014	637
5	Moisture Content	%	IS 10158 (1982) RA 2003	51.4
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1763
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1594
8	Ash Content	%	IS 10158 (1982) RA 2003	55.7
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	59.5
10	C/N Ratio	-	PCEI/SOP/LW/011	47.5
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	71.3
	<5.0 µm	%	PCEI/SOP/LW/021	20.1
	<1.0 µm	%	PCEI/SOP/LW/021	8.6
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.15
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	10.2
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.19
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	1.12
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	10.6
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	19.7
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	11.5
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	7.79

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TEST REPORT

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Report No	: PCEI/TR-LW-1531(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-326(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'1.52"N	**Longitude**	: 80°15'47.08"E
Sampling Name	: **Legacy Waste 5**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	21.6
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	0.67
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	0.56
4	Density	Kg/m^3	PCEI/SOP/LW/014	733
5	Moisture Content	%	IS 10158 (1982) RA 2003	39.6
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1589
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1437
8	Ash Content	%	IS 10158 (1982) RA 2003	48.1
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	52.3
10	C/N Ratio	-	PCEI/SOP/LW/011	32.2
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	44.9
	<5.0 µm	%	PCEI/SOP/LW/021	41.8
	<1.0 µm	%	PCEI/SOP/LW/021	13.3
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.29
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	6.74
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.23
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	1.19
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	11.20
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	20.30
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	9.68
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	9.21

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Report No	: PCEI/TR-LW-1563(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-358(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'13.16"N	**Longitude**	: 80°16'21.10"E
Sampling Name	: **Legacy Waste 6**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	24.2
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	0.54
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	0.41
4	Density	Kg/m^3	PCEI/SOP/LW/014	659
5	Moisture Content	%	IS 10158 (1982) RA 2003	41.7
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1426
7	Net Callorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1288
8	Ash Content	%	IS 10158 (1982) RA 2003	40.6
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	68.9
10	C/N Ratio	-	PCEI/SOP/LW/011	44.8
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	55.1
	<5.0 µm	%	PCEI/SOP/LW/021	33.0
	<1.0 µm	%	PCEI/SOP/LW/021	11.9
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.32
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	6.76
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.45
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	3.71
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	12.1
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	21.7
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	12.6
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	10.3

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Report No	: PCEI/TR-LW-1564(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-359(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'50.64"N	**Longitude**	: 80°16'5.02"E
Sampling Name	: **Legacy Waste 7**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	44.2
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	1.03
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	0.86
4	Density	Kg/m^3	PCEI/SOP/LW/014	747
5	Moisture Content	%	IS 10158 (1982) RA 2003	47.2
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1483
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1339
8	Ash Content	%	IS 10158 (1982) RA 2003	39.3
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	34.0
10	C:N Ratio	-	PCEI/SOP/LW/011	33.5
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	68.9
	<5.0 µm	%	PCEI/SOP/LW/021	19.7
	<1.0 µm	%	PCEI/SOP/LW/021	11.4
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.09
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	4.55
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.52
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	1.86
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	13.8
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	15.5
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	11.5
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	9.86

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Report No	: PCEI/TR-LW-1565(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-360(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'52.43"N	**Longitude**	: 80°16'13.32"E
Sampling Name	: **Legacy Waste 8**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	56.5
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	1.32
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	1.10
4	Density	Kg/m^3	PCEI/SOP/LW/014	878
5	Moisture Content	%	IS 10158 (1982) RA 2003	60.3
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1896
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2004	1621
8	Ash Content	%	IS 10158 (1982) RA 2003	50.2
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	43.5
10	C/N Ratio	-	PCEI/SOP/LW/011	42.8
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	48.6
	<5.0 µm	%	PCEI/SOP/LW/021	42.4
	<1.0 µm	%	PCEI/SOP/LW/021	9.0
Heavy Metals				
11	Arsenic	mg/kg	PCEI/SOP/LW/013	0.12
12	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	5.81
13	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.67
14	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	2.38
15	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	17.6
16	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	19.8
17	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	14.7
18	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	12.6

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Report No	: PCEI/TR-LW-1566(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-361(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'49.63"N	**Longitude**	: 80°16'13.06"E
Sampling Name	: **Legacy Waste 9**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	57.1
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	1.33
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	1.11
4	Density	Kg/m^3	PCEI/SOP/LW/014	735
5	Moisture Content	%	IS 10158 (1982) RA 2003	58.6
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1916
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1730
8	Ash Content	%	IS 10158 (1982) RA 2003	50.7
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	45.6
10	C/N Ratio	-	PCEI/SOP/LW/011	42.6
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	52.6
	<5.0 µm	%	PCEI/SOP/LW/021	40.9
	<1.0 µm	%	PCEI/SOP/LW/021	6.5
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.26
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	6.82
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	1.12
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	3.46
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	18.9
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	20.7
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	15.8
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	13.4

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Report No	: PCEI/TR-LW-1567(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-362(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'53.75"N	**Longitude**	: 80°16'0.06"E
Sampling Name	: **Legacy Waste 10**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	61.8
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	1.71
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	1.26
4	Density	Kg/m^3	PCEI/SOP/LW/014	769
5	Moisture Content	%	IS 10158 (1982) RA 2003	62.6
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1928
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1543
8	Ash Content	%	IS 10158 (1982) RA 2003	36.9
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	58.6
10	C/N Ratio	-	PCEI/SOP/LW/011	36.1
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	42.3
	<5.0 µm	%	PCEI/SOP/LW/021	48.1
	<1.0 µm	%	PCEI/SOP/LW/021	9.6
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.31
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	4.56
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.54
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	3.21
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	18.1
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	21.9
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	15.3
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	14.8

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Report No	: PCEI/TR-LW-1589(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-384(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13°08'04.7"N	**Longitude**	: 80°15'58.1"E
Sampling Name	: **Legacy Waste 11**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	50.3
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	1.20
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	1.01
4	Density	Kg/m^3	PCEI/SOP/LW/014	820
5	Moisture Content	%	IS 10158 (1982) RA 2003	49.1
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1850
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1590
8	Ash Content	%	IS 10158 (1982) RA 2003	55.2
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	45.5
10	C/N Ratio	-	PCEI/SOP/LW/011	41.9
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	41.5
	<5.0 µm	%	PCEI/SOP/LW/021	40.1
	<1.0 µm	%	PCEI/SOP/LW/021	7.3
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.15
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	3.55
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.60
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	1.90
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	15.5
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	17.3
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	8.90
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	8.75

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TEST REPORT

Accredited by **NABL** & **NABET**, Certified ISO 9001:2015, ISO 14001:2015 & ISO 45001 : 2018

Report No	: PCEI/TR-LW-1590(1)	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-385(1)-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 5kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13°08'07.6"N	**Longitude**	: 80°16'28.8"E
Sampling Name	: **Legacy Waste 12**		

S.No	Parameters	Units	Test Method	Results
1	Total Organic Carbon	%	PCEI/SOP/LW/016	35.2
2	Total Kjeldahl Nitrogen	%	IS 10158 (1982) RA 2003	0.78
3	Ammonical Nitrogen	%	IS 10158 (1982) RA 2003	0.70
4	Density	Kg/m^3	PCEI/SOP/LW/014	700
5	Moisture Content	%	IS 10158 (1982) RA 2003	47.5
6	Gross Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1790
7	Net Calorific Value	Kcal/Kg	IS 10158 (1982) RA 2003	1620
8	Ash Content	%	IS 10158 (1982) RA 2003	42.9
9	Volatile Organic Matter	%	IS 10158 (1982) RA 2004	50.2
10	C/N Ratio	-	PCEI/SOP/LW/011	45.13
Microplastics				
11	<10 µm	%	PCEI/SOP/LW/021	40.7
	<5.0 µm	%	PCEI/SOP/LW/021	16.9
	<1.0 µm	%	PCEI/SOP/LW/021	5.8
Heavy Metals				
12	Arsenic	mg/kg	PCEI/SOP/LW/013	0.25
13	Lead(as Pb)	mg/kg	PCEI/SOP/LW/013	5.40
14	Cadmium(as Cd)	mg/kg	PCEI/SOP/LW/013	0.20
15	Nickel(as Ni)	mg/kg	PCEI/SOP/LW/013	0.90
16	Chromium(as Cr)	mg/kg	PCEI/SOP/LW/013	18.2
17	Mercury(as Hg)	mg/kg	PCEI/SOP/LW/013	16.4
18	Copper(as Cu)	mg/kg	PCEI/SOP/LW/013	10.20
19	Zinc(as Zn)	mg/kg	PCEI/SOP/LW/013	9.60

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Report No	: PCEI/TR-LW-1527	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-322-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 19.995kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'14.27"N	**Longitude**	: 80°16'5.50"E
Sampling Name	: **Legacy Waste 1**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	10.96	54.79
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	5.56	27.81
4	Glass	PCEI/SOP/LW/001	0.04	0.20
5	Cloths and rags	PCEI/SOP/LW/001	1.78	8.90
6	Metal	PCEI/SOP/LW/001	0.04	0.18
7	Leather/Rubber	PCEI/SOP/LW/001	0.63	3.13
8	Wood	PCEI/SOP/LW/001	0.46	2.28
9	Stones	PCEI/SOP/LW/001	0.55	2.73
10	Inerts	PCEI/SOP/LW/001	0.00	0.00
		Total	**19.995**	**100.0**

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Report No	: PCEI/TR-LW-1528	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-323-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 20kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'15.77"N	**Longitude**	: 80°15'59.44"E
Sampling Name	: **Legacy Waste 2**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	7.80	39.01
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	6.12	30.61
4	Glass	PCEI/SOP/LW/001	0.04	0.20
5	Cloths and rags	PCEI/SOP/LW/001	2.70	13.50
6	Metal	PCEI/SOP/LW/001	0.00	0.00
7	Leather/Rubber	PCEI/SOP/LW/001	0.43	2.15
8	Wood	PCEI/SOP/LW/001	2.16	10.80
9	Stones	PCEI/SOP/LW/001	0.75	3.75
10	Inerts	PCEI/SOP/LW/001	0.00	0.00
		Total	**20.0**	**100.0**

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Report No	: PCEI/TR-LW-1529	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-324-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 26.4kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'5.45"N	**Longitude**	: 80°16'7.52"E
Sampling Name	: **Legacy Waste 3**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	9.15	34.65
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	5.80	21.96
4	Glass	PCEI/SOP/LW/001	0.17	0.64
5	Cloths and rags	PCEI/SOP/LW/001	1.25	4.73
6	Metal	PCEI/SOP/LW/001	0.00	0.00
7	Leather/Rubber	PCEI/SOP/LW/001	0.63	2.39
8	Wood	PCEI/SOP/LW/001	1.81	6.86
9	Stones	PCEI/SOP/LW/001	1.50	5.68
10	Inerts	PCEI/SOP/LW/001	6.10	23.11
		Total	**26.4**	**100.0**

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Report No	: PCEI/TR-LW-1530	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-325-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 15.47kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'3.45"N	**Longitude**	: 80°15'56.88"E
Sampling Name	: **Legacy Waste 4**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	5.23	33.81
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	4.79	30.96
4	Glass	PCEI/SOP/LW/001	0.05	0.32
5	Cloths and rags	PCEI/SOP/LW/001	1.73	11.18
6	Metal	PCEI/SOP/LW/001	0.00	0.00
7	Leather/Rubber	PCEI/SOP/LW/001	0.25	1.62
8	Wood	PCEI/SOP/LW/001	0.00	0.00
9	Stones	PCEI/SOP/LW/001	0.76	4.91
10	Inerts	PCEI/SOP/LW/001	2.66	17.19
		Total	**15.47**	**100.0**

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Report No	: PCEI/TR-LW-1531	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 19.03.2022	**Sample Reference No**	: PCEI/LW-326-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 20.03.2022
Qty of Sample Received	: 12.30kg	**Test Commenced On**	: 20.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'1.52"N	**Longitude**	: 80°15'47.08"E
Sampling Name	: **Legacy Waste 5**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	5.20	42.28
2	C&D Waste	PCEI/SOP/LW/001	2.53	20.57
3	Plastics	PCEI/SOP/LW/001	1.61	13.09
4	Glass	PCEI/SOP/LW/001	0.05	0.41
5	Cloths and rags	PCEI/SOP/LW/001	0.56	4.55
6	Metal	PCEI/SOP/LW/001	0.05	0.41
7	Leather/Rubber	PCEI/SOP/LW/001	0.00	0.00
8	Wood	PCEI/SOP/LW/001	0.00	0.00
9	Stones	PCEI/SOP/LW/001	0.50	4.07
10	Inerts	PCEI/SOP/LW/001	1.80	14.63
		Total	**12.30**	**100.0**

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Report No	: PCEI/TR-LW-1563	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-358-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 19.33kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 8'13.16"N	**Longitude**	: 80°16'21.10"E
Sampling Name	: **Legacy Waste 6**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	0.00	0.00
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	8.80	45.53
4	Glass	PCEI/SOP/LW/001	0.40	2.07
5	Cloths and rags	PCEI/SOP/LW/001	3.02	15.62
6	Metal	PCEI/SOP/LW/001	0.75	3.88
7	Leather/Rubber	PCEI/SOP/LW/001	0.51	2.64
8	Wood	PCEI/SOP/LW/001	0.45	2.33
9	Stones	PCEI/SOP/LW/001	1.33	6.88
10	Inerts	PCEI/SOP/LW/001	4.07	21.06
		Total	**19.33**	**100.0**

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Report No	: PCEI/TR-LW-1564	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-359-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 19.68kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'50.64"N	**Longitude**	: 80°16'5.02"E
Sampling Name	: **Legacy Waste 7**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	15.35	78.00
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	1.29	6.55
4	Glass	PCEI/SOP/LW/001	0.00	0.00
5	Cloths and rags	PCEI/SOP/LW/001	1.40	7.11
6	Metal	PCEI/SOP/LW/001	0.00	0.00
7	Leather/Rubber	PCEI/SOP/LW/001	0.17	0.86
8	Wood	PCEI/SOP/LW/001	0.23	1.17
9	Stones	PCEI/SOP/LW/001	0.00	0.00
10	Inerts	PCEI/SOP/LW/001	1.24	6.30
		Total	**19.68**	**100.0**

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Report No	: PCEI/TR-LW-1565	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-360-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 16.68kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'52.43"N	**Longitude**	: 80°16'13.32"E
Sampling Name	: **Legacy Waste 8**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
	Physical Parameters			
1	Bio-earth/soil	PCEI/SOP/LW/001	2.82	16.91
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	5.88	35.25
4	Glass	PCEI/SOP/LW/001	0.17	1.02
5	Cloths and rags	PCEI/SOP/LW/001	1.57	9.41
6	Metal	PCEI/SOP/LW/001	1.76	10.55
7	Leather/Rubber	PCEI/SOP/LW/001	0.19	1.14
8	Wood	PCEI/SOP/LW/001	0.96	5.76
9	Stones	PCEI/SOP/LW/001	1.36	8.15
10	Inerts	PCEI/SOP/LW/001	1.97	11.81
		Total	**16.68**	**100.0**

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TEST REPORT

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Report No	: PCEI/TR-LW-1566	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-361-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 20.79kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'49.63"N	**Longitude**	: 80°16'13.06"E
Sampling Name	: **Legacy Waste 9**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	16.92	81.39
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	1.25	6.01
4	Glass	PCEI/SOP/LW/001	0.05	0.24
5	Cloths and rags	PCEI/SOP/LW/001	0.56	2.69
6	Metal	PCEI/SOP/LW/001	0.00	0.00
7	Leather/Rubber	PCEI/SOP/LW/001	0.17	0.82
8	Wood	PCEI/SOP/LW/001	0.62	2.98
9	Stones	PCEI/SOP/LW/001	0.00	0.00
10	Inerts	PCEI/SOP/LW/001	1.22	5.87
		Total	**20.79**	**100.0**

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Report No	: PCEI/TR-LW-1567	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-362-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 15.9kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13° 7'53.75"N	**Longitude**	: 80°16'0.06"E
Sampling Name	: **Legacy Waste 10**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	1.30	8.16
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	7.53	47.27
4	Glass	PCEI/SOP/LW/001	0.13	0.82
5	Cloths and rags	PCEI/SOP/LW/001	0.95	5.96
6	Metal	PCEI/SOP/LW/001	0.46	2.89
7	Leather/Rubber	PCEI/SOP/LW/001	1.05	6.59
8	Wood	PCEI/SOP/LW/001	1.41	8.85
9	Stones	PCEI/SOP/LW/001	1.15	7.22
10	Inerts	PCEI/SOP/LW/001	1.95	12.24
		Total	**15.9**	**100.0**

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Report No	: PCEI/TR-LW-1589	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-384-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 20Kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13°08'04.7"N	**Longitude**	: 80°15'58.1"E
Sampling Name	: **Legacy Waste 11**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	8.70	43.50
2	C&D Waste	PCEI/SOP/LW/001	1.20	6.00
3	Plastics	PCEI/SOP/LW/001	6.15	30.75
4	Glass	PCEI/SOP/LW/001	0.00	0.00
5	Cloths and rags	PCEI/SOP/LW/001	0.45	2.25
6	Metal	PCEI/SOP/LW/001	0.20	1.00
7	Leather/Rubber	PCEI/SOP/LW/001	0.30	1.50
8	Wood	PCEI/SOP/LW/001	1.20	6.00
9	Stones	PCEI/SOP/LW/001	0.00	0.00
10	Inerts	PCEI/SOP/LW/001	1.80	9.00
		Total	**20**	**100**

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Report No	: PCEI/TR-LW-1590	**Report Date**	: 06.04.2022
Issued to	: **M/s Pollucare Engineers India Private Limited** Kodungaiyur Dumpyard Road, Block A, Kodungaiyur Landfill Site, Kodungaiyur, Chennai, Tamil Nadu 600118.		
Sampled by	: Laboratory		
Sample Collected Date	: 21.03.2022	**Sample Reference No**	: PCEI/LW-385-03-22
Sample Description	: **Solid Waste**	**Sample Received On**	: 22.03.2022
Qty of Sample Received	: 19.85kg	**Test Commenced On**	: 22.03.2022
Sample Condition	: Fit for Analysis	**Test Completed On**	: 06.04.2022
Latitude	: 13°08'07.6"N	**Longitude**	: 80°16'28.8"E
Sampling Name	: **Legacy Waste 12**		

S.No	Parameters	Test Method	Weight in Kg	% Composition
Physical Parameters				
1	Bio-earth/soil	PCEI/SOP/LW/001	6.90	34.76
2	C&D Waste	PCEI/SOP/LW/001	0.00	0.00
3	Plastics	PCEI/SOP/LW/001	5.20	26.20
4	Glass	PCEI/SOP/LW/001	0.20	1.01
5	Cloths and rags	PCEI/SOP/LW/001	2.50	12.59
6	Metal	PCEI/SOP/LW/001	0.65	3.27
7	Leather/Rubber	PCEI/SOP/LW/001	0.90	4.53
8	Wood	PCEI/SOP/LW/001	0.20	1.01
9	Stones	PCEI/SOP/LW/001	1.10	5.54
10	Inerts	PCEI/SOP/LW/001	2.20	11.08
		Total	**19.85**	**100.0**

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Annexure 15: Geo Technical Analysis Report of Kodungaiyur Site

GEOTECHNICAL SITE ASSESSMENT AT

KODUNGAIYUR DUMPSITE

20 April 2022

Prepared for

Pollucare Engineers India Pvt Ltd

Ayapakkam, Chennai,

Tamil Nadu 600077

By

STRATUS
ENVIRONMENTAL PVT, LTD

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DRAFT

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20 April 2022
Project No. 400-001-101

XXXX XXXX
Pollucare Engineers Private Limited
Chennai-600077, Tamil Nadu

Subject: **Advancement of Geotechnical Boring at Kodungaiyur Dumpsite, Chennai, Tamil Nadu**

Respected Sir,

Stratus Environmental (Stratus) has prepared this report to present findings during the advancement of geotechnical borings at the Kodungaiyur dumpsite. This report contains details associated with boring advancement, measurement of landfill gas and our observations og site geology and hydrogeology. It includes results of the geological site investigation, conclusions & recommendations.

If you have any questions regarding this report, please contact by telephone at +91-8072843347 or by email at vinothr@stratusinc.net

Submitted

Vinoth Ramachandran

Project Manager

DRAFT

INTRODUCTION

This report presents the procedures adopted and the results of a advancement of soil borings of Kodungaiyur Dumpsite, Chennai, Tamil Nadu. This study was performed for Pollucare Engineers India Pvt Ltd, in accordance with the work order (**PEIPL/GCC-DS/22-23/103**) dated 25th February 2022.

The scope of work included:

- Advancement of **10** bore holes and logging of soil.
- Conducted Standard Penetration Test with standard (SPT) equipment
- Boreholes were Advanced until hard rocky strata was encountered (equipment refusal). During the advancement of borehole stratus recorded soil lithology and depth to groundwater.
- Once rocky strata was encountered a diamond core drill bit was used to collect a rock core sample.
- Collection of soil samples from borehole
- Collection of one groundwater sample from borehole.
- Forwarded water, soil and rock core samples to laboratory for the analysis.

The location of the ten (10) soil test borings are shown in figure 1, site plan. The purpose of the investigation was to determine geotechnical properties of the subsoils present throughout the site. In addition, methane gas emission was monitored one location with proprietary soil gas measuring equipment.

BACKGROUND

The current landfill site lies at 13°8'5.13" N and 80°16'10.33" E. The total area of the site is approximately 300 acres that is being used for dumping municipal solid waste. The Kodungaiyur waste dumpsite is located west of the community of Old Washermanpet, east of the community of Raghavan nagar, north of the community of Susila nagar and Ezhil nagar and south of the community of Salai ma nagar and CPCL Refinery, Chennai District.

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Figure - Map showing Kodungaiyur Dumpsite/Landfill site

SCOPE OF WORK COMPLETED

Ten soil borings were advanced at locations shown in figure 1. The coordinates of the borehole locations are presented below:

Table 1. Coordinates of the borings and Total depth of drilled

S.NO.	Latitude and Longitude		Total Depth of Drilling (m)
BH-1	N 13.134224°	E 80.265613°	34.4
BH-2	N 13.137437°	E 80.266705°	39.4
BH-3	N 13.138760°	E 80.266181°	25.5
BH-4	N 13.137056°	E 80.268096°	25.2
BH-5	N 13.136298°	E 80.268715°	26.5
BH-6	N 13.135696°	E 80.269426°	26.5
BH-7	N 13.136489°	E 80.272569°	25.5
BH-8	N 13.135763°	E 80.274640°	27.0
BH-9	N 13.130405°	E 80.267734°	25.5
BH-10	N 13.130531°	E 80.270423°	25.5

Work began on 1st March 2022, with site visits and advancement of soil borings was initiated on 13th March 2022. A mobile mud rotary rig equipped with a soil recovery tool and SPT equipment was used to advance the borings. Drilling was initiated by creating a trial pit measuring 5feet by

5feet to a depth of 5 feet. A 12 inch diameter steel casing was placed in the trial pit to prevent sloughing of trash and to enable drilling within the steel casing. Soil samples were collected every 1.5 meters using a sampler (457-610 mm in long and 35-51 mm diameter).

Split Spoon Sample and Soil Sample Collection

A diamond drill bit was used to advance the boring within the bedrock to collect a rock core sample. Sampled collected from each borings were forwarded to the laboratory (Pollucare) with sample identification details. Given the drilling methods and site conditions, the SPT tests were performed when viable. A 10 feet long steel pipe was attached to the soil sampler and was used to conduct the SPT tests by driving the pipe using a 65-kilogram hammer. The blow counts and the depth of penetration were recorded. Sample descriptions, results of field testing, and observations of all site conditions during drilling were recorded on the field soil boring logs and data sheets. Copies of final boring logs are included in Appendix A. A total of 89 soil samples, 10 rock core samples and 10 groundwater samples were collected and forwarded to laboratory.

Boring BH-1 was advanced on 13th March 2022 to a total depth of 34.4 meters. At this boring, flowing trash were encountered to a depth of 12.4 meters. The 12-inch diameter steel casing was advanced to the depth of 12.4 meters. Advancement of the soil boring was continued within the steel casing. SPT tests were conducted at depths of 13.45, 15.4, 17.35, 19.3, 21.25, and 23.2 meters below ground surface (bgs) and blow counts of 13, 15, 23, 19, 40 and 39 were recorded, respectively. At 31 m bgs weathered bedrock was encountered and a rock core sample was collected between 33.4 and 34.4 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-2 was advanced on 15th March 2022 to a total depth of 39.4 meters. Similar to boring BH-1, top 7 meters of the boring encountered with trash and a steel casing was advanced to the depth of 7 meters. SPT tests were conducted at 7.15, 9.1, 11.05, 14.95, 16.9, 18.85, 20.8, 220.75,

24.70 and 26.65 meters bgs and blow counts of 18, 15, 14, 18, 20, 23, 20, 29, 34, 37 and 39 were recorded, respectively. A rock fragments were encountered at a depth of 32.95 meters and a rock core sample was collected from 37.9 to 39.4 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-3 was advanced on 18th March 2022 to a total depth of 25.5 meters. SPT testing was not conducted in this boring up to a depth of 11 meters below surface because of the flowing trash condition. A metal casing was set to a depth of 11 meters. SPT was conducted at 12, 13.5, 15, 16.5, 18 and 19.5 meters below surface and blow counts of 29, 32, 29, 29, 37 and 33 were recorded, respectively. The weathered rock fragments were encountered at a depth of 23.5 meters and a rock core sample collected from 24 to 25.5 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-4 was advanced on 19th March 2022, to a total depth of 25.2 meters. SPT test was not conducted in this boring up to a depth of 10.5 meters below surface. SPT was conducted at 11.25, 12.75, 14.25, 15.75 and 17.25 meters bgs and blow counts of 28, 32, 32, 33 and 33 were recorded, respectively. The weathered rock fragments were encountered at a depth of 21.75 meters and a rock core sample was collected at 23.7 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-5 was advanced on 20th March 2022, to a total depth of 26.5 meters. SPT test was not conducted in this boring up to a depth of 13.7 meters below surface. SPT was conducted at 15, 16.5, 18 and 19.5 meters bgs and blow counts of 59, 47. 31 and 21 were recorded, respectively. The weathered rock fragments were encountered at a depth of 24 meters and a rock core sample was collected at 25 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-6 was advanced on 22nd March 2022, to a total depth of 26.5 meters. SPT test was not conducted in this boring up to a depth of 13.9 meters below surface. SPT was conducted at 15, and 16.5 meters bgs and blow counts of 60 and 46 were recorded, respectively. The weathered rock fragments were encountered at a depth of 24 meters and a rock core sample was collected at 25 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-7 was advanced on 23rd March 2022, to a total depth of 25.5 meters. SPT test was not conducted in this boring up to a depth of 7.2 meters below surface. SPT was conducted at 7.5, 9, 10.5, 12 and 13.5 meters bgs and blow counts of 6, 7, 8, 11 and 24 were recorded, respectively. The weathered rock fragments were encountered at a depth of 22.5 meters and a rock core sample was collected at 24 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-8 was advanced on 25th March 2022, to a total depth of 27 meters. SPT test was not conducted in this boring up to a depth of 14.4 meters bgs. SPT was conducted at 15 meters below surface and blow counts of 51 were recorded, respectively. SPT were conducted in the below depth

and the resist values were more than 60 count. Samples were not recovered at few depths. The weathered rock fragments were encountered at a depth of 24 meters and a rock core sample was collected at 25.5 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-9 was advanced on 27th March 2022, to a total depth of 25.5 meters. SPT test was not conducted in this boring up to a depth of 13.5 meters below surface. SPT was conducted at 15 and 16.5 meters below surface and blow counts of 35 and 39 were recorded, respectively. SPT were conducted in the below depth and the resist values were more than 60 count. Samples were not recovered at few depths. The weathered rock fragments were encountered at a depth of 22.5 meters and a rock core sample was collected at 24 meters bgs. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Boring BH-10 was advanced on 29th March 2022, to a total depth of 25.5 meters. SPT test was not conducted in this boring up to a depth of 12.9 meters below surface. SPT was conducted at 13.5 and 15 meters below surface and blow counts of 18 and 19 were recorded, respectively. SPT were conducted in the below depth and the resist values were more than 60 count. Samples were not recovered at few depths. The weathered rock fragments were encountered at a depth of 22.5 meters and a rock core sample was collected at 24 meters. Upon completion of borings static groundwater elevation within the boring was measured and water sample was collected.

Standard Penetration Test

Standard penetration tests were carried out at every 1.5 m intervals and/or all field works were generally carried out in accordance with "BS 5930:2015. N is the number of blows required to effect a 300mm penetration below the seating drive. The seating drive shall be the first 150mm or 25 blows whichever is reached first. The sum of the blow (Trip Hammer) required for driving the last two 150mm intervals is referred as the Standard penetration Resistance or the N values. The values of N obtained in this investigation are recorded in borehole logs attached in the **Appendices.**

Borehole Termination Criteria

Boreholes were terminated as instructed by the Client. All boreholes were backfilled by using cement bentonite grout once the borehole field works completed (Cement: Water = 3 : 4 – by weight). Trial pit will be backfilled with compacted soil and the borehole location will be restored as its original condition.

SITE GEOLOGY

At all locations, the borings were advanced, trash was encountered to a depth ranging between 7 to 14.4 meters below surface. In general, below the trash the first encountered soil was clay with trace sand, and the thickness varied between 2.5 to 8.4 meters. Below the clay strata well graded

to poorly graded sand was encountered in varying thickness from 4.5 to 17.55 meters. Below the sand formation, bedrock, starting with weathered material was observed. The shallow clayey soil was damp to moist, and the site geologists were not sure if the dampness was due to leachate or groundwater. Static water level in the borings was observed to be between 7 to 15 meters below surface. Stratus prepared a geologic cross section to illustrate the site geology (see figure 2 & 3).

SITE HYDROGEOLOGY

Groundwater levels are measured at all the drilling locations. Water samples were collected in laboratory delivered water sample bottles. Recorded water levels were corrected with mean sea level elevation and used to create a flow direction map of the site (see Figure – 4). Groundwater flow was appears to be in all directions. It appears to be water flow from a mount. Water has been pulled from the center to all directions surrounded to the dumpsite. It could be due to pumping of water from the adjacent residential wells as well as the natural flow towards the sea.

Table 2: Groundwater Level Data

Well ID	Water Level(M)	Total depth of well (M)	Corrected Water Level (M)
L-1	17.35	34.4	8.35
L-2	16.9	39.4	10.9
L-3	18	25.5	15
L-4	15.75	25.2	7.75
L-5	18	26.5	7
L-6	18	26.5	7
L-7	15	25.5	9
L-8	18	27	14
L-9	18	25.5	15
L-10	16.5	25.5	4.5

LANDFILL GAS MONITORING

Stratus conducted a survey of landfill gas based on a request by Pollucare at different locations in Kodungaiyur dump. Given that there were no landfill gas wells within the dumpsite, Stratus advanced proprietary landfill gas collection probes to measure methane gas. A multi gas analyzer was used to record methane concentrations. Methane concentrations are also reported in the table below. Also a Photo ionization detector (PID) was used to measure the VOC's at the same locations. All measured concentrations are tabulated and illustrated in figure 5.

Table 3: Location of the Methane gas Sampling and measured concentrations

Sl.No	Date	Location	Latitude and longitude	Methane concentration (ppm)
1	21/04/2022	Location 1	13.137369°, 80.267244°	1100
2	21/04/2022	Location 2	13.136655°, 80.265870°	50250
3	21/04/2022	Location 3	13.134716°, 80.264389°	24250
4	21/04/2022	Location 4	13.134625°, 80.265911°	5100
5	21/04/2022	Location 5	13.135016°, 80.270340°	24750
6	21/04/2022	Location 6	13.135815°, 80.272759°	5400
7	21/04/2022	Location 7	13.131125°, 80.267789°	0
8	21/04/2022	Location 8	13.136667°, 80.273333°	7150
9	21/04/2022	Location 9	13.135630°, 80.269349°	23000
10	21/04/2022	Location 10	13.136856°, 80.268443°	5150

Figure - Location of the Methane gas Sampling

Findings

Based on the site investigations, Stratus observed that trash was encountered to a depth ranging between 7 and 14.4 meters below surface. Below the trash clay with trace sand, well graded to poorly graded sand was encountered in varying thickness from 4.5 to 17.55 meters. Below the sand formation, bedrock, starting with weathered material was observed. Static water level in the

borings was observed to be between 7 and 15 meters below surface. Groundwater flow appears to be in all directions from a mound in boring L10. Methane in the dedicated landfill gas measurement probes was in the range of 1100 to 50250 ppm and VOCs were in the range of 0.95 and 65.15ppm. SPT results in the clayey formation was in the range of 13 to 60 and in the sandy formation in the range of 20 to 36.

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LIMITATIONS:

This document was prepared in general accordance with accepted standards of care that existed at the time this work was performed. No other warranty, expressed or implied, is made. Conclusions and recommendations are based on field observations and data obtained from this work and previous investigations. It should be emphasized that evaluation of geologic conditions has not been exhaustive and hence judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the subsurface conditions. More extensive studies may be performed to reduce uncertainties. This document is solely for the use and information of our client unless otherwise noted.

Sincerely,

Stratus Environmental Inc.

Vinoth Ramachandran
Project Manager

Senthil Kumar,
Project Geologist

Figure 1	Siteplan Mentioning the Boreholes Locations
Figure 2	Kodungaiyur Dump Site Geologic Cross-sections A-A’
Figure 3	Kodungaiyur Dump Site Geologic Cross-sections B-B’
Figure 4	Groundwater Flow Direction Map
Figure 5	Location of the Methane gas Sampling with Measured values
Table 1	Borehole Locations
Table 2	Groundwater Level Data
Table 3	Location of the Methane sampling and measured concentration
Appendix A	Boring Logs and RQD values
Appendix B	Sample Details - COC (Chain of Custody)
Appendix C	Field Photographs

DRAFT

LEGEND

L-1 BHOREHOLE LOCATION

A—A' Cross section line

B—B' Cross section line

STRATUS ENVIRONMENTAL, INC.

PATH NAME: KODUNGAIYUR DUMP SITE

DRAFTER INITIALS: Senthilkumar S

DATE LAST REVISED: MAY 27, 2022

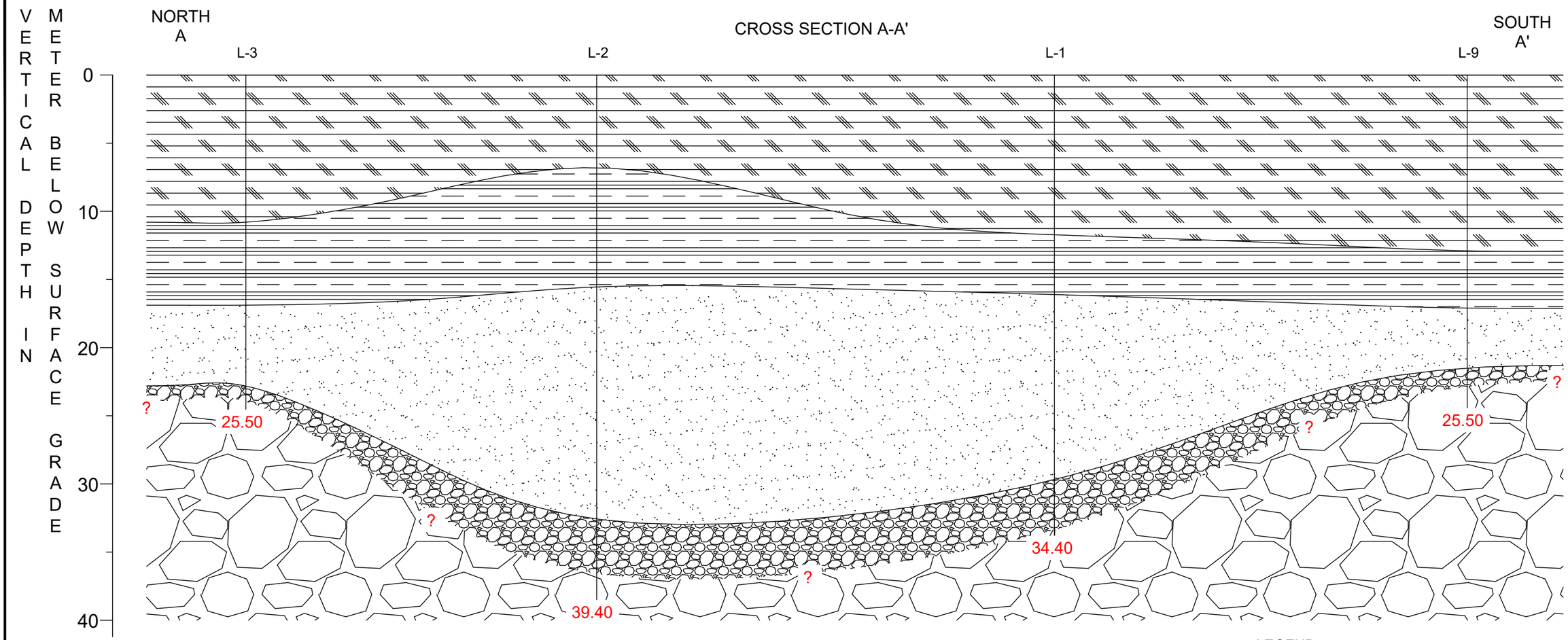
FILENAME: KODUNGAIYUR DUMP SITE MAP

NOT TO SCALE

KODUNGAIYUR DUMP SITE
CHENNAI

SITE MAP

FIGURE
1



LEGEND

- LAND FILL (Trash)
- CLAY
- SAND (POORLY & WELL GRADED SAND WITH SILT)
- WEATHERD ROCK
- BEDROCK

Location L-1

Note: Distance between locations not uniform on site

Elevation of locations are assumed zero (not to match with MSL)

STRATUS ENVIRONMENTAL, INC.

PATH NAME: KODUNGAIYUR
DRAFTER INITIALS: SENTHILKUMAR S
DATE LAST REVISED: APRIL 28, 2022
FILENAME: KODUNGAIYUR DUMP SITE CROSS SEC A-A'

NOT TO SCALE

KODUNGAIYUR DUMP SITE

CROSS SECTION A - A'

FIGURE
2

EAST
B

CROSS SECTION B-B'

WEST
B'

L-8 L-7 L-6 L-5 L-4 L-2

VERTICAL DEPTH IN METER BELOW SURFACE GRADE

0
10
20
30
40

?
?
?
?
?
?
?

27.00
25.50
26.50
26.50
25.20
39.40

LEGEND

- LAND FILL (Trash)
- CLAY
- SAND (POORLY & WELL GRADED SAND WITH SILT)
- WEATHERD ROCK
- BEDROCK

Location L-1

Note: Distance between locations not uniform on site
Elevation of locations are assumed zero (not to match with MSL)

STRATUS ENVIRONMENTAL, INC.

PATH NAME: KODUNGAIYUR
DRAFTER INITIALS: SENTHILKUMAR S
DATE LAST REVISED: APRIL 28, 2022
FILENAME: KODUNGAIYUR DUMP SITE CROSS SEC B-B'

NOT TO SCALE

KODUNGAIYUR DUMP SITE

CROSS SECTION B - B'

FIGURE
3

STRATUS ENVIRONMENTAL, INC.

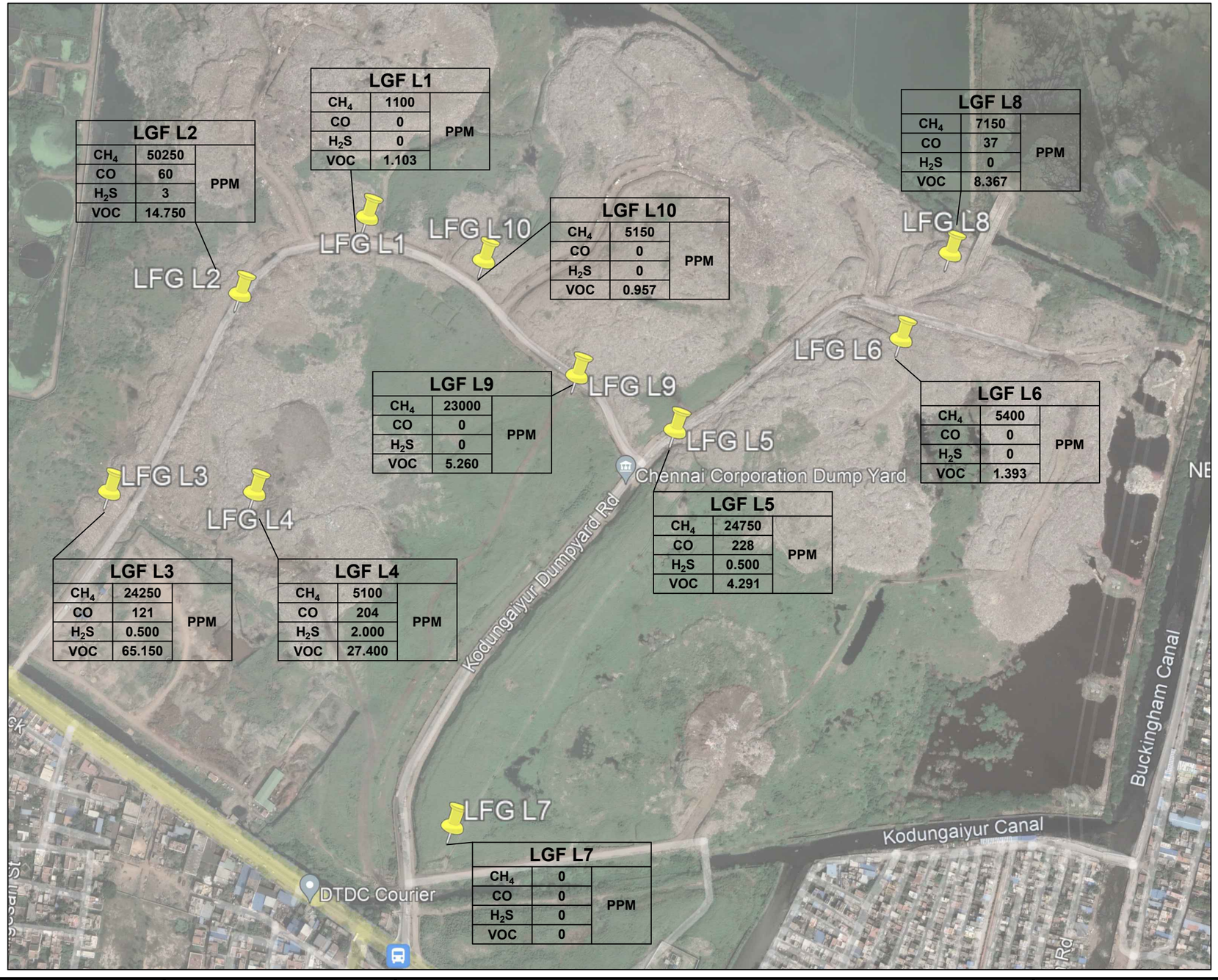
PATH NAME: KODUNGAIYUR DUMP SITE
DRAFTER INITIALS: SENTHILKUMAR S
DATE LAST REVISED: MAY 27, 2022
FILENAME: KODUNGAIYUR GW FLOW DIRECTION

NOT TO SCALE

KODUNGAIYUR DUMP SITE
CHENNAI

GROUNDWATER FLOW DIRECTION

FIGURE
4



LEGEND

LFG L1 METHANE CONCENTRATION MEASURED LOCATION

STRATUS ENVIRONMENTAL, INC.

PATH NAME: KODUNGAIYUR DUMP SITE
DRAFTER INITIALS: SENTHILKUMAR S
DATE LAST REVISED: APRIL 21, 2022
FILENAME: METHANE CONCENTRATION MAP

NOT TO SCALE

KODUNGAIYUR DUMP SITE
CHENNAI

METHANE CONCENTRATION MAP

FIGURE
5

Field location of boring:Kodungaiyur dump site Latitude: Longitude: **L-1**								Project No.: 101			Date:13/03/22			Boring No.: L-1		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 1		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split Spoon Sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:						Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				0												
				1												
				2												
				3												
				4												
				5												
				6												
				7												
				8												
				9												
				10												
				11												
				12		12.40m		0m to 12.40m completely landfill waste material								
				13												
						13.45m										
	(4,4,5)	SPT1	Soil	14		13.90m	CL	Clay with silt (2.5y,3/1) very dark grey, 90% clay, 10% silt. Wet								
				15		15..40m										
	(4,5,6)	SPT2	Soil			15.85m	CL	SAA								
				16												
				17		17.35m	SP	Poorly graded sand (2.5y,4/1) dark grey, Saturated, 90%								
	(6,8,9)	SPT3	Soil			17.80m		medium sand, 10% fine sand.								
				18												
				19		19.30m	SP	SAA								
	8	SPT4	Soil			19.75m										
				20												

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-1**								Project No.: 101			Date:13/03/22			Boring No.: L-1		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 2		
								Logged by:						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:						Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:		5		
				20												
				21		21.25m										
	(11,12,17	SPT5	Soil			21.70m	SP	SAA								
				22												
				23		23.20m										
	(12,13,14	SPT6	Soil			23.65m	SP	SAA								
				24												
				25		25.15m	SW	Well graded sand (2.5Y 4/2) Olive gray, Saturated, 20%								
			Soil			25.60m		coarse sand, 50% medium sand, 30% fine sand.								
				26												
				27		27.10m	SW	SAA								
			Soil			27.55m										
				28												
				29		29.05m										
			Soil			29.50m	SW	SAA								
				30												
				31		31.00m										
			WR			31.45m	WR	Weathered rock - Well graded Gravel with rock pieces								
				32												
						32.95m										
			WR	33		33.40m	WR	Weathered - Well graded Gravel with rock pieces								
		CORE	Rock	34		34.40m	ROCK	Driller suspect Hard rock started and collect core sample with the								
								length of 1 m and sample recovery was 0.5 m								
				35												
				36												
				37												
				38												
				39												
				40												

Remarks/notes: Total depth of the borehole was 34.40m, Rock Core sample collected from 33.40m to 34.40m, Core sample recovery is 0.50m.
Soil sample collected every 1.5m distance. Water sample were collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site Latitude: Longitude: **L-2**								Project No.:101			Date:15/03/22		Boring No.: L-2	
								Client: Pollucare						
								Location: Kodungaiyur dump yard						
								City: Chennai					Page 1	
								Logged by: G.Siva					of 2	
								Well Casing material:			Casing length (ft):			
								Well Casing diameter (in):			Slotted interval (ft):			
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):			
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:					Bags	
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):		
								Time:				Cement:		
								Date:				Bentonite:		
				0										
				1										
				2										
				3										
				4										
				5										
				6										
				7		7.00m		0m to 7 m landfill waste material						
	(8,4,6)	SPT1	Soil			7.15m	CL	Clay with silt (2.5Y 3/1) very dark grey, 90% clay, 10% silt, Wet.						
				8		7.60m								
				9										
	(4,5,6)	SPT2	Soil			9.10m	CL	SAA						
				10		9.55m								
				11										
	(5,4,5)	SPT3	Soil			11.05m	CL	SAA						
				12		11.50m								
	(6,5,7)		Soil	13		13.00m	CL	Clay (2.5Y 3/1) very dark grey, 100 % clay, Wet.						
						13.45m								
				14										
	(6,6,8)	SPT4	Soil	15		14.95m	CL	SAA						
						15.40m								
				16										
	(8,7,8)	SPT5	Soil	17		16.90m	SP	Poorly graded sand (2.5Y 4/1) dark grey, saturated, 80% medium sand,						
						17.35m		20% fine sand.						
				18										
	(7,8,5)	SPT6	Soil	19		18.85m	SP	SAA						
						19.30m								
				20										

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-2**								Project No.:101			Date:15/03/22			Boring No.: L-2		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 2		
								Logged by:						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:						Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				20												
	(9,9,11)	SPT7	Soil	21		20.80m	SP	Poorly graded sand (2.5,5/1) grey, saturated, 90 % medium sand								
						21.25m		10% fine sand.								
				22												
	(11,11,12)	SPT8	Soil	23		22.75m	SP	SAA								
						23.20m										
				24												
	(11,12,14)	SPT9	Soil	25		24.70m	SP	SAA								
						25.15m										
				26												
	(12,13,14)	SPT10	Soil	27		26.65m	SP	SAA								
						27.10m										
				28												
			Soil	29		28.60m	SW	Well graded sand (2.5Y 5/2) greyish brown, saturated, 30% coarse								
						29.05m		sand, 40% medium sand, 30% fine sand.								
				30												
			Soil	31		30.55m	SW	SAA								
						31.00m										
				32												
			Soil			32.50m	SW	SAA								
				33		32.95m										
				34												
			Rock			34.45m	WR	Weathered rock - Well graded Gravel with rock pieces								
				35		34.90m										
			Rock	36		35.95m	WR	Weathered rock - Well graded Gravel with rock pieces								
						36.40m										
				37												
			Rock	38		37.90m	Rock	Driller suspect Hard rock started and collected core sample with the								
						39.40m		length of 1.5 m and sample recovery was 0.75 m								
				39												
				40												

Remarks/notes Total depth of the borehole is 39.40m, Rock Core sample collected from 37.90m to 39.40m, Core sample recovery is 0.75m.
Soil sample collected at every 1.5m. Water sample collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site	Project No.:101	Date:18/03/22	Boring No.:
Latitude:	Client: Pollucare		L-3
Longitude:	Location: Kodungaiyur dump yard		
L-3	City: Chennai		Page 1
	Logged by: G.Siva		of 2
	Well Casing material:	Casing length (ft):	
	Well Casing diameter (in):	Slotted interval (ft):	
Drilling method: Rotary drilling	Sampling tool: Split spoon sampler	Slot size:	Sand interval (ft):
Borehole dia. (in): 6 inch	Drill rig: SPT rig	Drilling company/Driller:	Bags

DTW (ft):				Sand (type):	
Time:				Cement:	
Date:				Bentonite:	

Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	
				0				
				1				
				2				
				3				
				4				
				5				
				6				
				7				
				8				
				9				
				10				
				11		11m		0m to 11m landfill waste material.
	(8,10,11)	SPT1	Soil	12		12.00m	CL	Clay with silt (5Y 2.5/1) black, 90% full of clay, 10% of Silt, Wet.
						12.45m		
				13		13.50m		
	(10,11,11	SPT2	Soil			13.95m	CL	Clay (5y,2.5/1) black, 100% full of clay, Wet.
				14				
	(9,9,11)	SPT3	Soil	15		15.00m	CL	SAA
						15.45m		
				16				
	(9,10,11)	SPT4	Soil			16.50m	CL	SAA
				17		16.95m		
	(12,13,12)	SPT5	Soil	18		18.00m	SP	Poorly graded sand (2.5y,4/2) dark greyish brown, saturated,
						18.45m		80% medium sand, 20% fine sand.
				19				
	(11,10)	SPT6	Soil			19.50m		SAA
				20		19.95m		

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-3**								Project No.:101			Date:18/03/22		Boring No.: L-3		
								Client: Pollucare							
								Location: Kodungaiyur dump yard							
								City: Chennai					Page 2		
								Logged by: G.Siva					of 2		
								Well Casing material:			Casing length (ft):				
								Well Casing diameter (in):			Slotted interval (ft):				
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):				
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:					Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):			
								Time:				Cement:			
								Date:				Bentonite:			
				20											
			Soil	21		21.00m	SW	Well graded sand (2.5Y 6/1) grey saturated, 30% coarse sand,							
						21.45m		40% medium sand,30% fine sand.							
				22											
			Soil			22.50m	SW	SAA							
				23		22.95m									
			Rock			23.50m	WR	Weathered rock - Well graded Gravel with rock pieces.							
				24		23.95m									
		Core	Rock			24.00m	Rock	Driller suspect Hard rock started and collected core sample with the							
				25		25.50m		length of 1.5m and sample recovery was 0.7m.							
				26											
				27											
				28											
				29											
				30											
				31											
				32											
				33											
				34											
				35											
				36											
				37											
				38											
				39											
				40											

Remarks/notes: Total depth of the borehole was 25.50m, Rock Core sample collected from 24.00m to 25.50m, Core sample recovery was 0.70m.
Soil sample collected from 1.5m distance. Water sample collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site Latitude: Longitude: **L-4**								Project No.:101			Date:19/03/22			Boring No.: L-4		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 1		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:						Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	**Sample Interval**	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				0												
				1												
				2												
				3												
				4												
				5												
				6												
				7												
				8												
				9												
				10		10.50m		0m to 10.50m completely landfill waste material.								
				11												
	(8,9,11)	SPT1	Soil			11.25m	CL	Clay with silt (5Y 2.5/1) black, 90% clay, 10% of Silt, Wet.								
				12		11.70m										
	(11,10,11	SPT2	Soil	13		12.75m	CL	Clay with silt (5Y 2.5/1) black, 100% clay, Wet.								
						13.20m										
				14												
	(11,12,11	SPT3	Soil			14.25m	CL	SAA								
				15		14.75m										
	(11,10,12	SPT4	Soil	16		15.75m	SP	Poorly graded sand (5Y 4/1) dark grey, Saturated, 80% medium sand,								
						16.20m		20% fine sand.								
				17												
	(10,11,12	SPT5	Soil			17.25m	SP	SAA								
				18		17.70m										
			soil	19		18.75m	SW	Well graded sand (5Y 6/1) grey, saturated, 30% coarse sand,								
						19.20m		40% medium sand, 20% fine sand.								
				20												

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-4**								Project No.:101				Date:19/03/22			Boring No.: L-4		
								Client: Pollucare									
								Location: Kodungaiyur dump yard									
								City: Chennai							Page 2		
								Logged by: G.Siva							of 2		
								Well Casing material:				Casing length (ft):					
								Well Casing diameter (in):				Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:				Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:							Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):					
								Time:				Cement:					
								Date:				Bentonite:					
			soil	20		20.25m	SW	SAA									
				21		20.70m											
			soil	22		21.75m	WR	Weathered rock - Well graded Gravel with rock pieces.									
						22.20m											
				23													
						23.70m											
			Rock	24		25.20m	Rock	Driller suspect Hard rock started and collected core sample with the									
								length of 1.5 m and sample recovery was 0.80 m.									
				25													
				26													
				27													
				28													
				29													
				30													
				31													
				32													
				33													
				34													
				35													
				36													
				37													
				38													
				39													
				40													

Remarks/notes: Total depth of the borehole was 25.20m, Rock Core sample collected from 23.70m to 25.20m, Core sample recovery was 0.80m.
Sample collected from 1.5m distance. Water sample were collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site Latitude: Longitude: **L-5**								Project No.:101				Date:20/03/22			Boring No.: L-5	
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai							Page 1	
								Logged by: G.Siva							of 2	
								Well Casing material:				Casing length (ft):				
								Well Casing diameter (in):				Slotted interval (ft):				
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:				Sand interval (ft):				
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:							Bags	
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	**Sample Interval**	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				0												
				1												
				2												
				3												
				4												
				5												
				6												
				7												
				8												
				9												
				10												
				11												
				12												
				13		13.70m		0m to 13.70m - landfill waste material.								
				14												
	(16,24,14	SPT1	Soil	15		15.00m	CL	Clay (5Y 4/3) olive 100% clay, Wet.								
						15.40m										
				16												
	(13,16,18	SPT2	Soil			16.50m	CL	SAA								
				17		16.95m										
	(7,11,13)	SPT3	Soil	18		18.00m	SP	Poorly graded sand (5Y 5/2) olive grey, saturated, 80% medium sand,								
						18.45m		20% fine sand.								
				19												
	(9,2,0)	SPT4	Soil					No Recovery								
				20												

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-5**								Project No.:101			Date:20/03/22			Boring No.: L-5		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 2		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:								Bags
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	**Sample Interval**	USCS Symbol	DTW (ft):					Sand (type):			
								Time:					Cement:			
								Date:					Bentonite:			
				20												
			Soil	21		21.00m	SW	Well graded sand (5Y 4/2) olive grey, saturated, 30% Coarse sand								
						21.45m		40% medium sand, 30% fine sand.								
				22												
			Soil			22.50m	SW	SAA								
				23		22.95m										
			Rock	24		24.00m	WR	Weathered rock - Well graded Gravel with rock pieces.								
						24.45m										
				25												
						25.00m	Rock	Driller suspect Hard rock started and collected core sample with the								
			Rock	26		26.50m		length of 1.5 m and sample recovery was 0.75 m.								
				27												
				28												
				29												
				30												
				31												
				32												
				33												
				34												
				35												
				36												
				37												
				38												
				39												
				40												

Remarks/notes: Total depth of the borehole was 26.50m, Rock Core sample collected from 25.00m to 26.50m, Core sample recovery is 0.75m.
Soil sample collected at every 1.5m. Water sample was collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site Latitude: Longitude: **L-6**								Project No.:101			Date:22/03/22		Boring No.: L-6		
								Client: Pollucare							
								Location: Kodungaiyur dump yard							
								City: chennai					Page 1		
								Logged by: G.Siva					of 2		
								Well Casing material:			Casing length (ft):				
								Well Casing diameter (in):			Slotted interval (ft):				
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):				
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:					Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):			
								Time:				Cement:			
								Date:				Bentonite:			
				0											
				1											
				2											
				3											
				4											
				5											
				6											
				7											
				8											
				9											
				10											
				11											
				12											
				13		13.90m		0m to 13.90m - landfill waste material							
				14											
	(16,21,23)	SPT1	Soil	15		15.00m	CL	Clay wih silt (2.5Y 3/1) very dark grey, 90% clay, 10% silt, Wet.							
						15.45m									
				16											
	(18,13,15)	SPT2	Soil			16.50m	CL	SAA							
				17		16.95m									
			Soil	18		18.00m	SP	Poorly graded sand (2.5Y 4/1) dark grey, saturated, 80% medium sand							
						18.45m		20% fine sand.							
				19											
			Soil			19.50m	SP	SAA							
				20		19.95m									

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-6**								Project No.:101			Date:22/03/22			Boring No.: L-6		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 2		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:								Bags
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				20												
			Soil	21		21.00m	SW	Well graded sand (2.5Y 5/1) grey, saturated, 40% coarse sand,								
						21.45m		30% medium sand, 30% fine sand.								
				22												
			Soil			22.50m	SW	SAA								
				23		22.95m										
			Rock	24		24.00m	WR	Weathered rock - Well graded Gravel with rock pieces								
						24.45m										
				25												
						25.00m		Driller suspect Hard rock started and collected core sample with the								
		Core	Rock	26		26.50m		length of 1.5m and sample recovery was 0.75 m								
				27												
				28												
				29												
				30												
				31												
				32												
				33												
				34												
				35												
				36												
				37												
				38												
				39												
				40												

Remarks/notes: Total depth of the borehole was 26.50m, Rock Core sample collected from 25.00m to 26.50m, Core sample recovery was 0.75m.
Soil sample collected at every 1.5m depth. Water sample collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site Latitude: Longitude: **L-7**								Project No.:101			Date:23/03/22			Boring No.: L-7		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 1		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:								Bags
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				0												
				1												
				2												
				3												
				4												
				5												
				6												
				7		7.20m		0m to 7.20m - landfill waste material.								
	(2,2,2)	SPT1	Soil	8		7.50m	CL	Clay with silt (2.5Y 3/2) very dark greyish brown, 90% clay, 10% silt, Wet.								
						7.95m										
	(2,3,2)	SPT2	Soil	9		9.00m	CL	SAA								
						9.45m										
				10												
	(3,2,3)	SPT3	Soil			10.50m	CL	Clay with silt (2.5Y 3/2) very dark greyish brown, 90% clay, 10% silt,								
				11		10.95m		Wet.								
	(4,3,4)	SPT4	Soil	12		12.00m	CL	SAA								
						12.45m										
				13												
	(8,7,9)	SPT5	Soil			13.50m	CL	SAA								
				14		13.95m										
			Soil	15		15.00m	SP	Poorly graded sand (2.5Y 4/2) dark greyish brown, saturated,								
						15.45m		80% medium sand, 20% fine sand.								
				16												
			Soil			16.50m	SP	SAA								
				17		16.95m										
			Soil	18		18.00m	SP	SAA								
						18.45m										
				19												
			Soil			19.50m	SW	Well graded sand (2.5Y 6/1) grey, saturated, 20% coarse sand,								
				20		19.95m		50% medium sand, 30% fine sand.								

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-7**								Project No.:101			Date:23/03/22			Boring No.: L-7		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 2		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:						Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				20												
				21		21.00m	SW	SAA								
						21.45m										
				22												
			Rock			22.50m	WR	Weathered - Well graded Gravel with rock pieces.								
				23		22.95m										
				24												
		Core	Rock			24.00m	Rock	Driller suspect Hard rock started and collected core sample with the								
				25		25.50m		length of 1.5m and sample recovery was 0.80 m								
				26												
				27												
				28												
				29												
				30												
				31												
				32												
				33												
				34												
				35												
				36												
				37												
				38												
				39												
				40												

Remarks/notes: Total depth of the borehole was 25.50m, Rock Core sample collected from 24m to 25.50m, Core sample recovery was 0.80m.
Soil sample collected at every 1.5m depth. Water sample collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site	Project No.:101	Date:25/03/22	Boring No.:
Latitude:	Client: Pollucare		L-8
Longitude:	Location: Kodungaiyur dump yard		
L-8	City: Chennai		Page 1
	Logged by: G.Siva		of 2
	Well Casing material:	Casing length (ft):	
	Well Casing diameter (in):	Slotted interval (ft):	
Drilling method: Rotary drilling	Sampling tool: Split spoon sampler	Slot size:	Sand interval (ft):
Borehole dia. (in): 6 inch	Drill rig: SPT rig	Drilling company/Driller:	Bags

DTW (ft):				Sand (type):	
Time:				Cement:	
Date:				Bentonite:	

Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sampler Interval	USCS Symbol	
				0				
				1				
				2				
				3				
				4				
				5				
				6				
				7				
				8				
				9				
				10				
				11				
				12				
				13				
				14		14.40m		0 to 14.40m - landfill waste material
	(18,15,18)	SPT1	Soil	15		15.00m	CL	Clay with silt (2.5Y 3/1) very dark grey, 90% clay, 10% silt, Wet.
						15.45m		
				16				
			Soil			16.50m	SP	Poorly graded sand (2.5Y 3/2) very dark greyish brown, saturated,
				17		16.95m		70% medium sand, 30% fine sand.
			Soil	18		18.00m	SP	SAA
						18.45m		
				19				
			Soil			19.50m	SW	Well graded sand (2.5Y 5/1) grey, saturated, 30% coarse sand,
				20		19.15m		40% medium sand, 30% fine sand.

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard	Project No.:101	Date:25/03/22	Boring No.:
Latitude:	Client: Pollucare		L-8
Longitude:	Location: Kodungaiyur dump yard		
L-8	City: Chennai		Page 2
	Logged by: G.Siva		of 2
	Well Casing material:	Casing length (ft):	
	Well Casing diameter (in):	Slotted interval (ft):	
Drilling method: Rotary drilling	Sampling tool: Split spoon Sampler	Slot size:	Sand interval (ft):
Borehole dia. (in): 6 inch	Drill rig: SPT rig	Drilling company/Driller:	Bags

DTW (ft):				Sand (type):									
Time:				Cement:									
Date:				Bentonite:									

Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	
				20				
			Soil	21		21.00m	SW	SAA
						21.45m		
				22				
			Soil			22.50m	SW	SAA
				23		22.95m		
			Rock	24		24.00m	WR	Weathered rock - Well graded Gravel with rock pieces.
						24.45m		
				25				
		Core	Rock	26		25.50m	Rock	Driller suspect Hard rock started and collected core sample with the
						27.00m		length of 1.5 m and sample recovery was 0.75 m
				27				
				28				
				29				
				30				
				31				
				32				
				33				
				34				
				35				
				36				
				37				
				38				
				39				
				40				

Remarks/notes: Total depth of the borehole was 27m, Rock Core sample collected from 25.50m to 27m, Core sample recovery was 0.75m.
Soil sample collected at every 1.5m depth. Water sample were collected using a bio degradable bailer.
Borehole was backfilled with bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site	Project No.:101	Date:27/03/22	Boring No.:
Latitude:	Client: Pollucare		L-9
Longitude:	Location: Kodungaiyur dump yard		
L-9	City: Chennai		Page 1
	Logged by: G.Siva		of 2
	Well Casing material:	Casing length (ft):	
	Well Casing diameter (in):	Slotted interval (ft):	
Drilling method: Rotary drilling	Sampling tool: Split spoon sampler	Slot size:	Sand interval (ft):
Borehole dia. (in): 6 inch	Drill rig: SPT rig	Drilling company/Driller:	Bags

Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	
				0				
				1				
				2				
				3				
				4				
				5				
				6				
				7				
				8				
				9				
				10				
				11				
				12				
				13		13.50m		0 to 13.50m - landfill waste material
				14				
	(12,11,12)	SPT1	Soil	15		15.00m	CL	Clay (5Y 3/1) very dark grey, 100% clay, Wet.
						15.45m		
				16				
	(13,12,14)	SPT2	Soil			16.50m	CL	SAA
				17		16.95m		
			Soil	18		18.00m	SP	Poorly graded sand (5Y 4/1) dark grey, saturated, 80% medium sand.
						18.45m		20% fine sand
				19				
			Soil			19.50m	SP	SAA
				20		19.95m		

								DTW (ft):			Sand (type):
								Time:			Cement:
								Date:			Bentonite:

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-9**								Project No.:101			Date:27/03/22			Boring No.: L-9		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 2		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:								Bags
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				20												
			Soil	21		21.00m	SW	Well graded sand (2.5Y 6/1) grey, saturated, 40% coarse sand								
						21.45m		30% medium sand, 30% fine sand.								
				22												
			Rock			22.50m	WR	Weathered rock - Well graded Gravel with rock pieces								
				23		22.95m										
				24												
		Core	Rock			24.00m	Rock	Driller suspect Hard rock started and collected core sample with the								
				25		25.50m		length of 1.5m and sample recovery was 0.80 m								
				26												
				27												
				28												
				29												
				30												
				31												
				32												
				33												
				34												
				35												
				36												
				37												
				38												
				39												
				40												

Remarks/notes: Total depth of the borehole was 25.5m, Rock Core sample collected from 24m to 25.50m, Core sample recovery was 0.80m.
Soil sample collected at every 1.5m depth. Water sample collected using a bio degradable bailer.
Borehole was backfilled by bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump site Latitude: Longitude: **L-10**								Project No.:101			Date: 29/03/22			Boring No.: L-10		
								Client: Pollucare								
								Location: Kodungaiyur dump yard								
								City: Chennai						Page 1		
								Logged by: G.Siva						of 2		
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:						Bags		
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	**Sample Interval**	USCS Symbol	DTW (ft):				Sand (type):				
								Time:				Cement:				
								Date:				Bentonite:				
				0												
				1												
				2												
				3												
				4												
				5												
				6												
				7												
				8												
				9												
				10												
				11												
				12												
						12.90m		0 to 12.9m - landfill waste material.								
				13												
	(4,7,7)	SPT1	Soil			13.50m	CL	Clay with Silt (2.5Y 3/1) very dark grey, 90% clay, 10% silt, Wet.								
				14		13.95m										
	(6,7,6)	SPT2	Soil	15		15.00m	CL	SAA								
						15.45m										
				16												
			Soil			16.50m	SP	Poorly graded sand (2.5Y 3/2) very dark greyish brown, saturated								
				17		16.95m		80% medium sand, 20% fine sand.								
			Soil	18		18.00m	SP	SAA								
						18.45m										
				19												
			Soil			19.50m	SW	Well graded sand (2.5Y 5/2) greyish brown, 40% coarse sand,								
				20		19.95m		30% medium sand, 30% fine sand								

Remarks/notes:

STRATUS ENVIRONMENTAL, INC.

Field location of boring:Kodungaiyur dump yard Latitude: Longitude: **L-10**								Project No.:101			Date : 29-03-2022				Boring No.:	
								Client: Pollucare							L-10	
								Location: Kodungaiyur dump yard								
								City: Chennai							Page	2
								Logged by: G.Siva							of	2
								Well Casing material:			Casing length (ft):					
								Well Casing diameter (in):			Slotted interval (ft):					
Drilling method: Rotary drilling			Sampling tool: Split spoon sampler					Slot size:			Sand interval (ft):					
Borehole dia. (in): 6 inch			Drill rig: SPT rig					Drilling company/Driller:							Bags	
Time	Blows/ft or Pressure (psi)	Sample Name	Sample medium	Depth (M)	Sample	Sample Interval	USCS Symbol	DTW (ft):					Sand (type):			
								Time:					Cement:			
								Date:					Bentonite:			
				20												
			Soil	21		21.00m	SW	SAA								
						21.45m										
				22												
			Rock			22.50m	WR	Weathered - Well graded Gravel with rock pieces								
				23		22.95m										
				24												
		Core	Rock			24.00m	Rock	Driller suspect Hard rock started and collected core sample with the								
				25		25.50m		length of 1.5 m and sample recovery was 0.80 m								
				26												
				27												
				28												
				29												
				30												
				31												
				32												
				33												
				34												
				35												
				36												
				37												
				38												
				39												
				40												

Remarks/notes: Total depth of the borehole was 25.50m, Rock Core sample collected from 24m to 25.50m, Core sample recovery was 0.80m.
Soil sample collected at every 1.5m depth. Water sample were collected using a bio degradable bailer.
Borehole was backfilled with bentonite grout till surface.

STRATUS ENVIRONMENTAL, INC.

GSTIN: 33AVBPJ7079E1ZO

DYNAMIQ ENGINEERING RESEARCH CENTRE

AN ISO / IEC 17025:2017 ACCREDITED LABORATORY

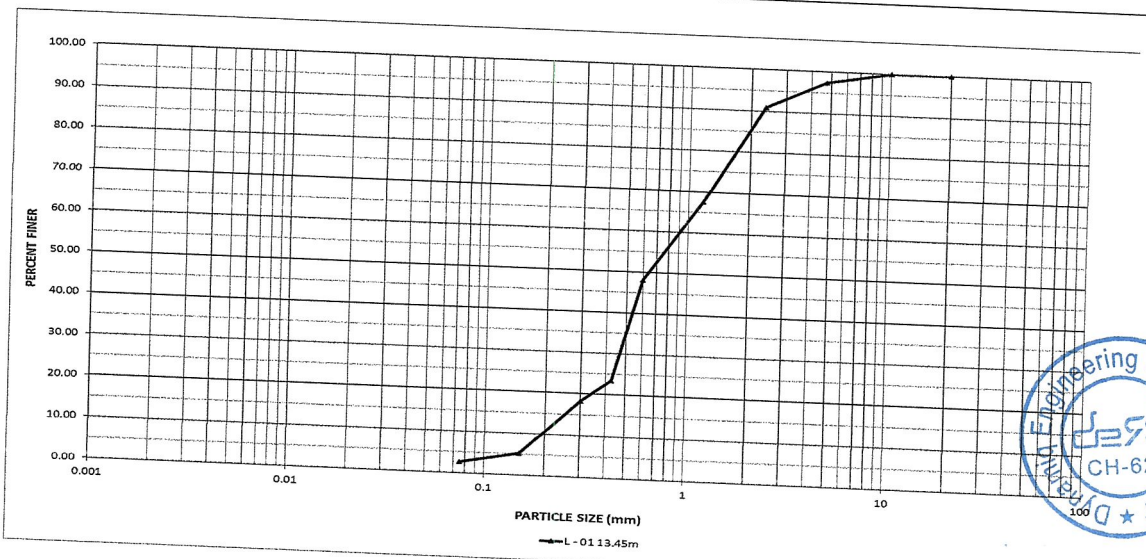
TEST REPORT

Certificate No & Date: DERC/R542/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 13.45m **Strata Description:** Gray / Silty Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.54
2.	Moisture Content	: 22.89 %
3.	Bulk Density	: 1.65 gm/cc
4.	pH	: 7.85.
5.	Sieve Analysis	



Dynamiq Engineering Research Centre ★ CH-62.

Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	13.45m	97.40	23.38	2.60	-	-	4.74	1.24	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
H.O. & Laboratory Address: #12, Indira nagar, Kovilpathagai, AVADI, Chennai - 600 062.
Mob: +91-9629819560 / +91-9788532418, **Web:** www.derc.org.in, **Email:** dercprojects@gmail.com

GSTIN: 33AVBPJ7079E1ZO

DYNAMIQ ENGINEERING RESEARCH CENTRE

AN ISO / IEC 17025:2017 ACCREDITED LABORATORY

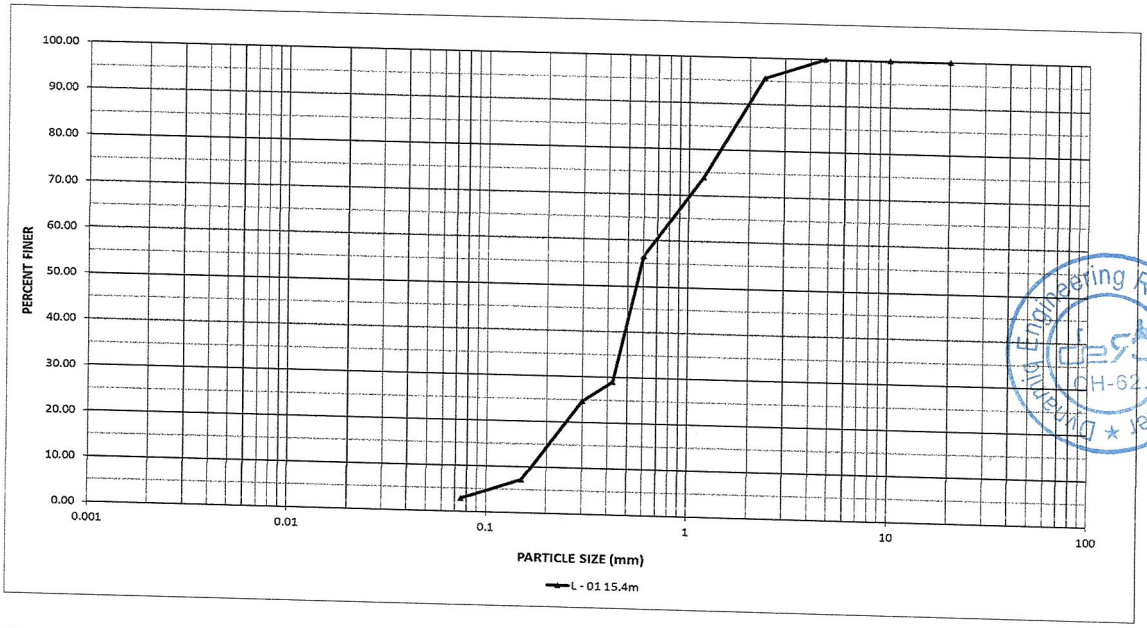
TEST REPORT

Certificate No & Date: DERC/R543/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 15.4m **Strata Description:** Gray / Silty Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.43
2.	Moisture Content	: 19.54 %
3.	Bulk Density	: 1.63 gm/cc
4.	pH	: 7.79
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	15.4m	100.00	28.99	2.90	-	-	4.12	1.63	SP

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GSTIN: 33AVBPJ7079E1ZO

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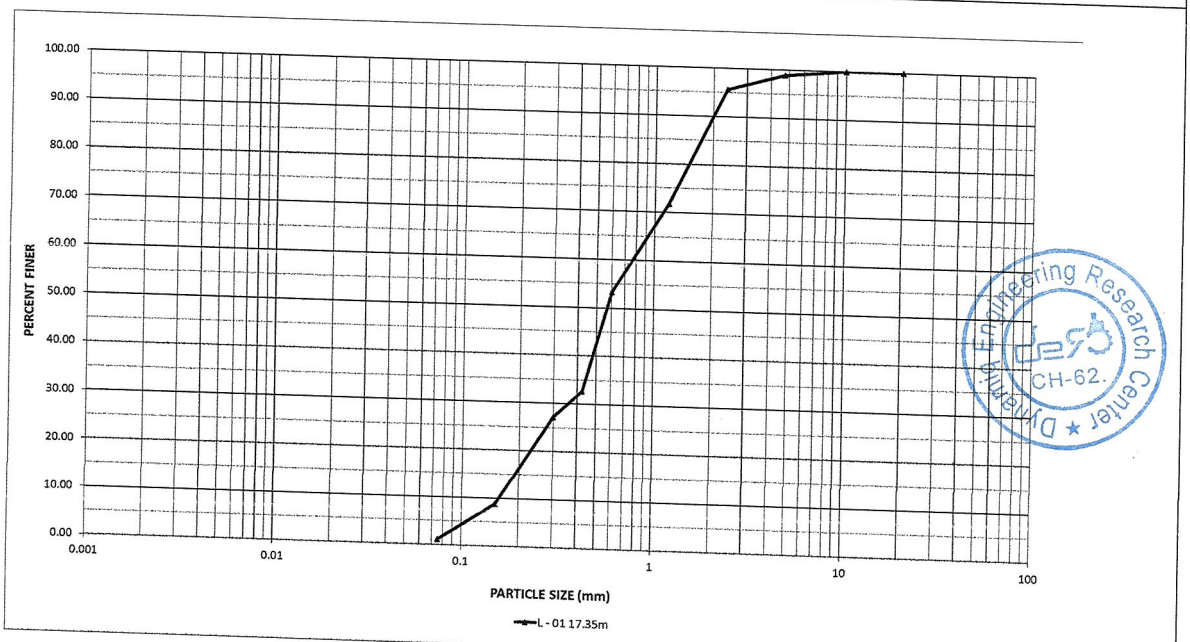
TEST REPORT

Certificate No & Date: DERC/R544/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 17.35m **Strata Description:** Gray / Silty Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.46
2.	Moisture Content	: 13.95 %
3.	Bulk Density	: 1.65 gm/cc
4.	pH	: 7.85
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	17.35m	98.91	32.61	1.09	-	-	4.88	1.04	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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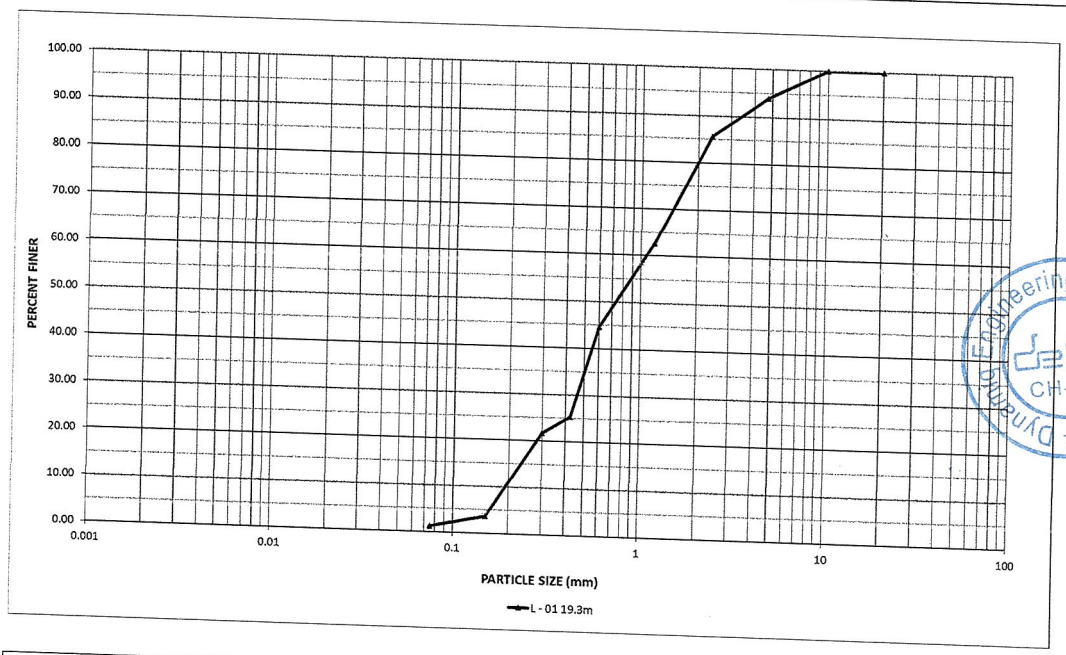
TEST REPORT

Certificate No & Date: DERC/R545/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 19.30m **Strata Description:** Gray / Silty Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.48
2.	Moisture Content	: 21.84.38 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 7.80
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	19.3m	93.98	25.30	1.20	-	-	6.32	0.97	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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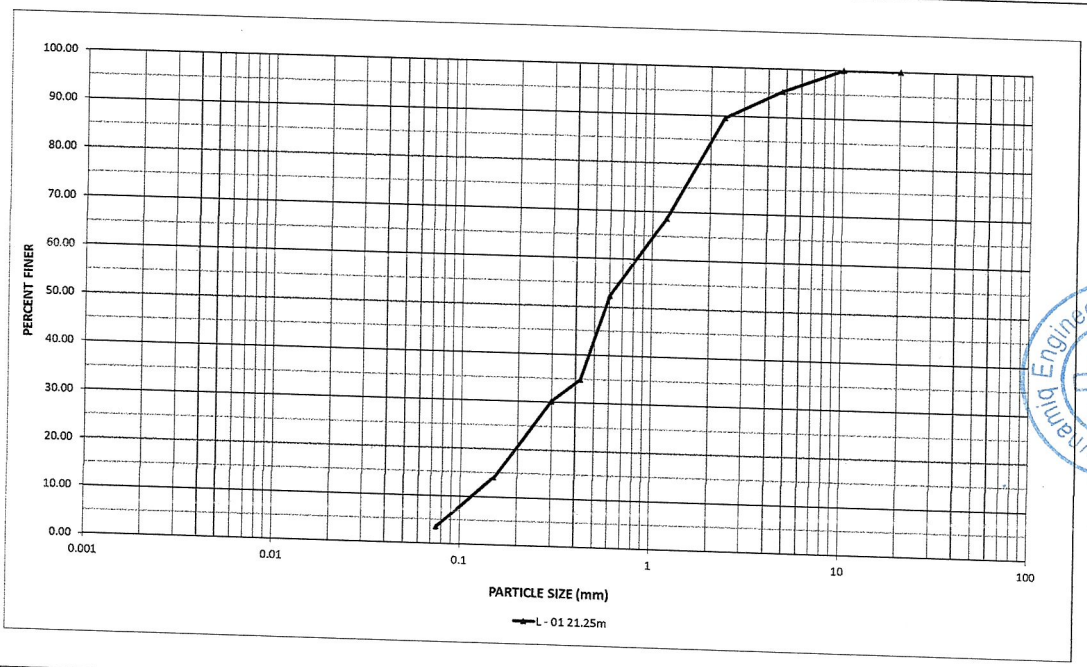
TEST REPORT

Certificate No & Date: DERC/R546/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 21.25m **Strata Description:** Gray / Silty Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.69
2.	Moisture Content	: 22.47 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.09
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	21.25m	95.35	34.88	3.49	-	-	6.38	0.83	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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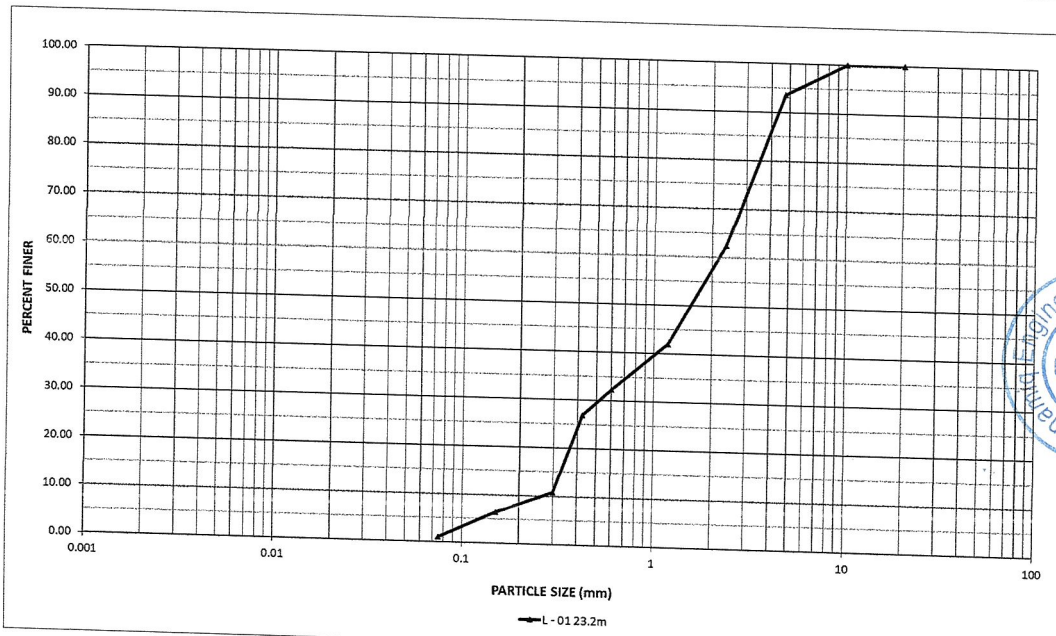
TEST REPORT

Certificate No & Date: DERC/R547/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 23.20m **Strata Description:** Gray / Silty Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.49
2.	Moisture Content	: 14.42 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.75
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	23.2m	93.55	26.88	1.08	-	-	13.53	0.72	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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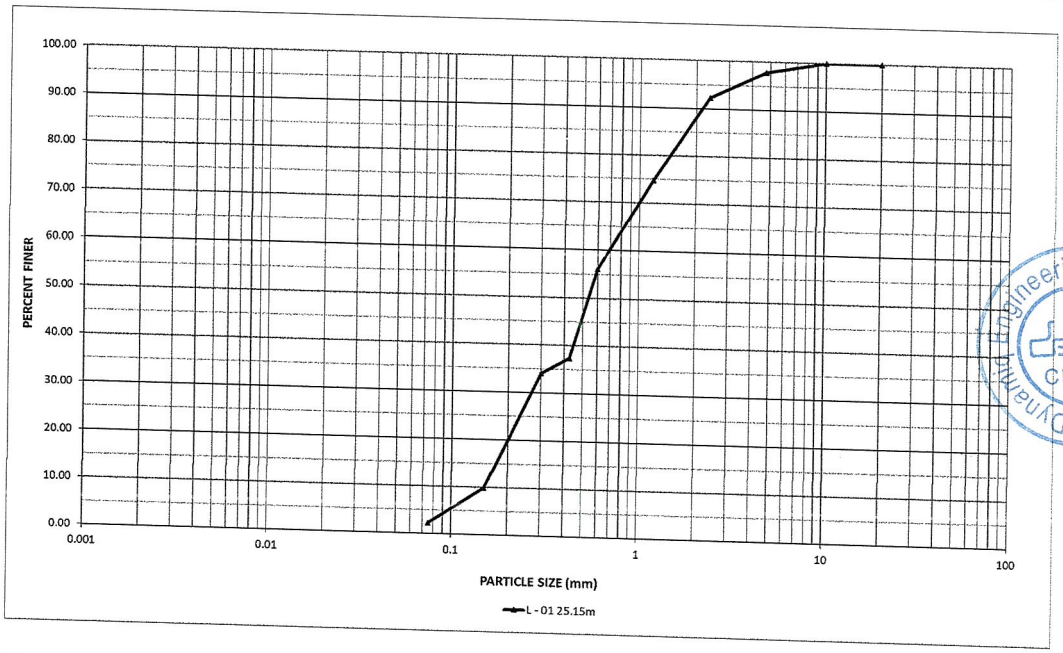
TEST REPORT

Certificate No & Date: DERC/R548/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 25.15m **Strata Description:** Olive Gray / Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.50
2.	Moisture Content	: 20.65 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.92
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	25.15m	97.80	37.36	2.20	-	-	4.38	0.63	SP

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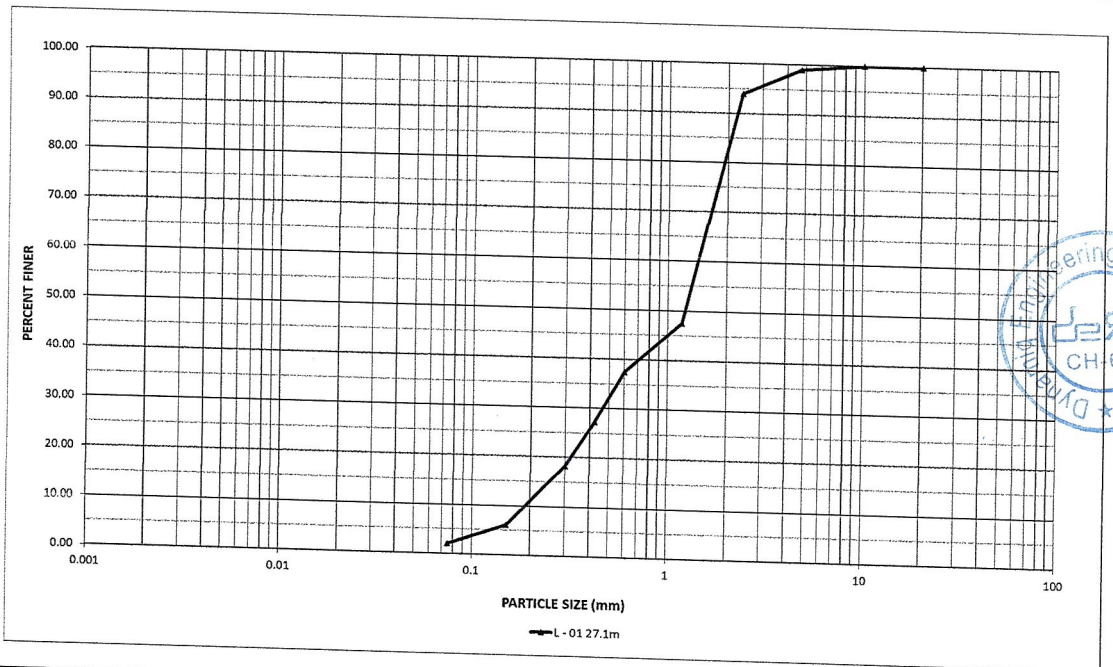
TEST REPORT

Certificate No & Date: DERC/R549/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 27.10m **Strata Description:** Olive Gray / Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.31
2.	Moisture Content	: 18.18 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.62
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	27.1m	98.99	27.27	2.02	-	-	7.89	0.81	SP

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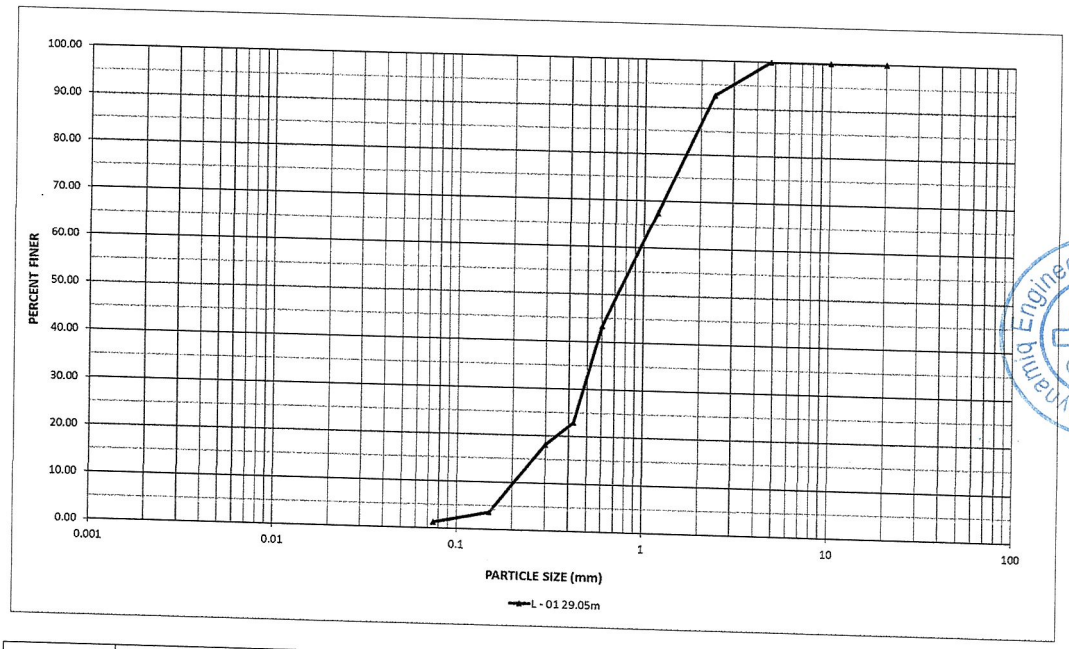
TEST REPORT

Certificate No & Date: DERC/R550/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 29.05m **Strata Description:** Olive Gray / Sand **Testing Date:** 03-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.41
2.	Moisture Content	: 16.67 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 8.13.
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 01	29.05m	100.00	22.89	1.20	-	-	8.73	2.18	SW

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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TEST REPORT

Certificate No & Date: DERC/R568/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L1- 33.40 – 34.40m **Strata Description:** Rock **Testing Date:** 04-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.71
2.	Water Absorption	: 1.36 %
3.	Bulk Density	: 2.68 gm/cc
4.	Compressive Strength	: 50.6 N/mm^2.
5.	Core Recovery	: 46 %.
6.	RQD	: 15 %.

Note: -

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TEST REPORT

Certificate No & Date: DERC/R553/2022-23 & 07-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	03-05-2022 to 06-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	13.45	0.5 1 1.5	37 80 120	0.268 0.580 0.870	31.02
2	15.40	0.5 1 1.5	35 76 117	0.254 0.551 0.848	30.55
3	17.35	0.5 1 1.5	60 113 157	0.435 0.819 1.138	35.10
4	19.30	0.5 1 1.5	56 109 150	0.406 0.790 1.088	34.27
5	21.25	0.5 1 1.5	52 112 149	0.377 0.812 1.080	35.12

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6	23.20	0.5 1 1.5	48 104 150	0.348 0.754 1.088	36.48
7	25.15	0.5 1 1.5	59 113 169	0.428 0.819 1.225	38.57
8	27.10	0.5 1 1.5	67 128 178	0.486 0.928 1.291	38.81
9	29.05	0.5 1 1.5	69 123 183	0.500 0.892 1.327	39.57

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 12.4m	Filling - Waste Material						
2	13.5	SP	9	9	31	_	20.17	13.43
3	15.4	SP	11	11	30	_	17.47	16.15
4	17.4	SP	17	13	35	_	37.01	18.90
5	19.30	SP	21	15	34	_	36.57	21.74
6	21.25	SP	25	16	35	_	46.29	24.04
7	23.20	SP	27	16	36	_	58.78	25.59
8	25.15	SP	>60	>60	38	_	84.68	59.78
9	27.10	SP	>60	>60	38	_	87.80	61.43
10	29.05	SW	>60	>60	39	_	104.85	63.08
10	31.00	WR	>100	>100	_	_	_	72.22
11	32.95	WR	>100	>100	_	_	_	73.96

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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Quality Engineer
Dynamiq Engineering Research Centre
AVADI, Chennai - 600 062.

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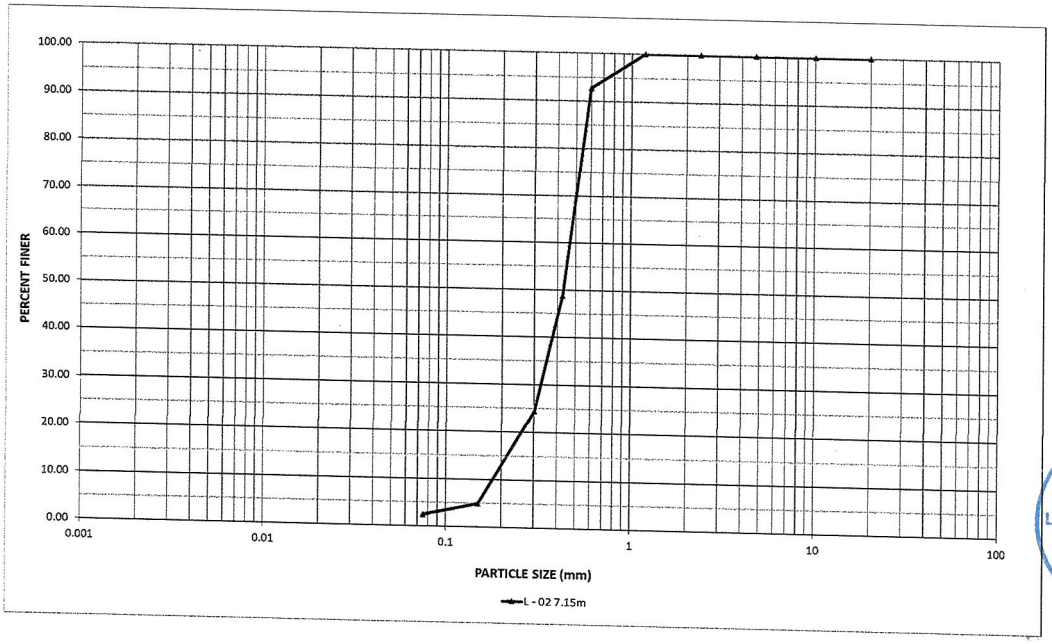
TEST REPORT

Certificate No & Date: DERC/R554/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 7.15m **Strata Description:** Gray / Silty Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.67
2.	Moisture Content	: 17.89 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 6.25
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	7.15m	100.00	48.78	2.44	-	-	2.56	1.32	SP

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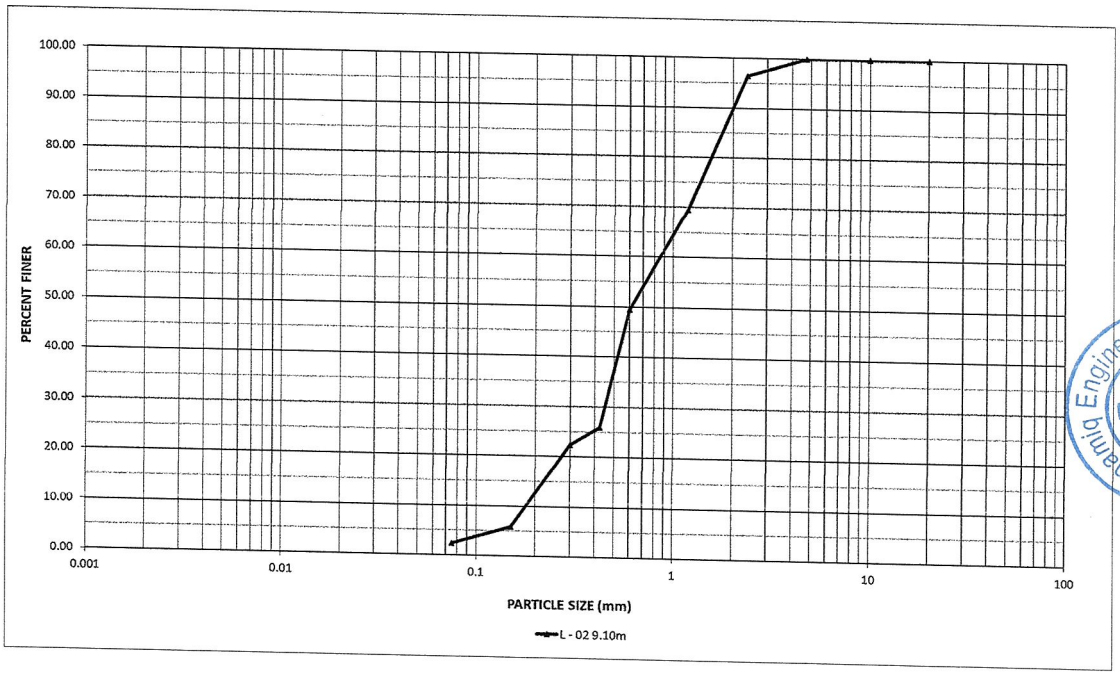
TEST REPORT

Certificate No & Date: DERC/R555/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 9.10m **Strata Description:** Gray / Silty Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.76
2.	Moisture Content	: 14.44 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 6.13
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	9.10m	100.00	25.88	2.35	-	-	4.78	1.37	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
H.O. & Laboratory Address: #12, Indira nagar, Kovilpathagai, AVADI, Chennai - 600 062.
Mob: +91-9629819560 / +91-9788532418, **Web:** www.derc.org.in, **Email:** dercprojects@gmail.com

GSTIN: 33AVBPJ7079E1ZO

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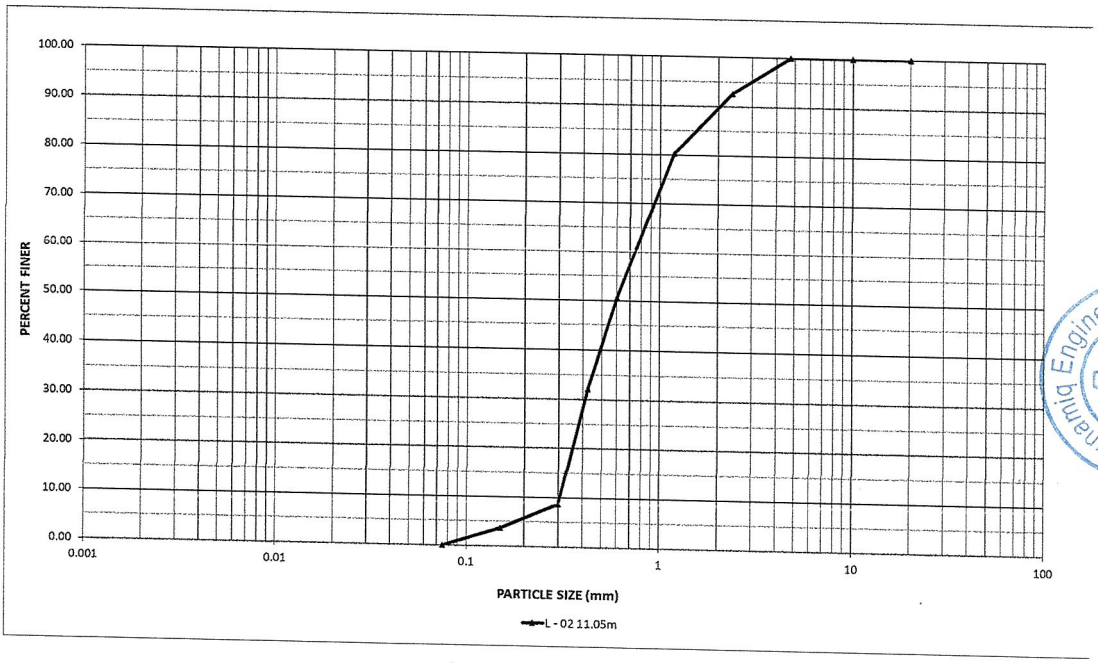
Certificate No & Date: DERC/R556/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 11.05m **Strata Description:** Gray / Silty Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.61
2.	Moisture Content	: 15.38 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 6.33
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	11.05m	100.00	32.10	0.00	-	-	2.42	0.76	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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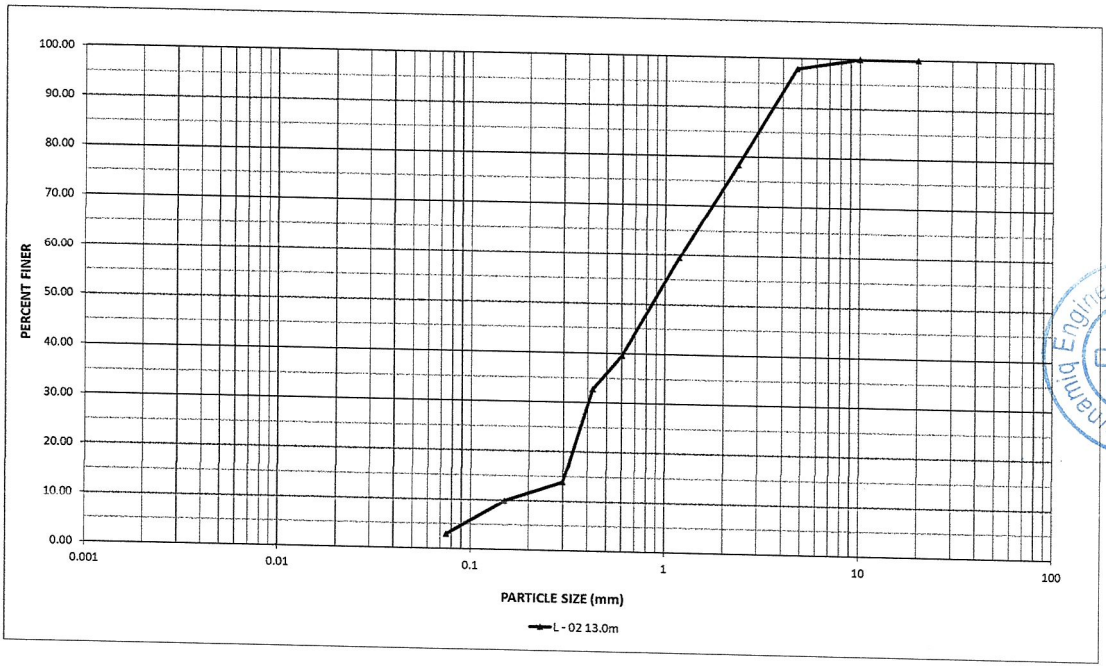
TEST REPORT

Certificate No & Date: DERC/R557/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 13.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.58
2.	Moisture Content	: 16.16%
3.	Bulk Density	: 1.75 gm/cc
4.	pH	: 6.42
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	13.0m	98.02	32.67	2.97	-	-	8.13	0.81	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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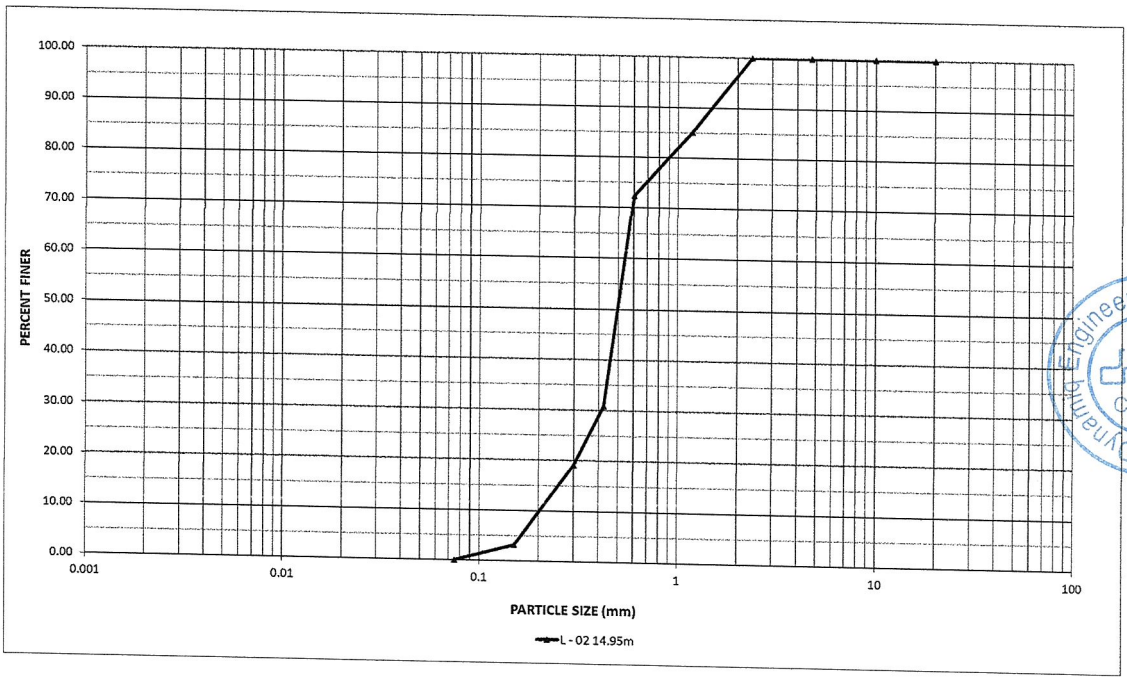
Certificate No & Date: DERC/R558/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 14.95m **Strata Description:** Gray / Silty Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.33
2.	Moisture Content	: 19.15 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.80
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	14.95m	100.00	30.85	0.00	-	-	2.62	1.60	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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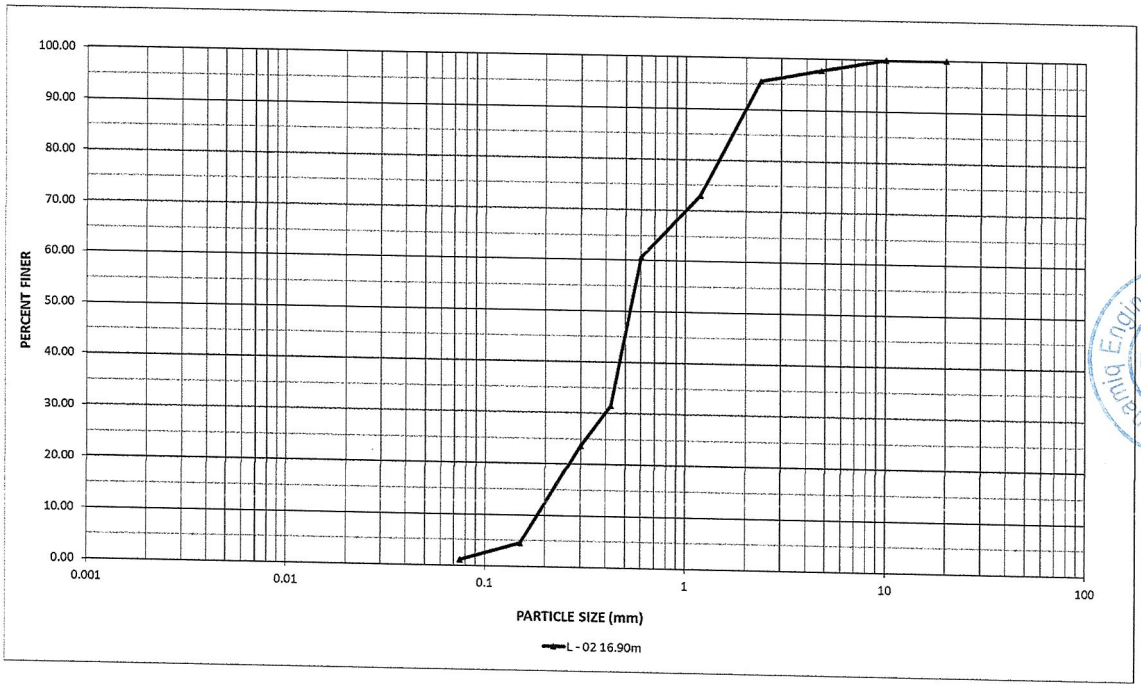
Certificate No & Date: DERC/R559/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 16.90m **Strata Description:** Gray / Silty Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.51
2.	Moisture Content	: 17.20 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.25
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	16.90m	97.75	31.46	1.12	-	-	13.53	0.72	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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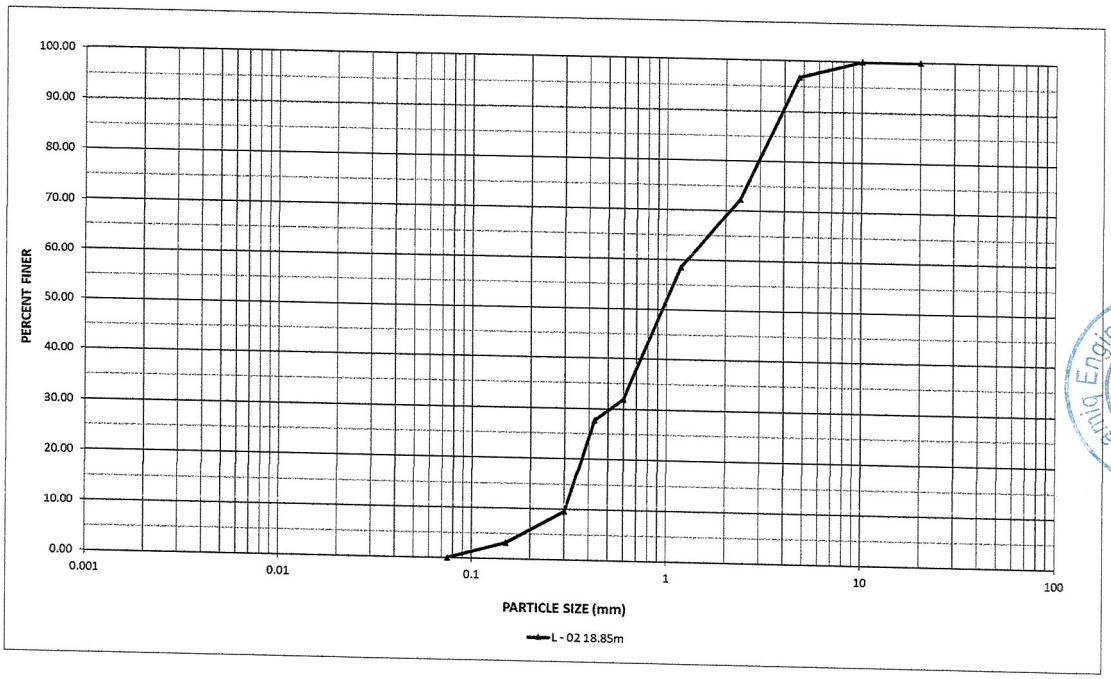
Certificate No & Date: DERC/R560/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 18.85m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.50
2.	Moisture Content	: 18.18 %
3.	Bulk Density	: 1.8 gm/cc
4.	pH	: 7.70
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	18.85m	96.81	27.66	0.00	-	-	4.52	0.60	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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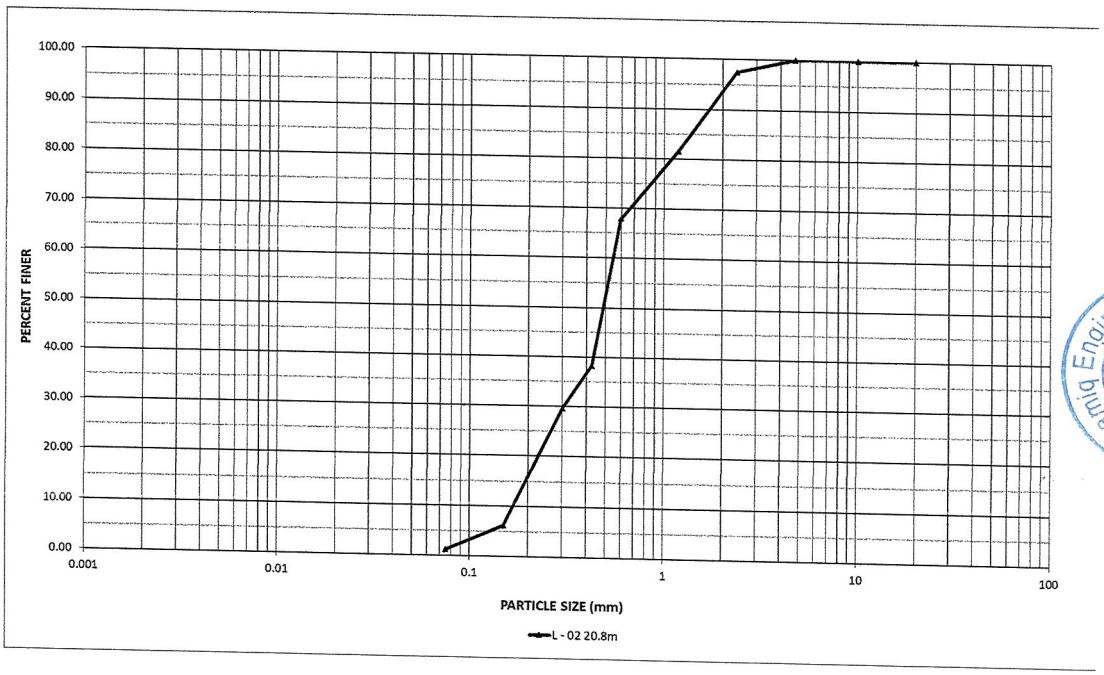
Certificate No & Date: DERC/R561/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 20.80m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.65
2.	Moisture Content	: 16.33 %
3.	Bulk Density	: 1.8 gm/cc
4.	pH	: 7.83
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	20.8m	100.00	38.27	1.23	-	-	3.24	1.03	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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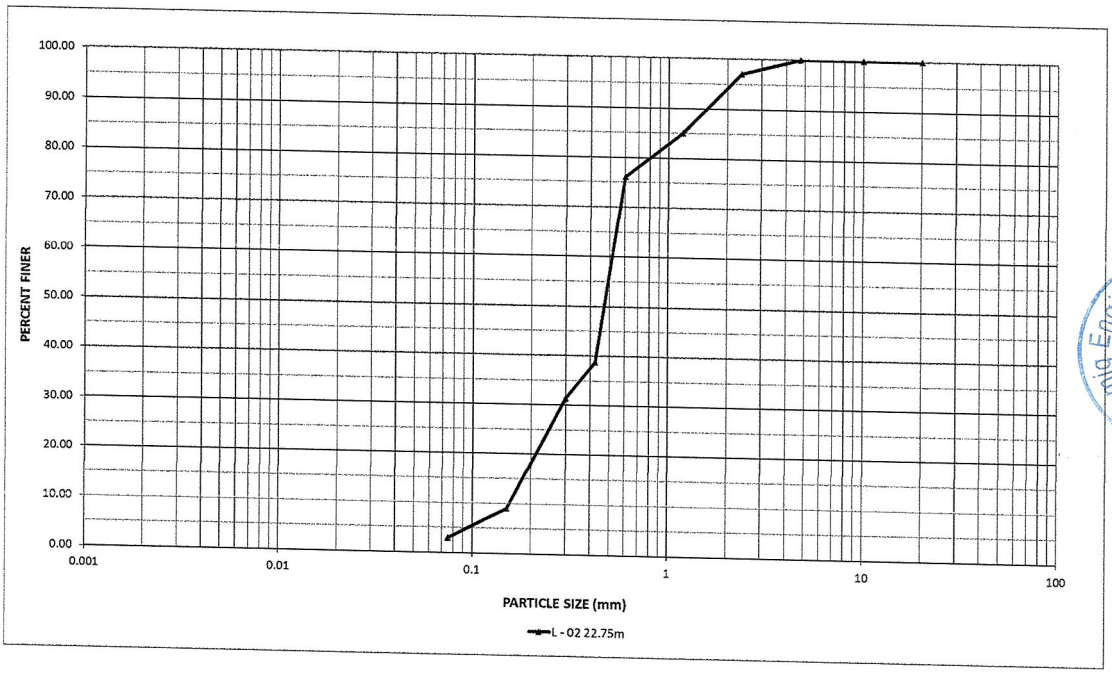
Certificate No & Date: DERC/R562/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 22.75m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.79
2.	Moisture Content	: 12.77 %
3.	Bulk Density	: 1.8gm/cc
4.	pH	: 7.45
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	22.75m	100.00	38.81	2.99	-	-	3.25	1.01	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
H.O. & Laboratory Address: #12, Indira nagar, Kovilpathagai, AVADI, Chennai - 600 062.
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GSTIN: 33AVBPJ7079E1ZO

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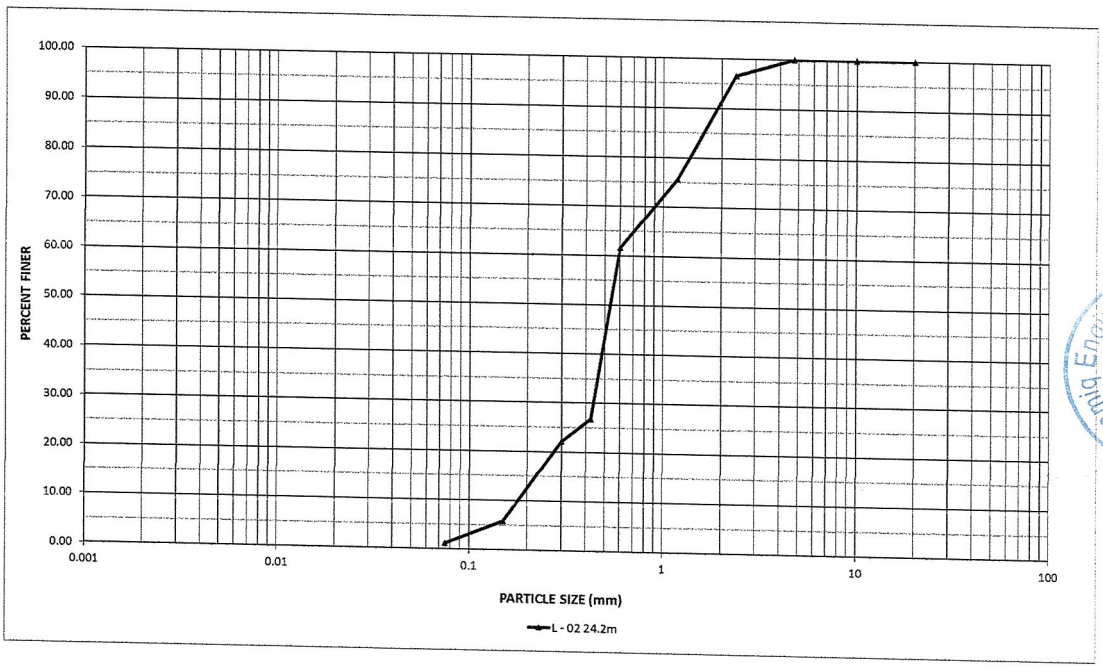
TEST REPORT

Certificate No & Date: DERC/R563/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 24.70m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.67
2.	Moisture Content	: 12.77 %
3.	Bulk Density	: 1.8 gm/cc
4.	pH	: 6.80
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	24.2m	100.00	26.74	1.16	-	-	4.21	1.33	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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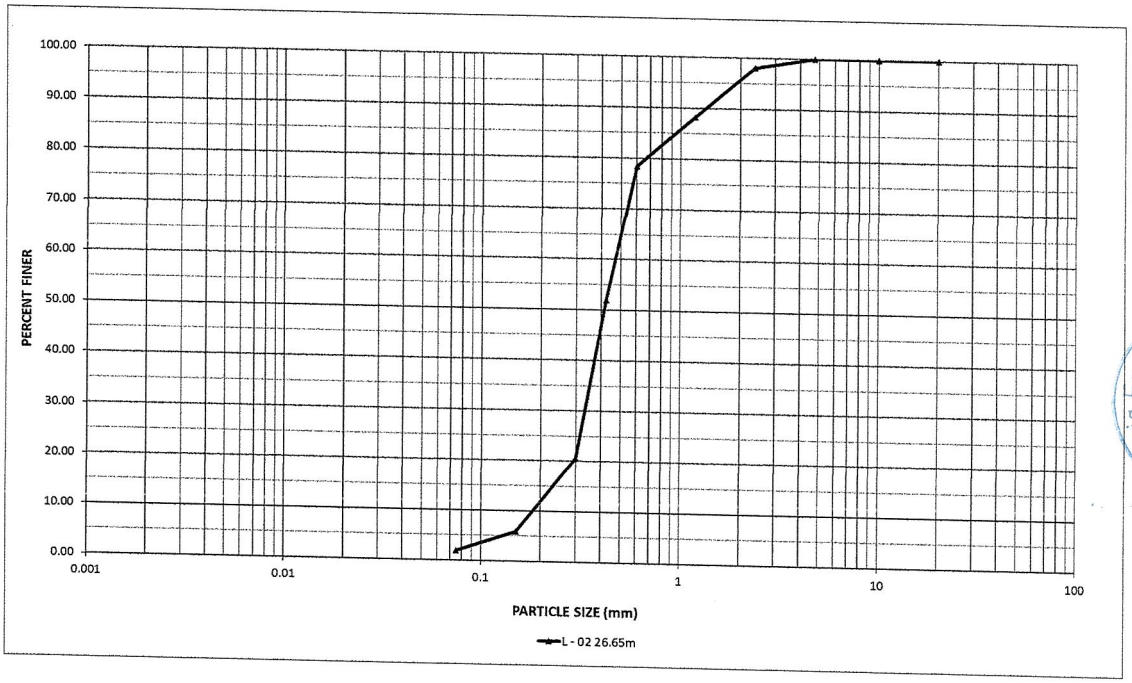
TEST REPORT

Certificate No & Date: DERC/R564/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 26.65m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.71
2.	Moisture Content	: 17.05 %
3.	Bulk Density	: 1.8 gm/cc
4.	pH	: 8.04
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	26.65m	100.00	51.96	1.96	-	-	2.58	1.24	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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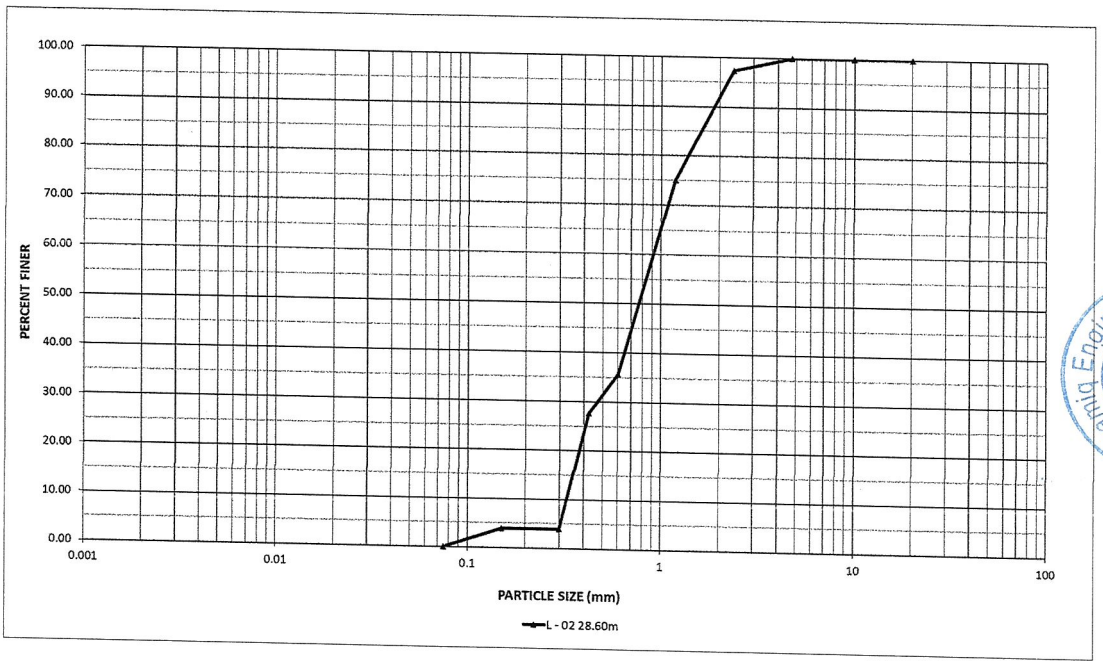
TEST REPORT

Certificate No & Date: DERC/R565/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 28.60m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 1.61
2.	Moisture Content	: 17.05 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 7.93
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	28.60m	100.00	27.63	0.00	-	-	2.73	0.81	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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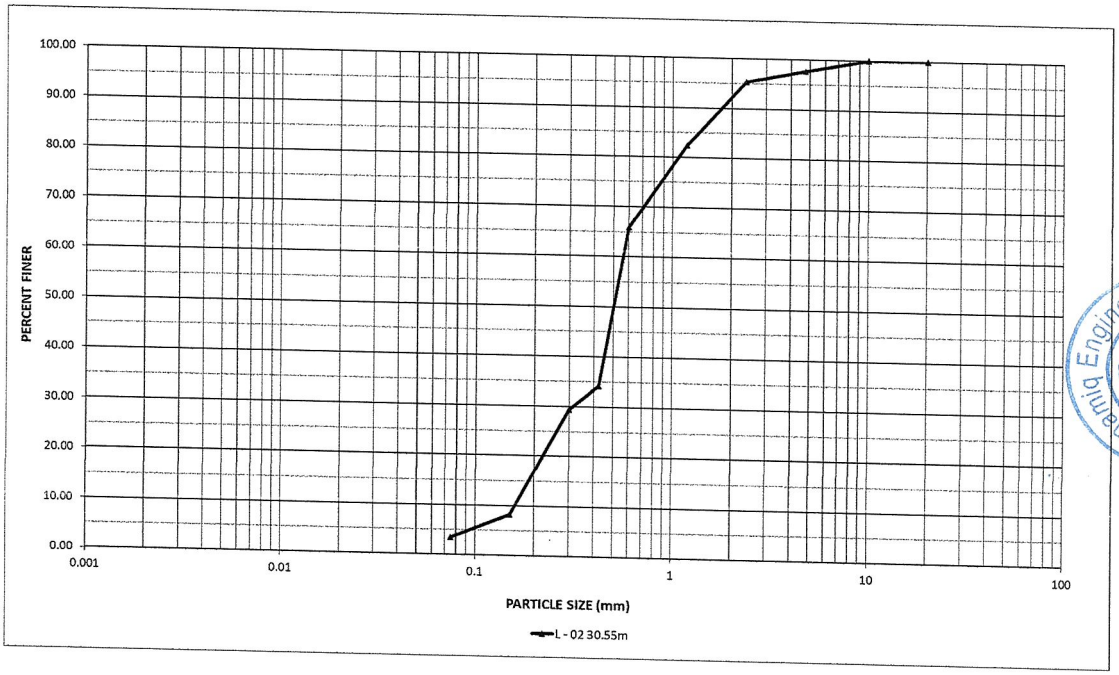
TEST REPORT

Certificate No & Date: DERC/R566/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 30.55m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.57
2.	Moisture Content	: 21.35 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 7.81
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	30.55m	97.65	34.12	3.53	-	-	3.56	1.12	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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GSTIN: 33AVBPJ7079E1ZO

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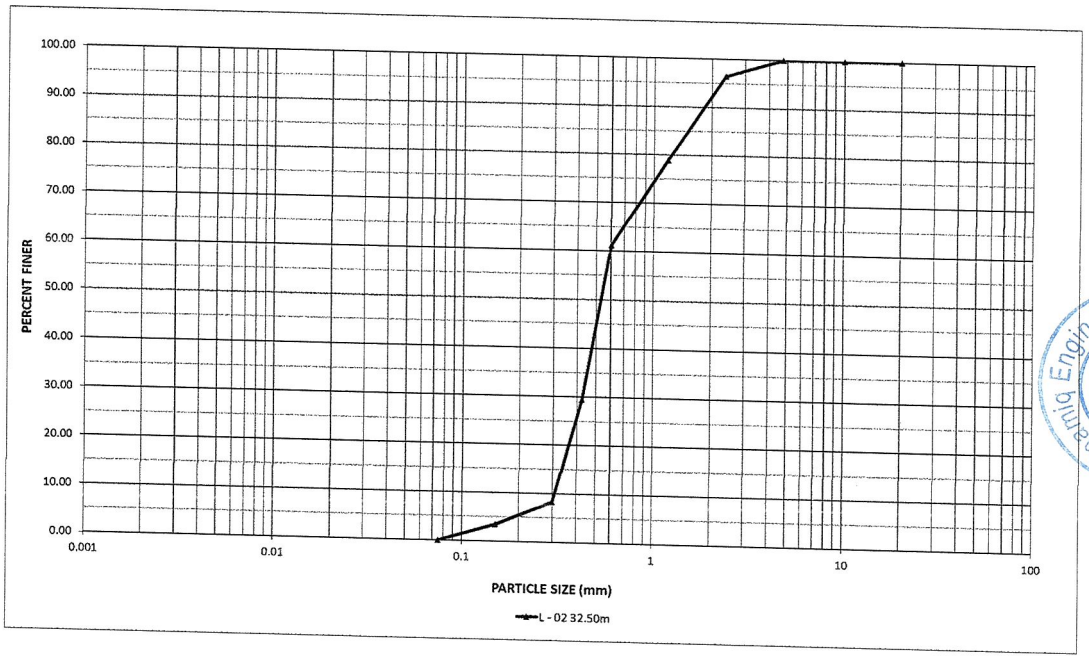
TEST REPORT

Certificate No & Date: DERC/R567/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 32.5m **Strata Description:** Gray / Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.84
2.	Moisture Content	: 17.58 %
3.	Bulk Density	: 1.95 gm/cc
4.	pH	: 8.10
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 02	32.50m	100.00	29.41	0.00	-	-	1.84	0.98	SP

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Certificate No & Date: DERC/R568/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L2- 37.90 – 39.40m **Strata Description:** Rock **Testing Date:** 08-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.69
2.	Water Absorption	: 1.28%
3.	Bulk Density	: 2.67 gm/cc
4.	Compressive Strength	: 46.7 N/mm^2.
5.	Core Recovery	: 50 %.
6.	RQD	: 43.66 %.

Note: -

- ✓ This certificate refers only to the sample submitted for testing.
- ✓ This certificate may not be reproduced in part/full, without the permission of the laboratory.
- ✓ Any correction invalidates this certificate.

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TEST REPORT

Certificate No & Date: DERC/R569/2022-23 & 09-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	06-05-2022 to 08-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	7.15m	0.5 1 1.5	32 68 112	0.232 0.493 0.812	30.12
2	9.10m	0.5 1 1.5	34 76 108	0.247 0.551 0.783	28.21
3	11.05m	0.5 1 1.5	37 85 123	0.268 0.616 0.892	31.93
4	13.0m	0.5 1 1.5	38 92 127	0.276 0.667 0.921	32.83
5	14.95m	0.5 1 1.5	37 86 132	0.268 0.624 0.957	34.54

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6	16.90m	0.5 1 1.5	41 93 130	0.297 0.674 0.943	32.83
7	18.85m	0.5 1 1.5	39 97 137	0.283 0.703 0.993	35.39
8	20.80m	0.5 1 1.5	40 99 146	0.290 0.718 1.059	37.54
9	22.75m	0.5 1 1.5	43 98 145	0.312 0.711 1.051	36.48
10	24.70m	0.5 1 1.5	44 100 146	0.319 0.725 1.059	36.48
11	26.65m	0.5 1 1.5	39 105 150	0.283 0.761 1.088	38.81
12	28.6m	0.5 1 1.5	36 96 145	0.261 0.696 1.051	38.33
13	30.55m	0.5 1 1.5	42 105 160	0.305 0.761 1.160	40.55
14	32.50m	0.5 1 1.5	43 99 154	0.312 0.718 1.117	38.84

Note: -

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

GSTIN: 33AVBPJ7079E1ZO

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N-Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 7m	Filling - Waste Material						
2	7.15m	SP	10	10	30.12	_	14.68	9.96
3	9.10m	SP	11	11	28.21	_	15.31	11.96
4	11.05m	SP	9	9	31.93	_	19.15	11.79
5	13.0m	SP	12	12	32.83	_	25.04	15.41
6	14.95m	SP	14	14	34.54	_	36.37	18.49
7	16.90m	SP	15	15	32.83	_	29.24	20.82
8	18.85m	SP	13	13	35.39	_	44.45	21.04
9	20.80m	SP	20	16	37.54	_	66.97	24.95
10	22.75m	SP	23	17	36.48	_	58.71	27.38
10	24.70m	SP	26	18	36.48	_	64.74	29.92
11	26.65m	SP	27	18	38.81	_	92.52	31.71
12	28.60m	SP	>60	>60	38.33	_	95.83	64.55
13	30.55m	SP	>60	>60	40.55	_	128.12	66.35
14	32.50m	SP	>60	>60	38.84	_	102.45	68.14
15	34.45m	WR	>100	>100	_	_	_	77.32
16	35.95m	WR	>100	>100	_	_	_	78.70

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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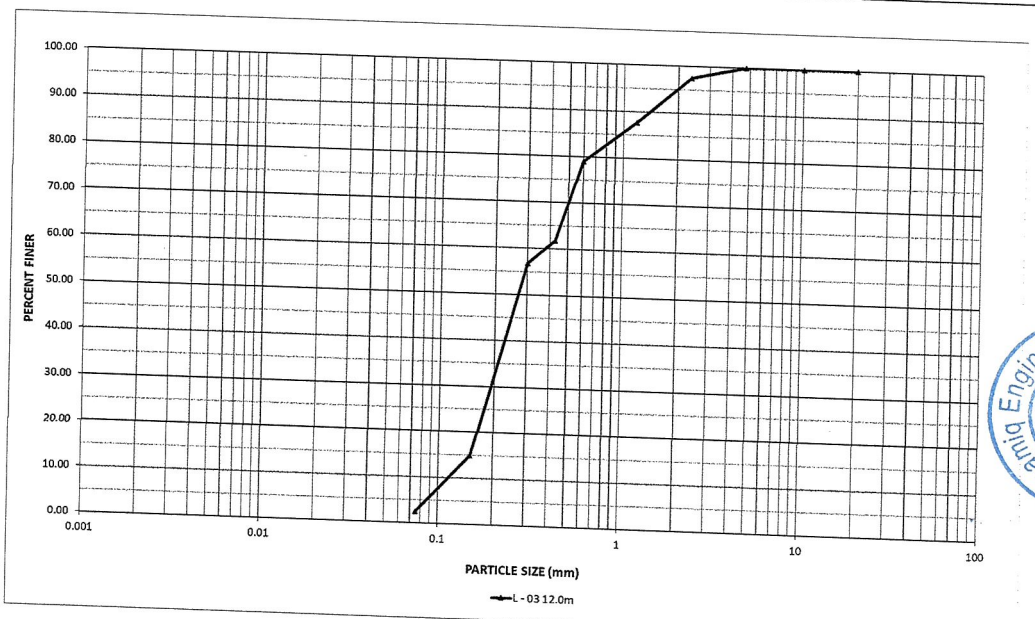
TEST REPORT

Certificate No & Date: DERC/R570/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 12.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 07-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.63
2.	Moisture Content	: 17.65 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.42
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	12.0m	100.00	61.73	2.47	-	-	2.92	0.73	SP

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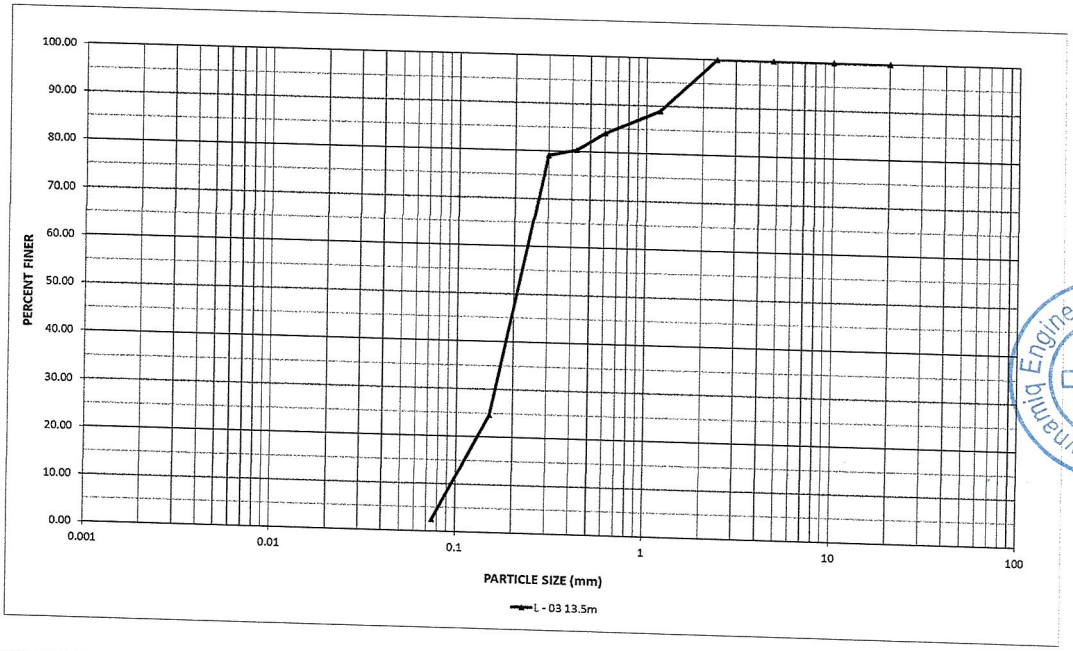
TEST REPORT

Certificate No & Date: DERC/R571/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 13.5m **Strata Description:** Brownish Gray / Silty Sand **Testing Date:** 07-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.36
2.	Moisture Content	: 22.35 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.28
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	13.5m	100.00	80.25	2.47	-	-	2.53	1.12	SP

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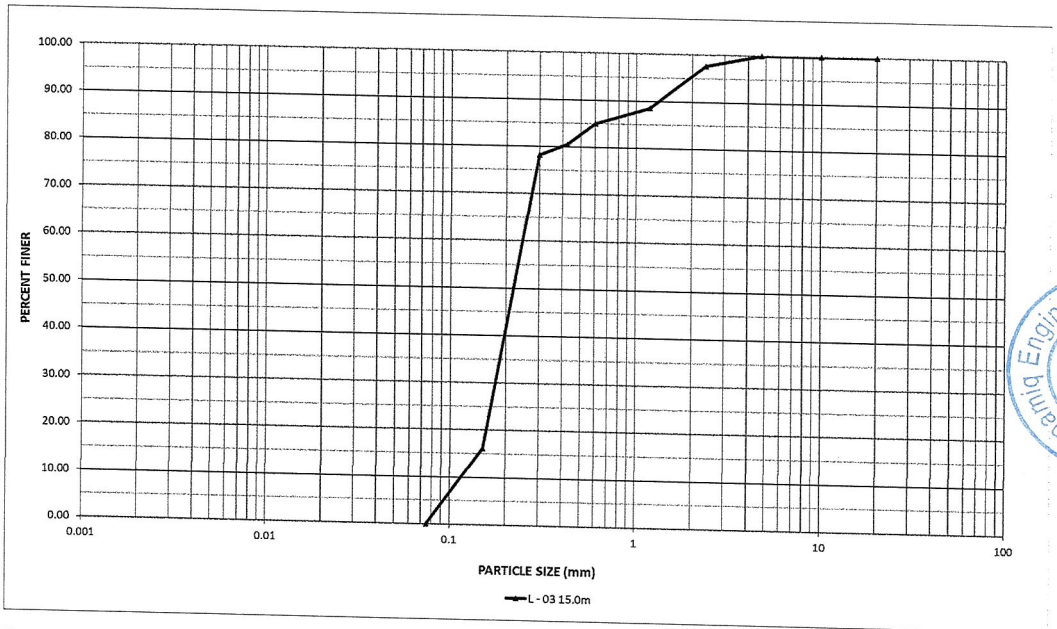
TEST REPORT

Certificate No & Date: DERC/R572/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 15.0m **Strata Description:** Yellowish Brown / Sand **Testing Date:** 07-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.40
2.	Moisture Content	: 21.05 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.20
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	15.0m	100.00	80.46	0.00	-	-	1.92	1.00	SP

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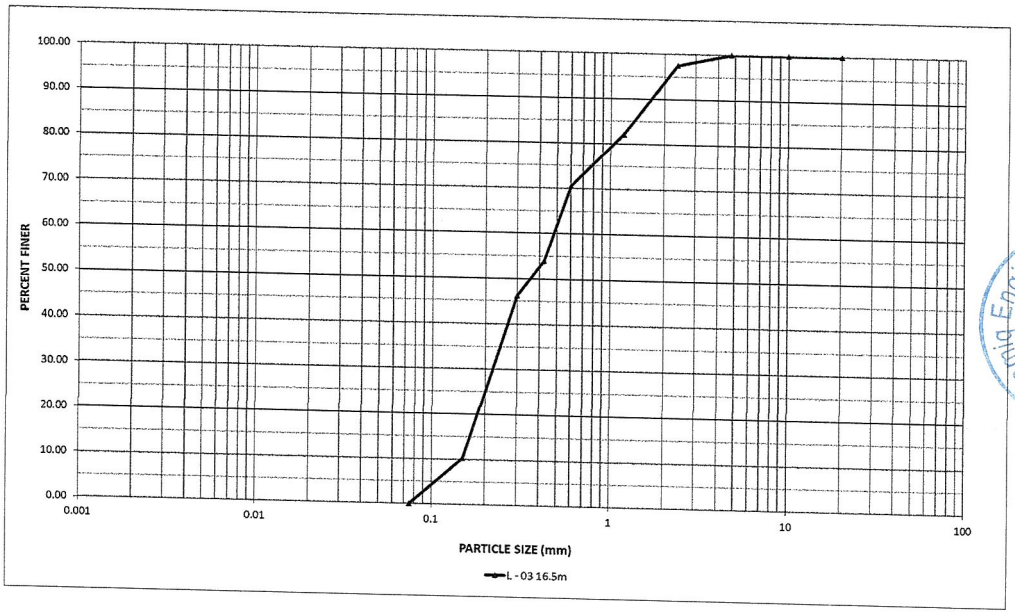
TEST REPORT

Certificate No & Date: DERC/R573/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 16.5m **Strata Description:** Yellowish Brown / Silty Sand **Testing Date:** 06-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.23
2.	Moisture Content	: 20.24%
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.35
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	16.5m	100.00	53.85	0.00	-	-	3.27	0.72	SP

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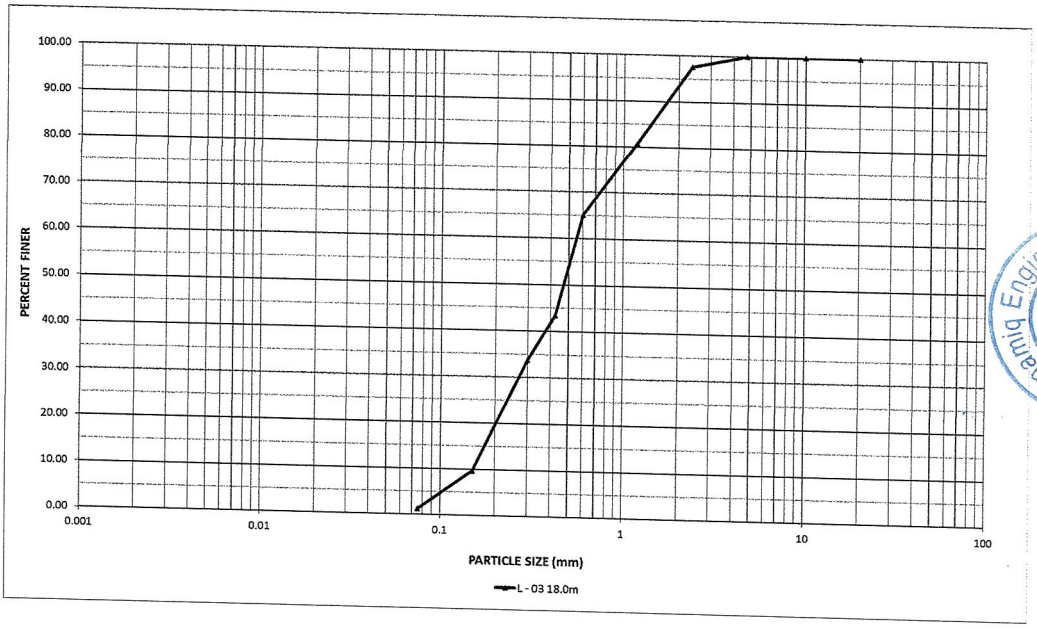
TEST REPORT

Certificate No & Date: DERC/R574/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 18.0m **Strata Description:** Yellowish Gray / Silty Sand **Testing Date:** 07-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.64
2.	Moisture Content	: 23.75 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.18
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	18.0m	100.00	43.37	1.20	-	-	3.50	0.81	SP

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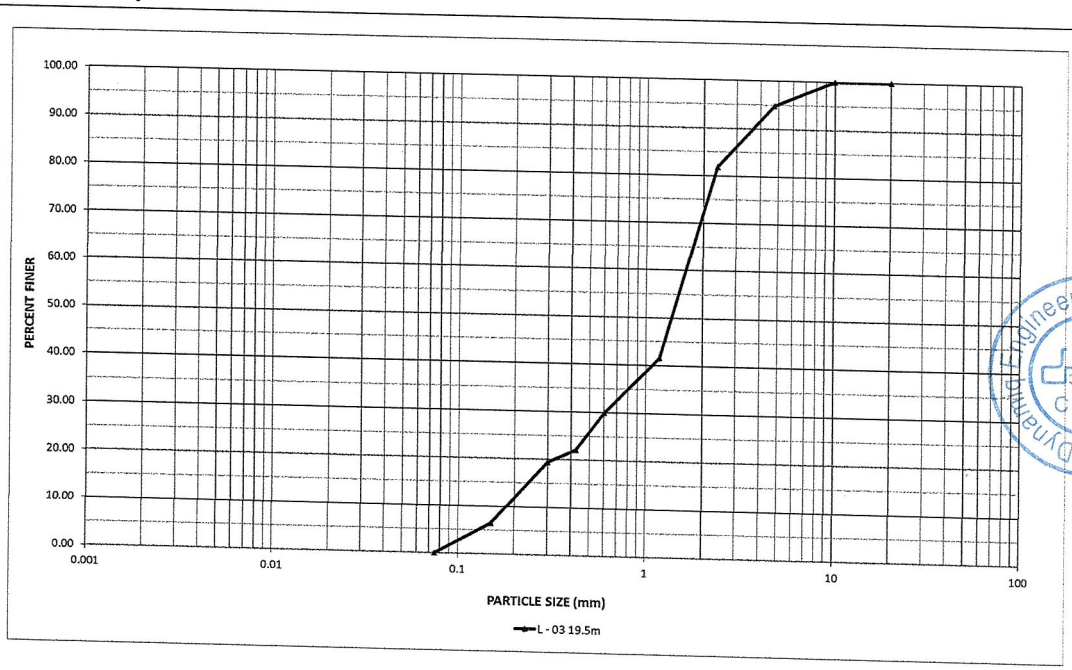
TEST REPORT

Certificate No & Date: DERC/R575/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 19.50m **Strata Description:** Gray / Sand **Testing Date:** 07-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.32
2.	Moisture Content	: 26.19 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.85
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	19.5m	94.81	22.08	0.00	-	-	8.65	1.26	SW

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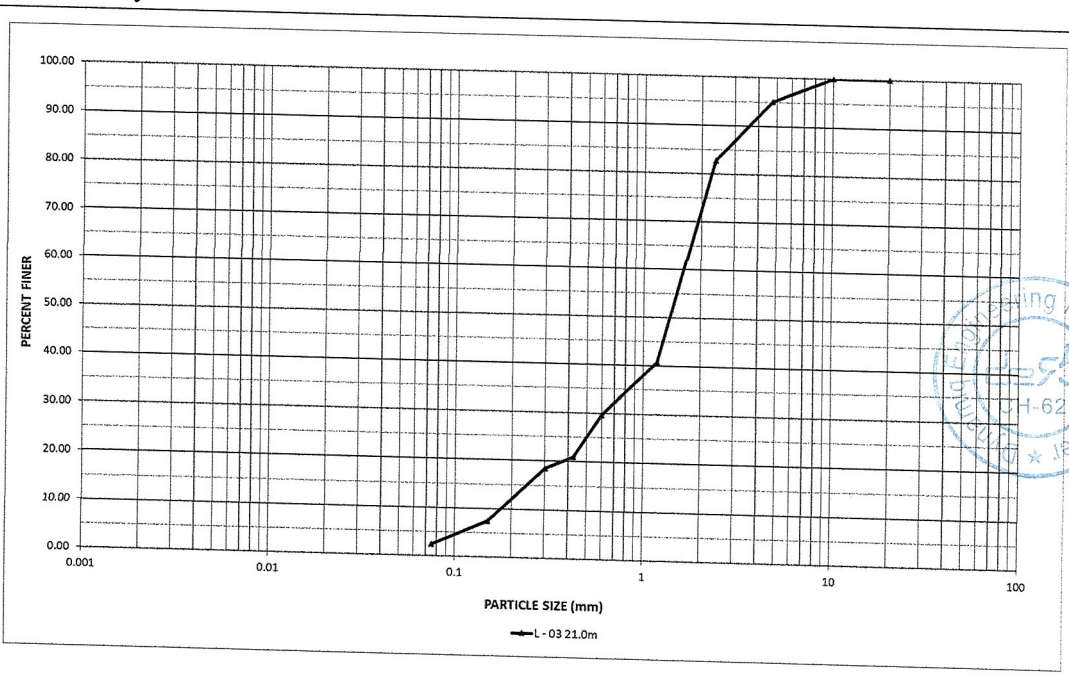
TEST REPORT

Certificate No & Date: DERC/R576/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 21.0m **Strata Description:** Gray / Sand **Testing Date:** 07-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.52
2.	Moisture Content	: 20.0 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 7.98
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	21.0m	95.06	20.99	2.47	-	-	9.41	1.37	SW

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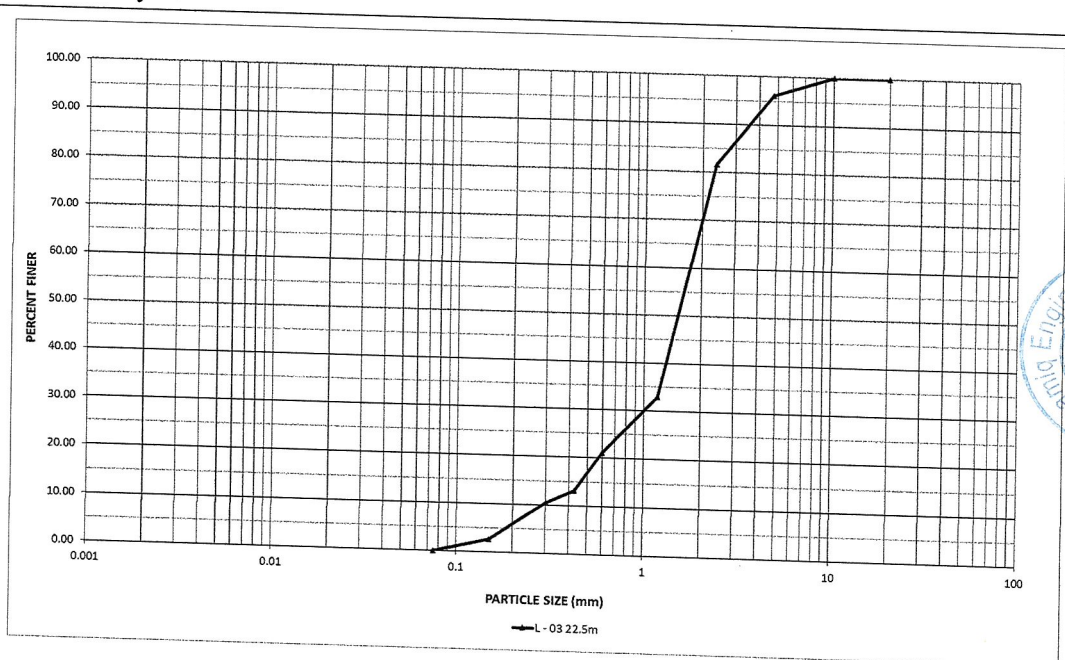
TEST REPORT

Certificate No & Date: DERC/R577/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 22.50m **Strata Description:** Gray / Sand **Testing Date:** 07-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.53
2.	Moisture Content	: 18.39 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 7.89
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 03	22.5m	96.05	13.16	0.00	-	-	5.86	2.03	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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TEST REPORT

Certificate No & Date: DERC/R578/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L3- 24.0m – 25.5m **Strata Description:** Rock **Testing Date:** 09-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.65
2.	Water Absorption	: 1.30 %
3.	Bulk Density	: 2.69 gm/cc
4.	Compressive Strength	: 51.2 N/mm^2.
5.	Core Recovery	: 46.66 %.
6.	RQD	: 13.33 %.

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TEST REPORT

Certificate No & Date: DERC/R579/2022-23 & 10-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	08-05-2022 to 09-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	12.00	0.5 1 1.5	42 87 132	0.305 0.631 0.957	33.12
2	13.50	0.5 1 1.5	44 86 130	0.319 0.624 0.943	31.93
3	15.0	0.5 1 1.5	38 82 125	0.276 0.595 0.906	32.22
4	16.50	0.5 1 1.5	39 91 132	0.283 0.660 0.957	33.99
5	18.0	0.5 1 1.5	54 105 151	0.392 0.761 1.095	35.13

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6	19.5	0.5 1 1.5	43 94 140	0.312 0.682 1.015	35.12
7	21.0	0.5 1 1.5	48 103 158	0.348 0.747 1.146	38.57
8	22.5	0.5 1 1.5	46 102 160	0.334 0.740 1.160	39.57

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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GSTIN: 33AVBPJ7079E1ZO

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 11m	Filling - Waste Material						
2	12.0	SP	22	16	33	_	30.20	17.64
3	13.5	SP	22	16	31	_	23.38	19.20
4	15.0	SP	20	15	32	_	28.13	20.01
5	16.5	SP	21	15	33	_	33.27	21.57
6	18.0	SP	25	16	35	_	43.37	23.86
7	19.5	SP	21	14	35	_	45.04	23.94
8	21.0	SP	>60	>60	38	_	78.05	59.60
9	22.50	SP	>60	>60	39	_	97.60	61.26
10	23.5	WR	>100	>100	_	_	_	70.39

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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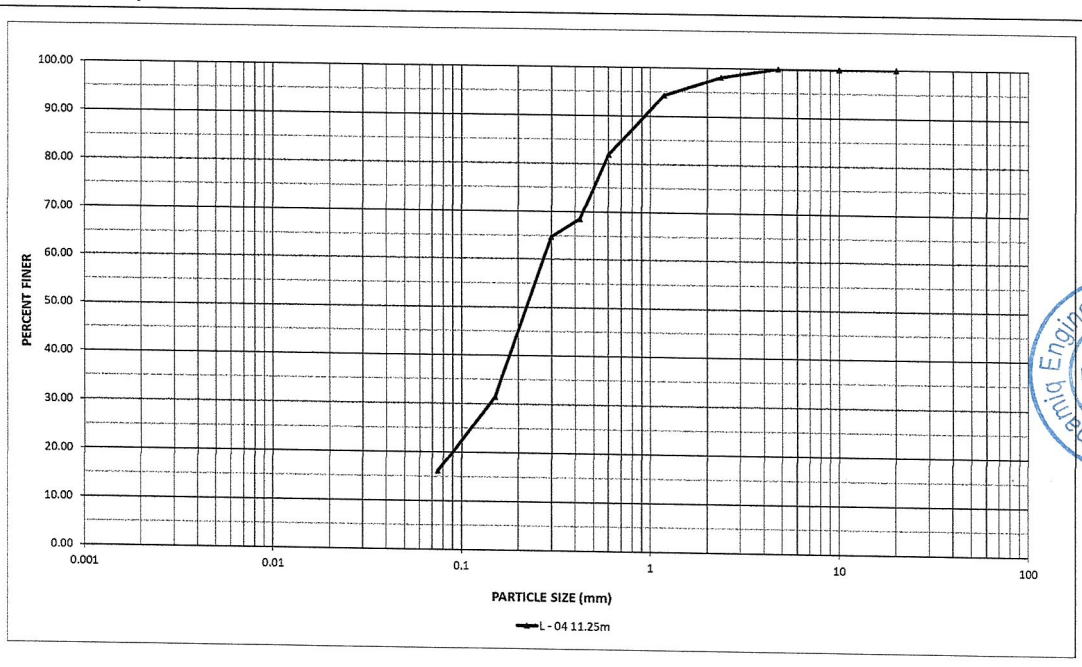
TEST REPORT

Certificate No & Date: DERC/R580/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4- 11.25m **Strata Description:** Gray / Silty Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.37
2.	Moisture Content	: 13.33 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.69
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 04	11.25m	100.00	68.57	16.19	-	-	-	-	SP - SM

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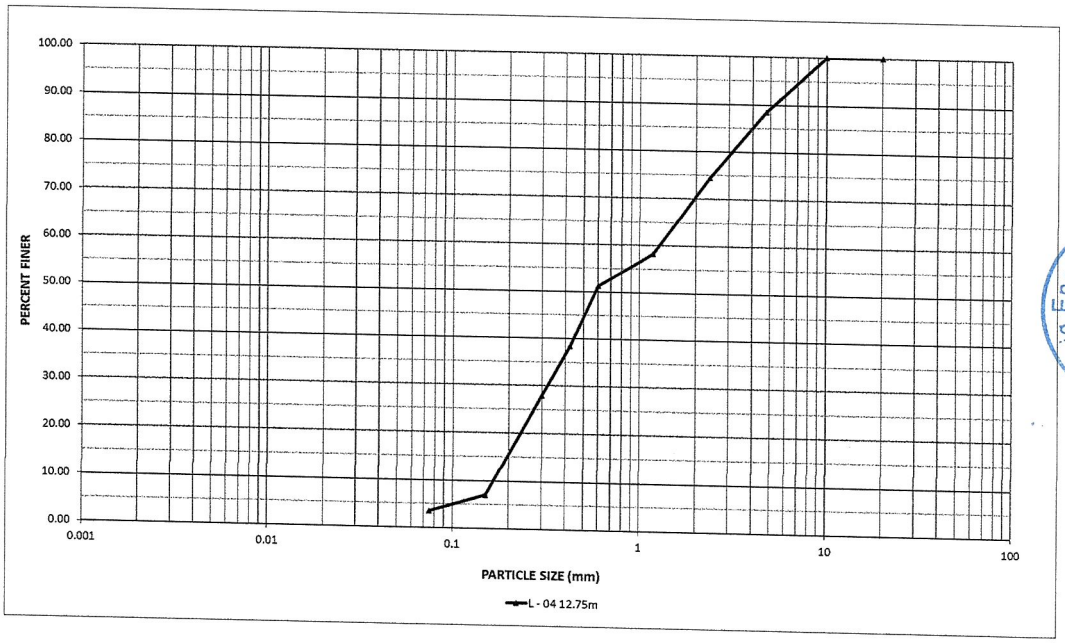
TEST REPORT

Certificate No & Date: DERC/R581/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4- 12.75m **Strata Description:** Yellowish Brown / Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.56
2.	Moisture Content	: 20.73 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.55
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 04	12.75m	88.37	38.37	3.49	-	-	8.24	0.46	SP

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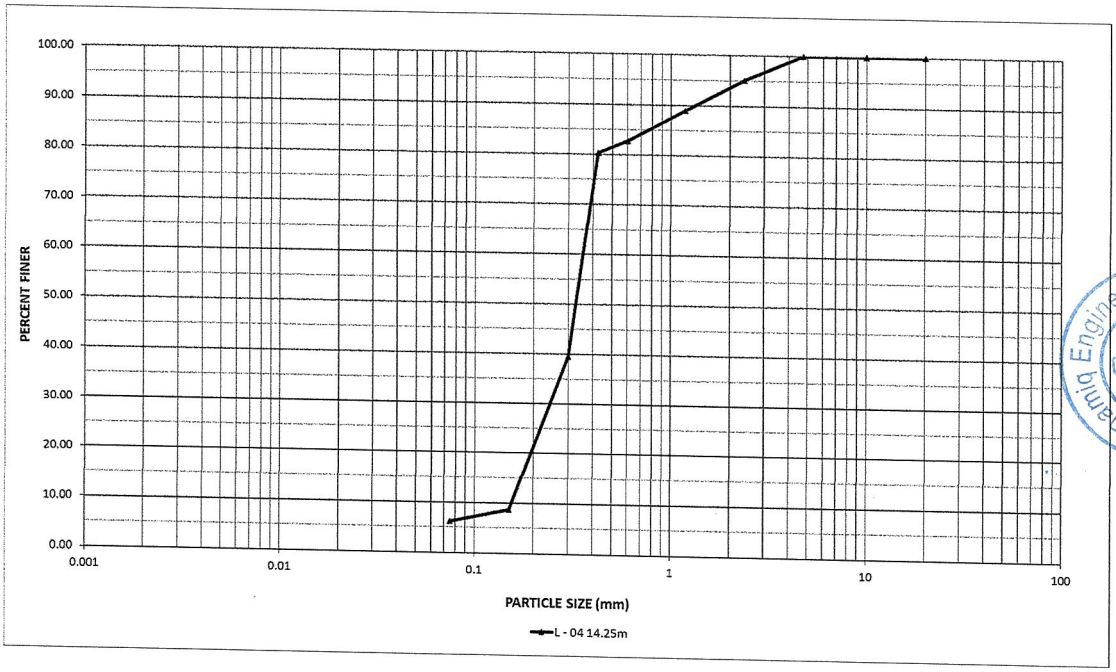
TEST REPORT

Certificate No & Date: DERC/R582/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4- 14.25m **Strata Description:** Yellowish Brown / Silty Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.63
2.	Moisture Content	: 20.99 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.65
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 04	14.25m	100.00	80.25	6.17	-	-	2.25	1.09	SP-SM

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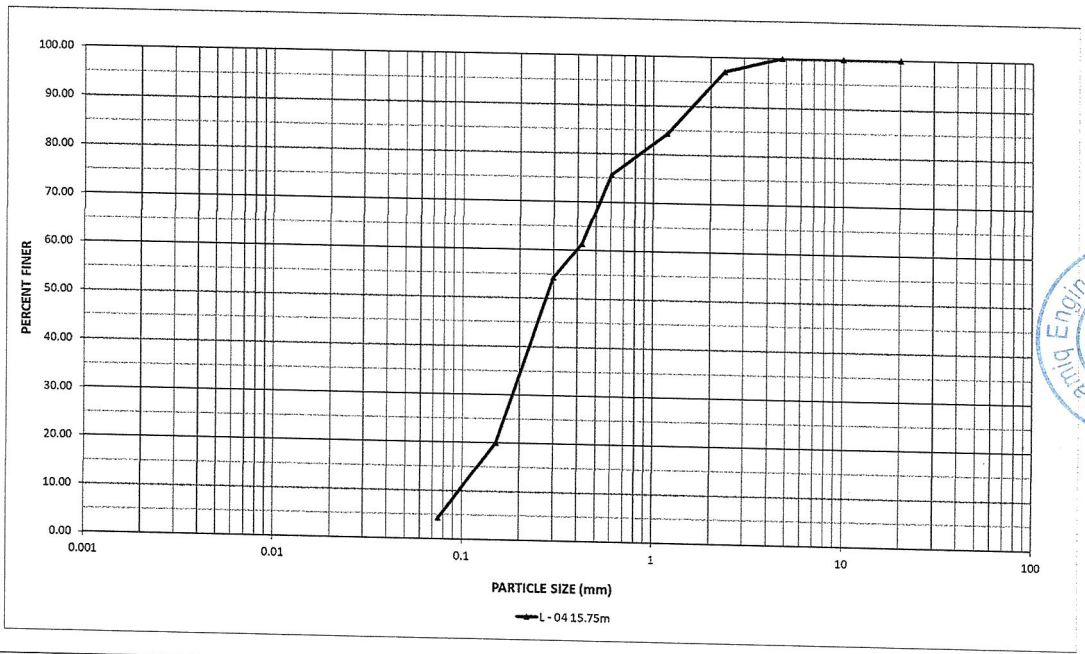
TEST REPORT

Certificate No & Date: DERC/R583/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4- 15.75m **Strata Description:** Yellowish Brown / Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.34
2.	Moisture Content	: 18.07%
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.44
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 04	15.75m	100.00	61.43	4.29	-	-	4.00	0.90	SP

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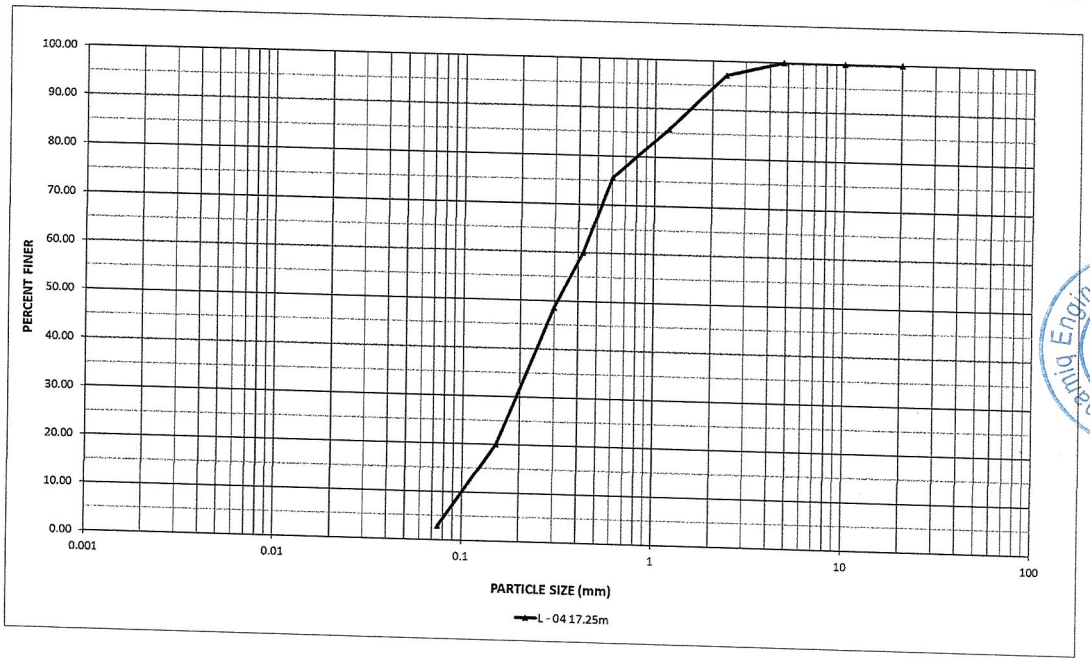
TEST REPORT

Certificate No & Date: DERC/R584/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4- 17.25m **Strata Description:** Yellowish Gray / Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.43
2.	Moisture Content	: 14.94 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.50
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 04	17.25m	100.00	60.00	2.86	-	-	4.30	0.84	SP

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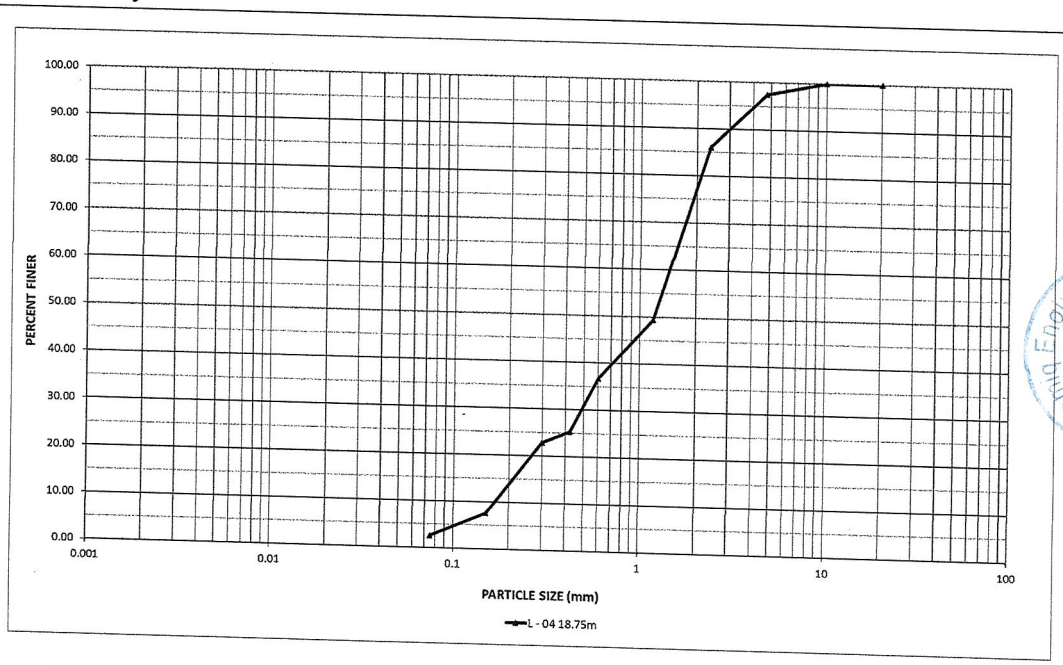
TEST REPORT

Certificate No & Date: DERC/R585/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4 – 18.75m **Strata Description:** Gray / Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.49
2.	Moisture Content	: 20.73 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.89
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 04	18.75m	97.47	25.32	2.53	-	-	9.09	1.01	SW

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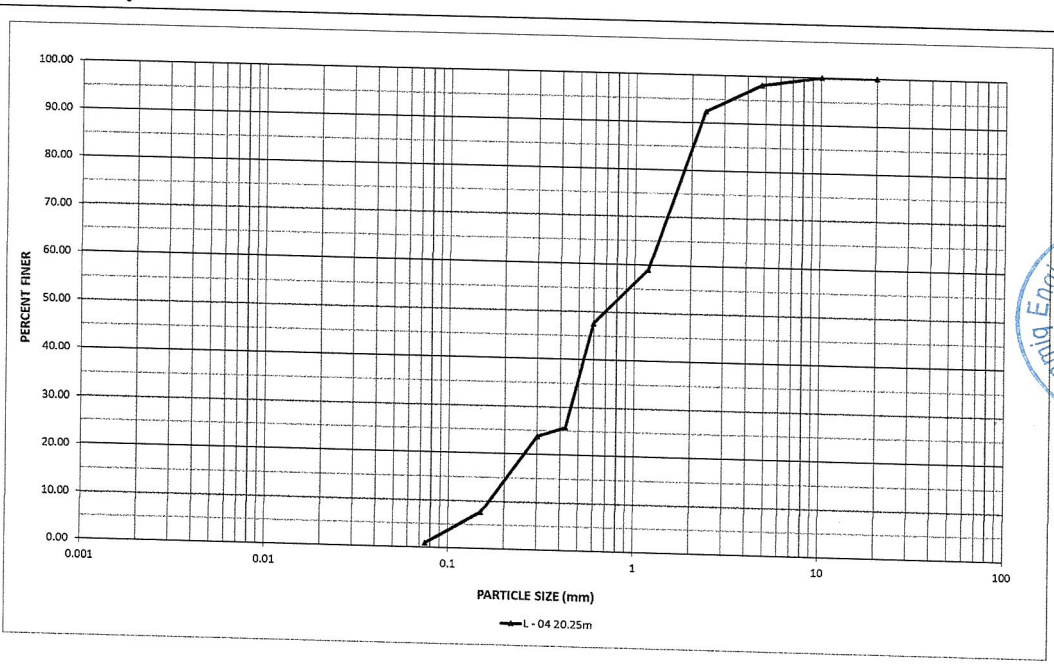
TEST REPORT

Certificate No & Date: DERC/R586/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4- 20.25m **Strata Description:** Gray / Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.68
2.	Moisture Content	: 20.83 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 8.02
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 04	20.25m	98.10	25.71	0.95	-	-	8.13	1.02	SW

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Certificate No & Date: DERC/R587/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L4 - 23.7m – 25.2m **Strata Description:** Rock **Testing Date:** 09-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.74
2.	Water Absorption	: 1.45 %
3.	Bulk Density	: 2.65 gm/cc
4.	Compressive Strength	: 53.8 N/mm^2.
5.	Core Recovery	: 53.3 %.
6.	RQD	: 49 %.

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TEST REPORT

Certificate No & Date: DERC/R588/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	09-05-2022 to 10-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	11.25	0.5 1 1.5	43 89 131	0.312 0.645 0.950	32.55
2	12.75	0.5 1 1.5	44 87 135	0.319 0.631 0.979	33.40
3	14.25	0.5 1 1.5	41 99 139	0.297 0.718 1.008	35.39
4	15.75	0.5 1 1.5	35 83 121	0.254 0.602 0.877	31.93
5	17.25	0.5 1 1.5	46 100 147	0.334 0.725 1.066	36.22

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6	18.75	0.5 1 1.5	52 118 160	0.377 0.856 1.160	38.08
7	20.25	0.5 1 1.5	49 106 159	0.355 0.769 1.153	38.57

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 10.5m	Filling - Waste Material						
2	11.25	SP	20	16	32	_	22.45	18.83
3	12.75	SP	21	16	33	_	19.77	20.05
4	14.25	SP	23	16	35	_	40.01	21.28
5	15.75	SP	22	16	31	_	36.16	22.59
6	17.25	SP	23	16	36	_	43.48	23.89
7	18.75	SP	>60	>60	38	_	59.54	57.80
8	20.25	SP	>60	>60	38	_	82.61	59.18
9	21.75	WR	>100	>100	_	_	_	67.95

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

Note: -

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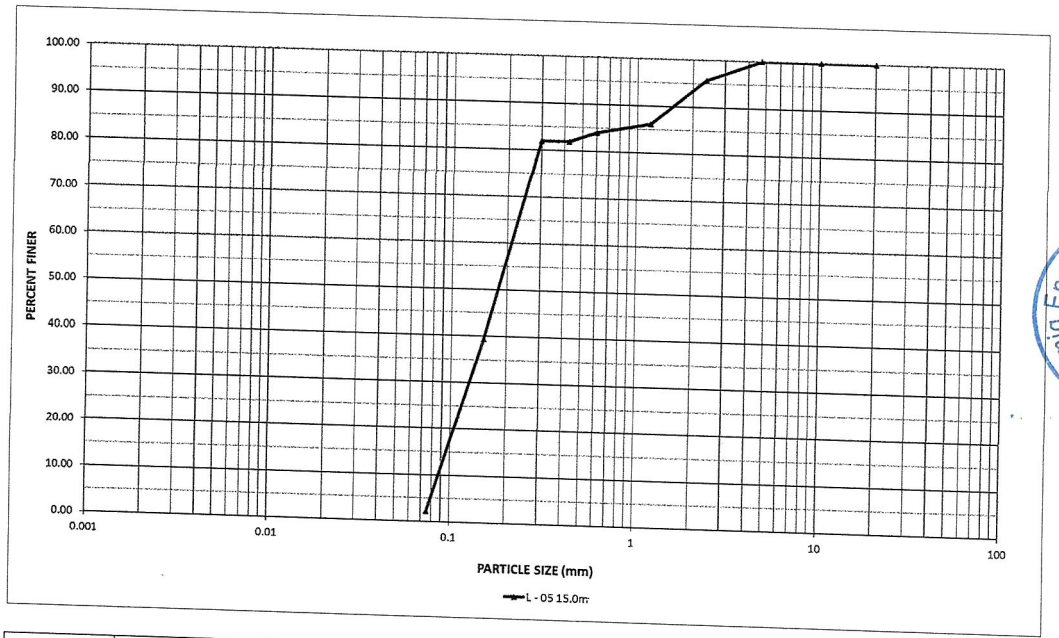
TEST REPORT

Certificate No & Date: DERC/R589/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L5- 15.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 10-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.37
2.	Moisture Content	: 21.07 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.30
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 05	15.0m	100.00	81.91	2.13	-	-	2.61	0.97	SP

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GSTIN: 33AVBPJ7079E1ZO

DYNAMIQ ENGINEERING RESEARCH CENTRE

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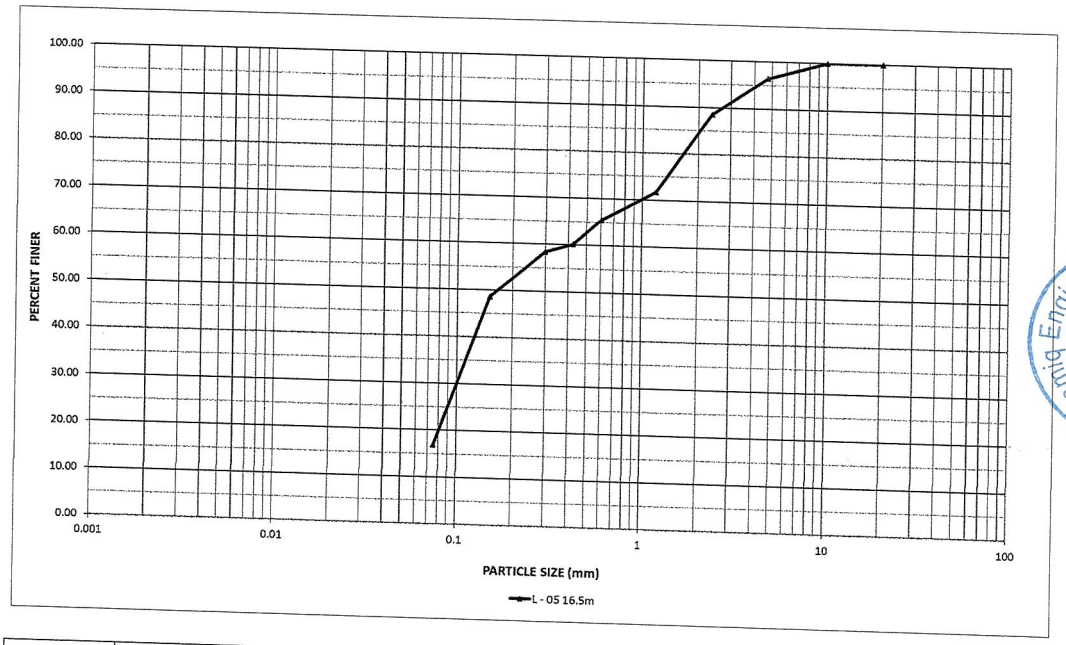
TEST REPORT

Certificate No & Date: DERC/R590/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L5- 16.5m **Strata Description:** Gray / Silty Sand **Testing Date:** 10-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.34
2.	Moisture Content	: 23.14 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.55
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 05	16.5m	96.46	60.18	16.81	-	-	-	-	SP-SM

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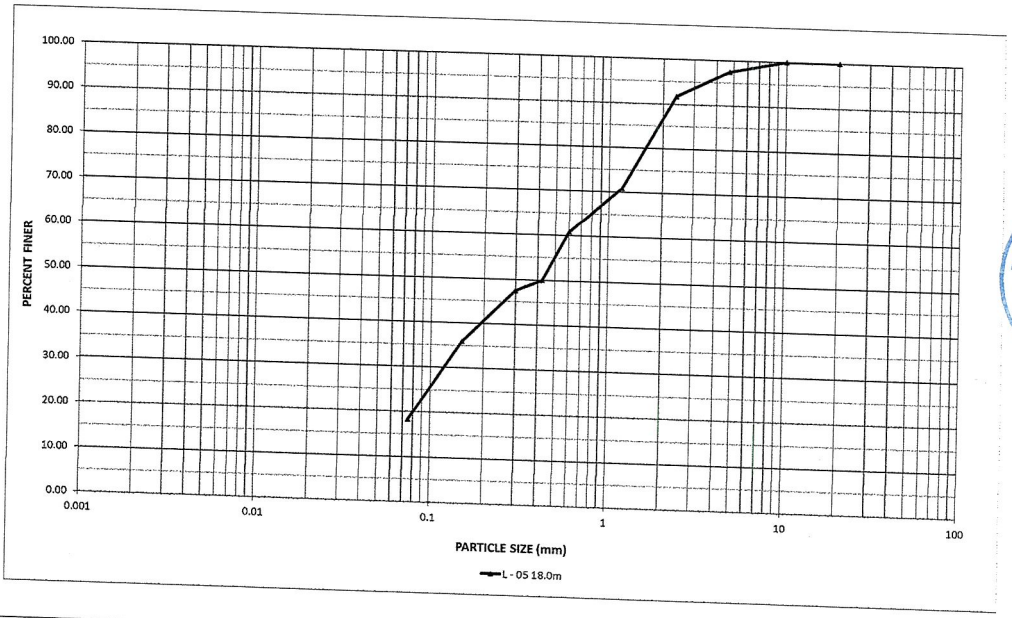
TEST REPORT

Certificate No & Date: DERC/R591/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L5- 18.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 09-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.25
2.	Moisture Content	: 23.70 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.35
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 05	18.0m	97.50	50.00	18.33	-	-	_	_	SP-SM

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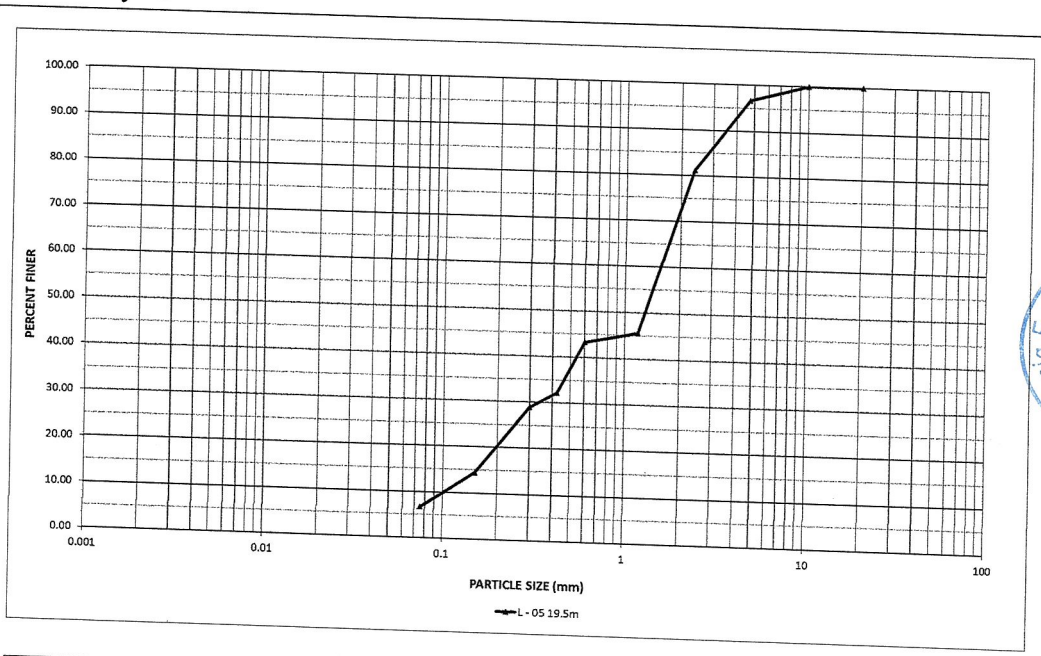
TEST REPORT

Certificate No & Date: DERC/R592/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L5- 19.5m **Strata Description:** Gray / Silty Sand **Testing Date:** 10-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.33
2.	Moisture Content	: 27.37%
3.	Bulk Density	: 1.8 gm/cc
4.	pH	: 7.63
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 05	19.5m	96.67	32.22	6.67	-	-	16.00	0.72	SP-SM

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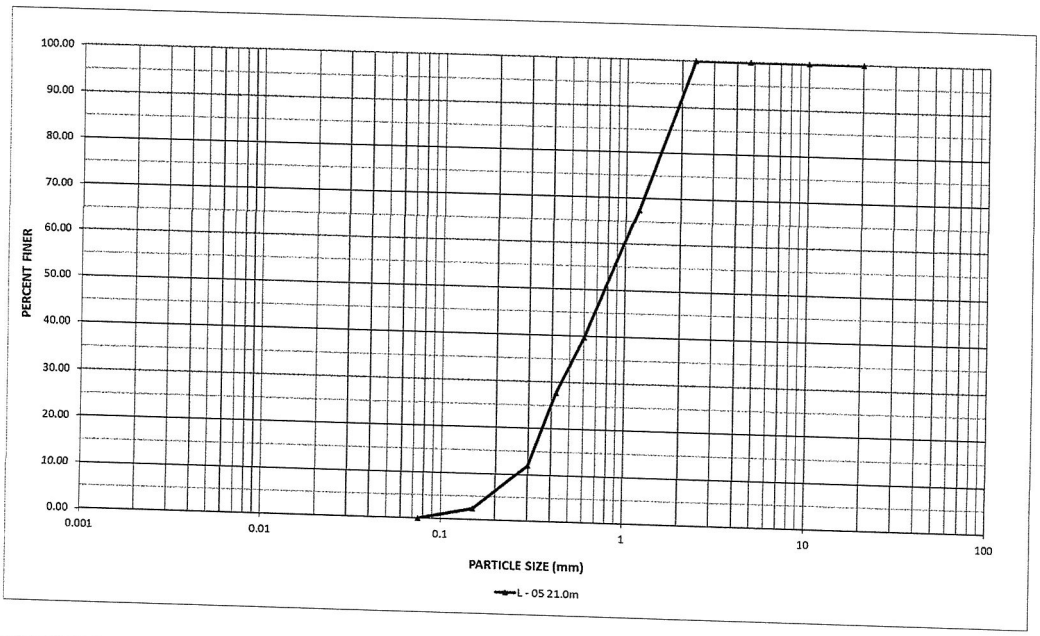
TEST REPORT

Certificate No & Date: DERC/R593/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L5- 21.0m **Strata Description:** Gray / Sand **Testing Date:** 10-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.34
2.	Moisture Content	: 12.57 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 7.16
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 05	21.0m	100.00	27.78	0.00	-	-	3.85	0.81	SP

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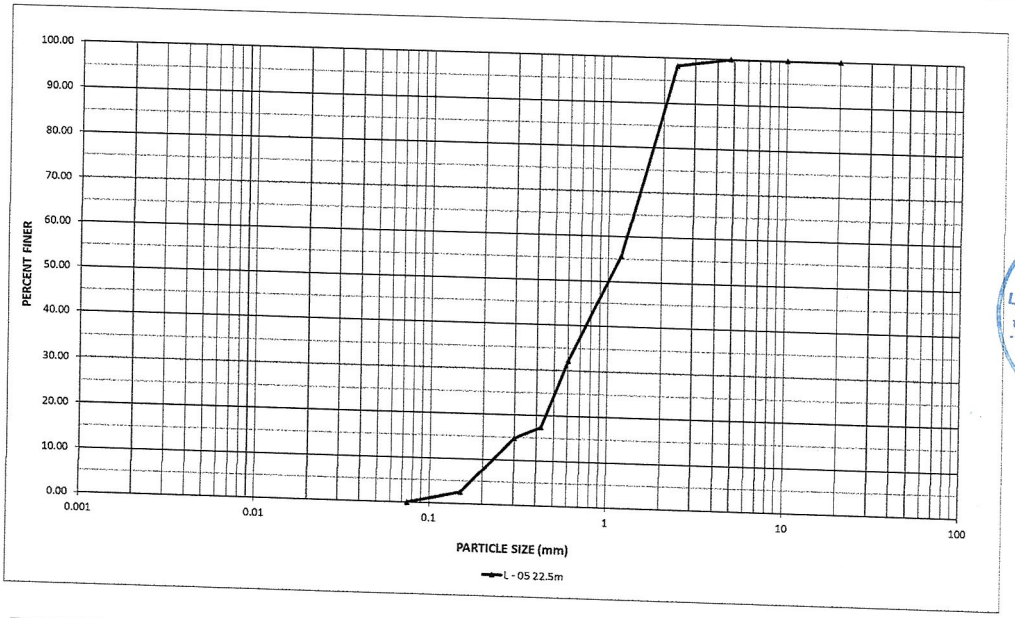
TEST REPORT

Certificate No & Date: DERC/R594/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L5 – 22.5m **Strata Description:** Gray / Sand **Testing Date:** 10-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.49
2.	Moisture Content	: 16.75 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.39
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 05	22.5m	100.00	17.39	0.00	-	-	6.09	1.01	SW

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TEST REPORT

Certificate No & Date: DERC/R595/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L5- 25.0m – 26.5m **Strata Description:** Rock **Testing Date:** 10-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.73
2.	Water Absorption	: 0.88 %
3.	Bulk Density	: 2.59 gm/cc
4.	Compressive Strength	: 54.3 N/mm^2.
5.	Core Recovery	: 38.86 %.
6.	RQD	: 14 %.

Note: -

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TEST REPORT

Certificate No & Date: DERC/R596/2022-23 & 11-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	09-05-2022 to 10-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	15.0	0.5 1 1.5	46 101 139	0.334 0.732 1.008	33.83
2	16.50	0.5 1 1.5	49 106 146	0.355 0.769 1.059	35.12
3	18.0	0.5 1 1.5	42 90 129	0.305 0.653 0.935	32.26
4	19.50	0.5 1 1.5	43 87 133	0.312 0.631 0.964	33.12
5	21.0	0.5 1 1.5	47 98 152	0.341 0.711 1.102	37.29

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6	22.5	0.5 1 1.5	52 108 160	0.377 0.783 1.160	38.08

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

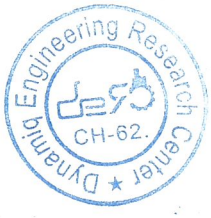
N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.



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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 13.7m	Filling - Waste Material						
2	15.0	SP	24	17	33	–	23.78	19.64
3	16.5	SP-SM	29	18	35	–	21.35	21.60
4	18.0	SP-SM	18	14	32	–	41.42	19.88
5	19.5	SP-SM	21	15	33	–	39.37	21.84
6	21.0	SP	>60	>60	37	–	47.39	56.34
7	22.5	SW	>60	>60	38	–	60.23	57.57
8	24.0	WR	>100	>100		–	–	66.34

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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A. RAMESH M.E
Quality Engineer
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AVADI, Chennai - 600 062.

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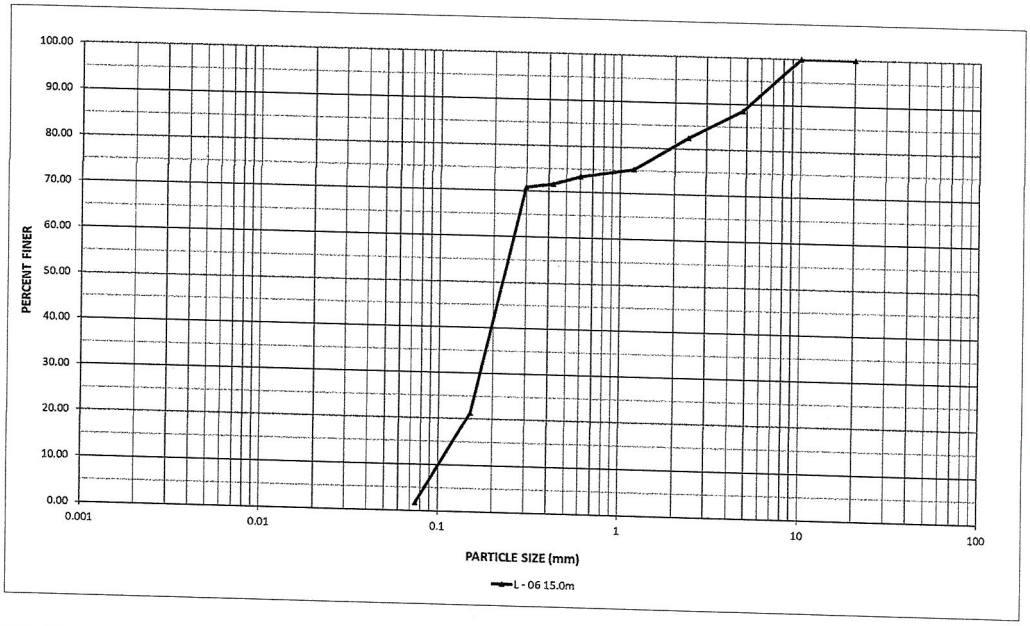
TEST REPORT

Certificate No & Date: DERC/R597/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L6- 15.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.30
2.	Moisture Content	: 26.67 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 6.58
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 06	15.0m	88.50	71.68	1.77	-	-	2.60	1.25	SP - SM

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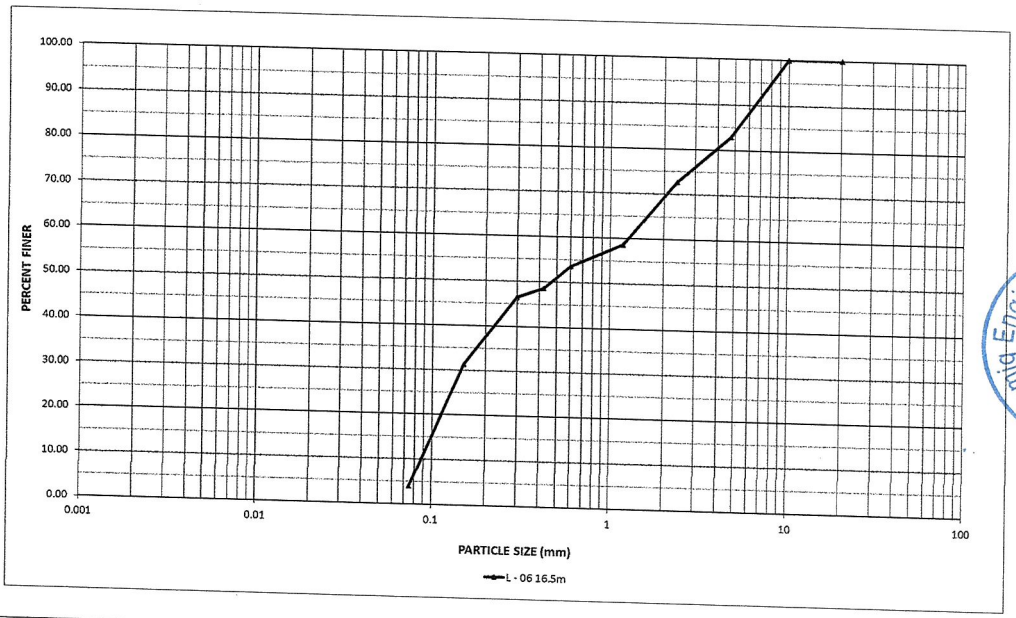
TEST REPORT

Certificate No & Date: DERC/R598/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L6- 16.5m **Strata Description:** Gray / Silty Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.43
2.	Moisture Content	: 27.60 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 6.95
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 06	16.5m	82.83	48.48	4.04	-	-	15.56	0.18	SP

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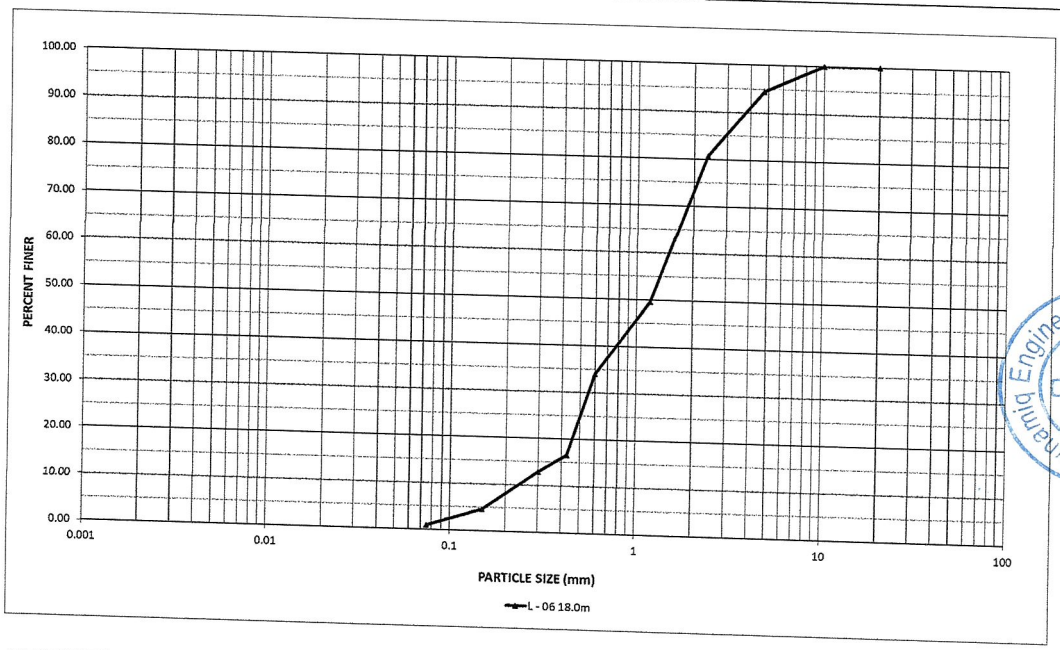
TEST REPORT

Certificate No & Date: DERC/R599/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L6- 18.0m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.44
2.	Moisture Content	: 21.49 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.33
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 06	18.0m	94.50	16.51	0.92	-	-	6.46	0.84	SP

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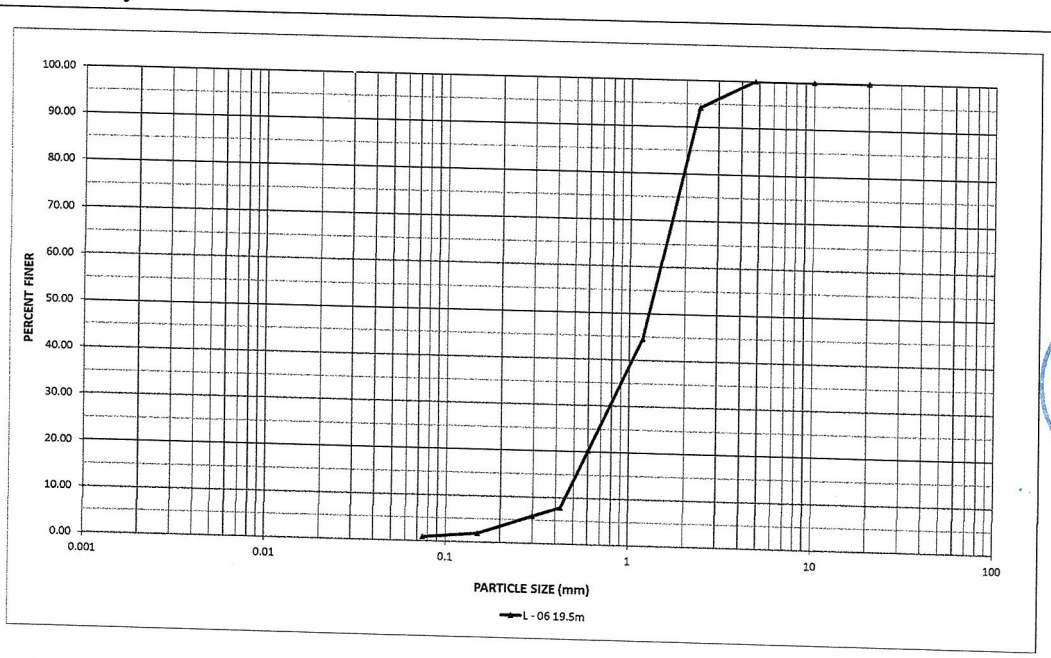
TEST REPORT

Certificate No & Date: DERC/R600/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L6- 19.5m **Strata Description:** Yellowish Brown / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.57
2.	Moisture Content	: 24.43%
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.21
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 06	19.5m	100.00	7.77	0.97	-	-	3.33	0.95	SP

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GSTIN: 33AVBPJ7079E1ZO

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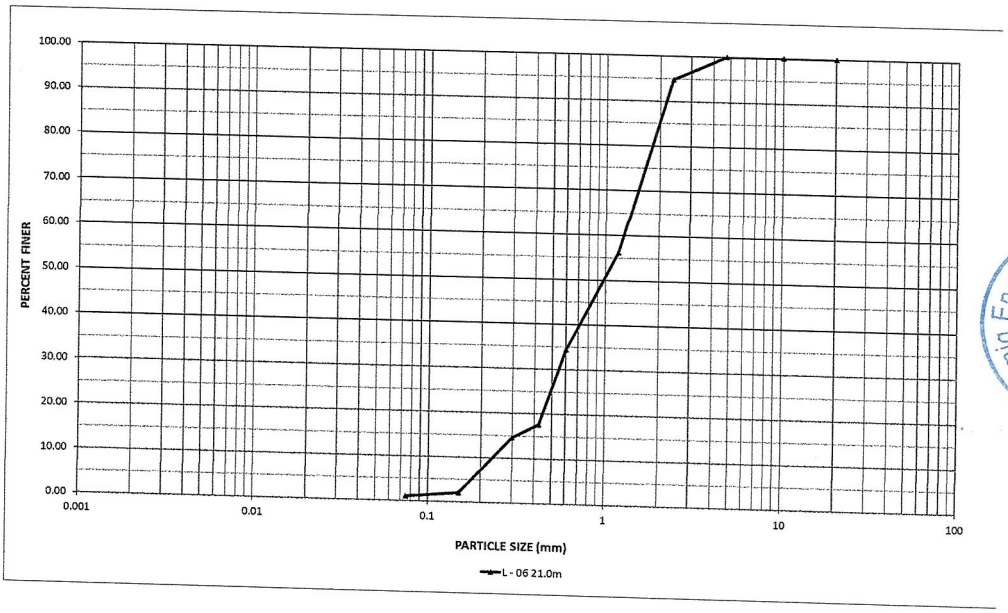
TEST REPORT

Certificate No & Date: DERC/R601/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L6- 21.0m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.43
2.	Moisture Content	: 16.37 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.64
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 06	21.0m	100.00	17.71	1.04	-	-	5.63	0.93	SP

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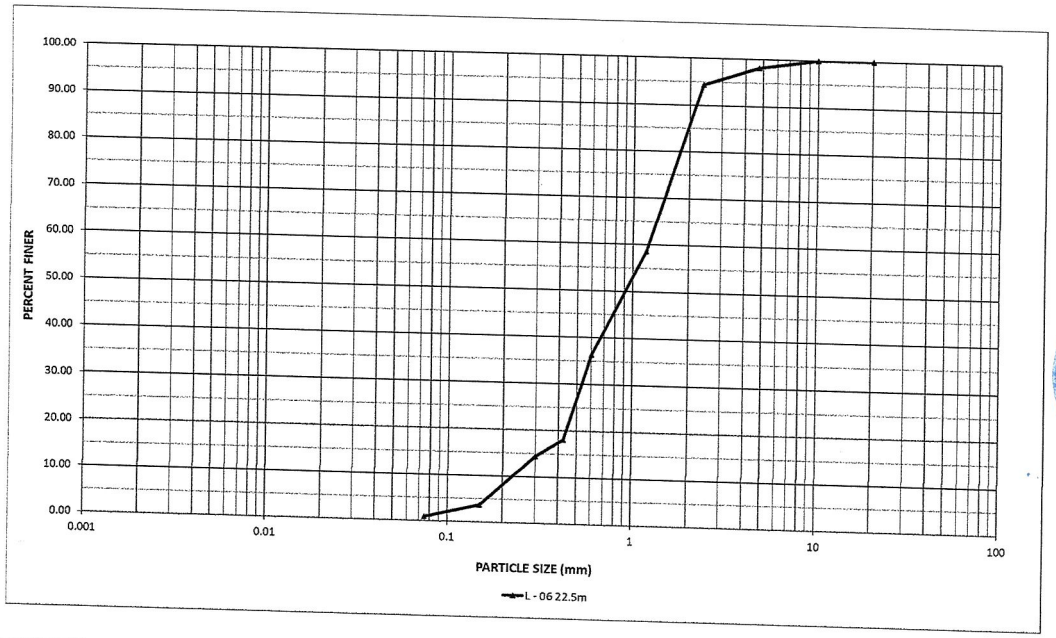
TEST REPORT

Certificate No & Date: DERC/R602/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L6 – 22.5m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26)

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.57
2.	Moisture Content	: 16.47 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.32
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 06	22.5m	98.14	18.14	0.93	-	-	5.87	0.90	SP

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TEST REPORT

Certificate No & Date: DERC/R603/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L6- 25.0m – 26.5m **Strata Description:** Rock **Testing Date:** 11-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.66
2.	Water Absorption	: 1.08 %
3.	Bulk Density	: 2.59 gm/cc
4.	Compressive Strength	: 48.92 N/mm^2.
5.	Core Recovery	: 37.33 %.
6.	RQD	: 28 %.

Note: -

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TEST REPORT

Certificate No & Date: DERC/R604/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	10-05-2022 to 11-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	15.0	0.5 1 1.5	38 83 126	0.276 0.602 0.914	32.55
2	16.5	0.5 1 1.5	37 90 135	0.268 0.653 0.979	35.39
3	18.0	0.5 1 1.5	41 93 142	0.297 0.674 1.030	36.22
4	19.5	0.5 1 1.5	55 110 160	0.399 0.798 1.160	37.29
5	21.0	0.5 1 1.5	48 96 159	0.348 0.696 1.153	38.84

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6	22.5	0.5 1 1.5	61 116 175	0.442 0.841 1.269	39.57

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 13.9m		Filling - Waste Material					
2	15.0	SP-SM	44	25	32	_	28.13	26.30
3	16.5	SP	28	18	35	_	42.03	22.35
4	18.0	SP	>60	>60	36	_	56.73	54.79
5	19.5	SP	>60	>60	37	_	69.30	56.16
6	21.0	SP	>60	>60	38	_	82.93	57.54
7	22.5	SP	>60	>60	39	_	97.60	58.92
8	24.0	WR	>100	>100	_	_	_	67.69

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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Quality Engineer
Dynamiq Engineering Research Centre
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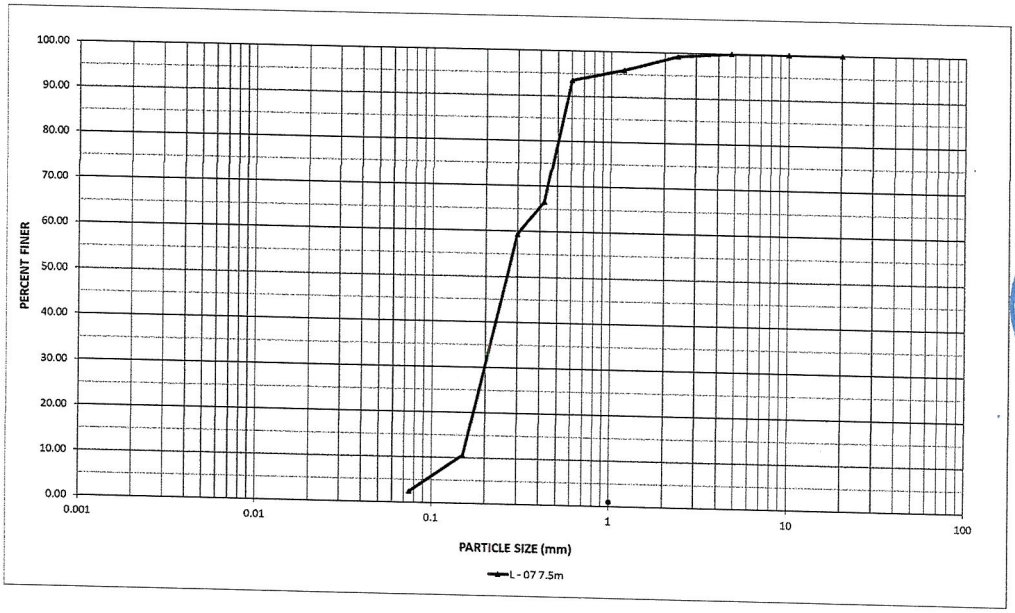
TEST REPORT

Certificate No & Date: DERC/R605/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 7.50m **Strata Description:** Grayish Brown / Silty Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.68
2.	Moisture Content	: 20.73 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 6.66
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	7.5m	100.00	66.67	2.44	-	-	2.07	0.86	SP

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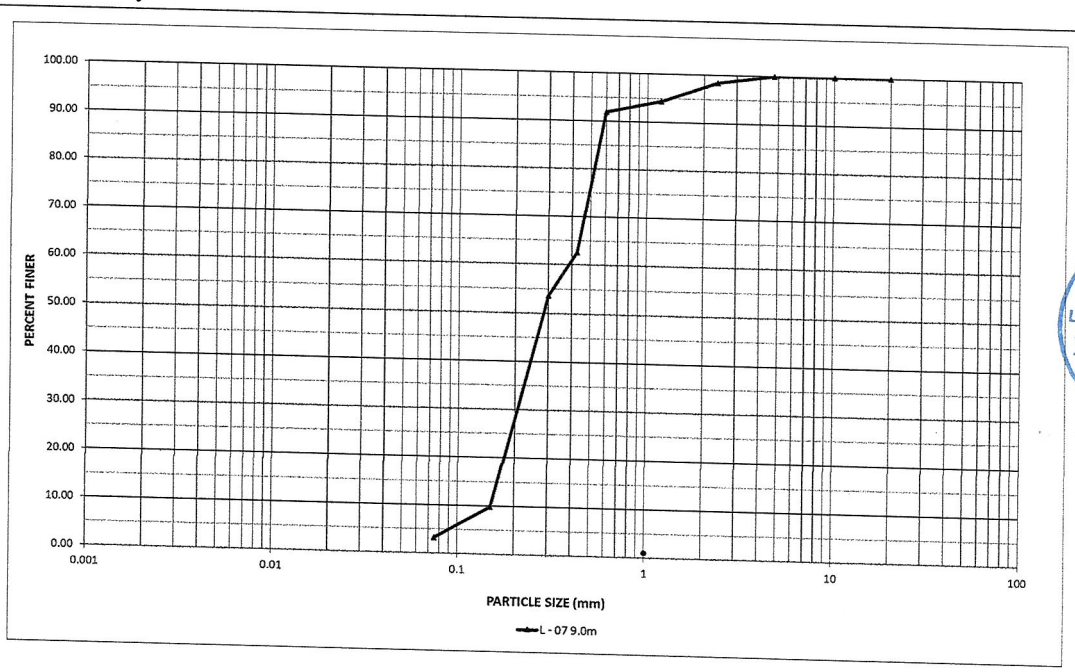
TEST REPORT

Certificate No & Date: DERC/R605-A/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 9.0m **Strata Description:** Grayish Brown / Silty Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.61
2.	Moisture Content	: 22.33 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 6.82
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	9.0m	100.00	62.60	3.25	-	-	2.52	0.73	SP

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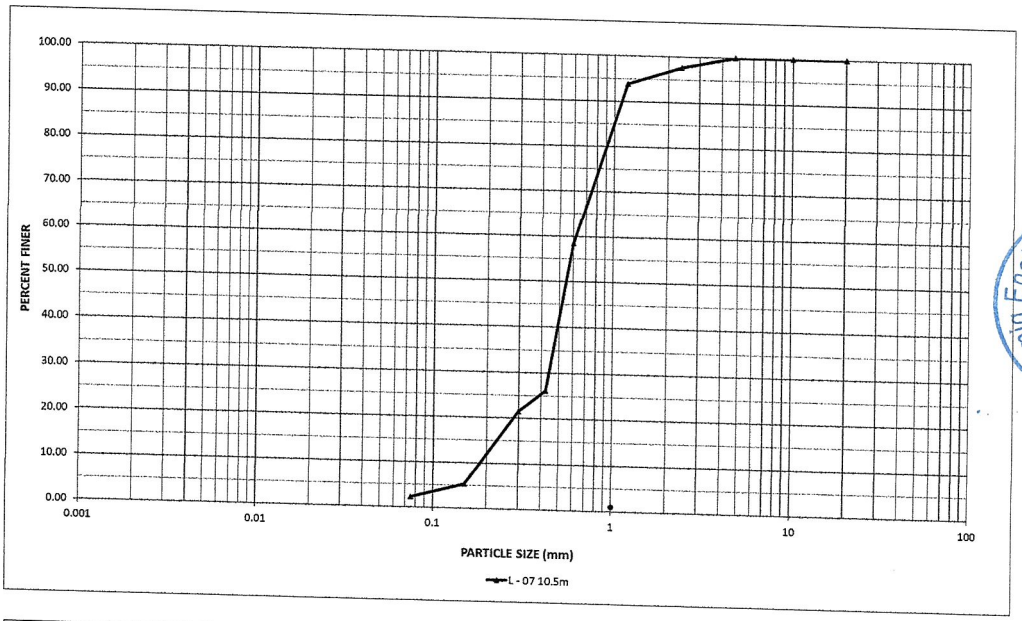
TEST REPORT

Certificate No & Date: DERC/R606/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 10.5m **Strata Description:** Grayish Brown / Silty Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.63
2.	Moisture Content	: 21.40 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 7.31
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	10.5m	100.00	26.15	2.31	-	-	3.26	1.72	SP

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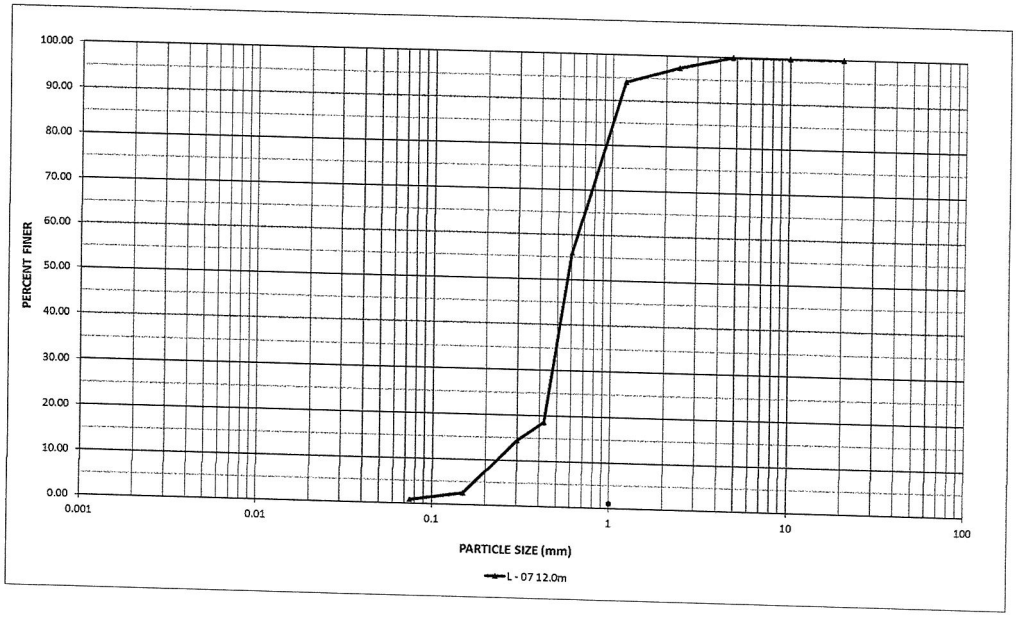
TEST REPORT

Certificate No & Date: DERC/R607/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 12.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.61
2.	Moisture Content	: 20.81 %
3.	Bulk Density	: 1.70 gm/cc
4.	pH	: 7.83
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	12.0m	100.00	18.64	0.85	-	-	2.71	1.48	SP

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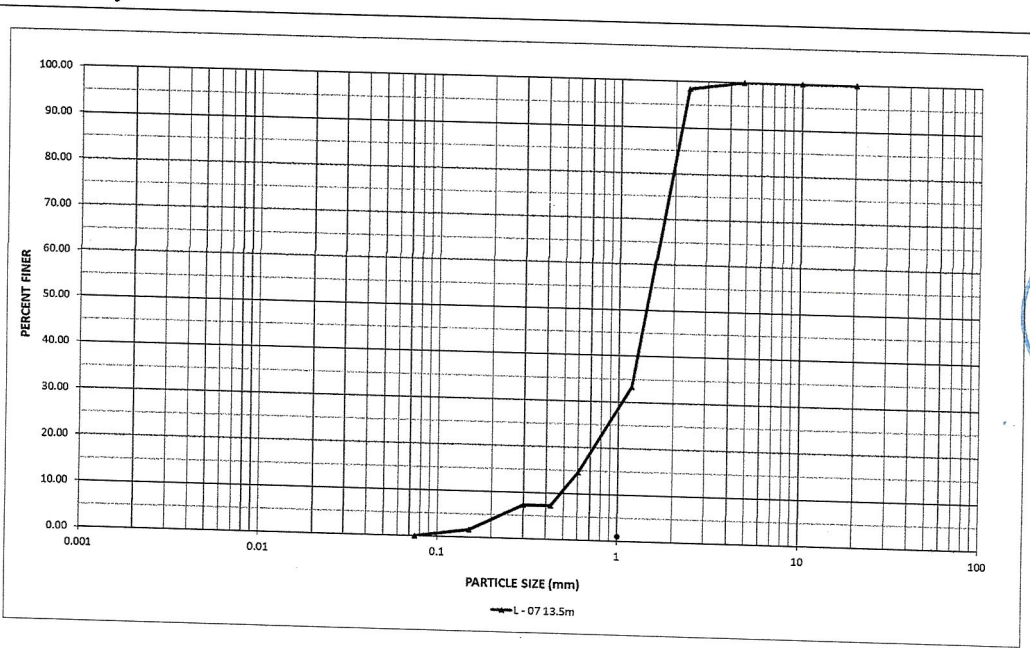
TEST REPORT

Certificate No & Date: DERC/R608/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 13.50m **Strata Description:** Grayish Brown / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.58
2.	Moisture Content	: 32.31%
3.	Bulk Density	: 17.5 gm/cc
4.	pH	: 7.34
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	13.5m	100.00	7.32	0.00	-	-	3.20	1.51	SP

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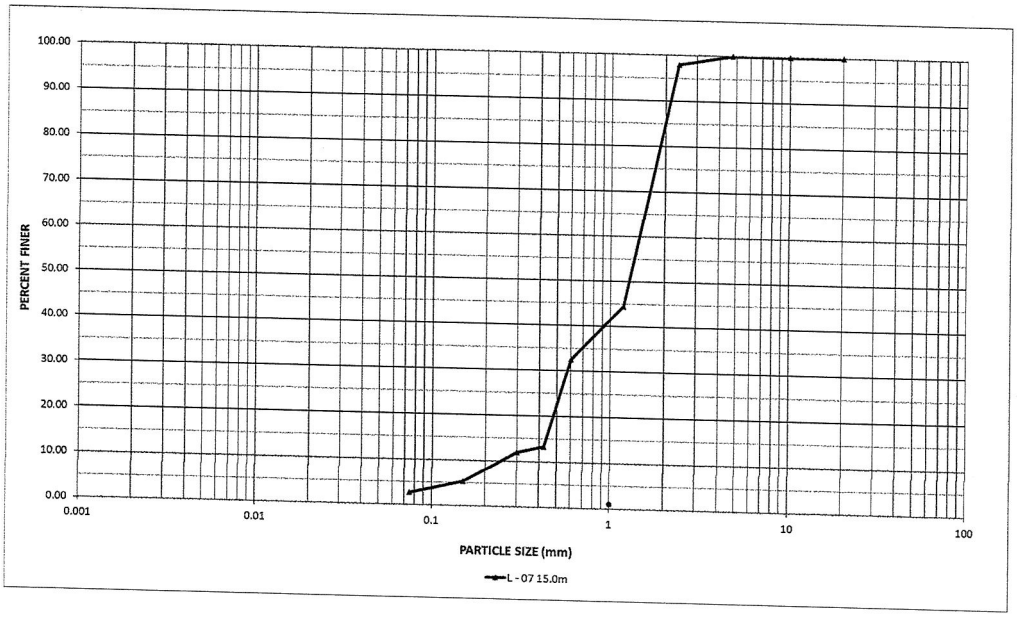
TEST REPORT

Certificate No & Date: DERC/R609/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 15.0m **Strata Description:** Grayish Brown / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.59
2.	Moisture Content	: 21.06%
3.	Bulk Density	: 19.0 gm/cc
4.	pH	: 7.49
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	15.0m	100.00	13.25	2.65	-	-	6.00	0.90	SP

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TEST REPORT

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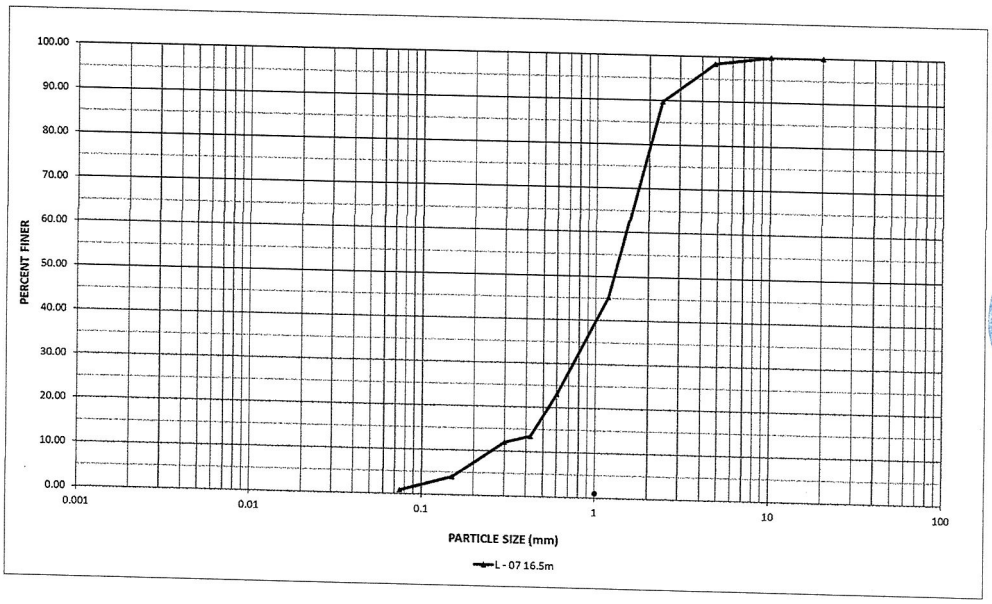
Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7 – 16.5m **Strata Description:** Grayish Brown / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.62
2.	Moisture Content	: 18.89 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 8.15
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	16.5m	98.41	13.49	0.79	-	-	5.77	1.44	SP

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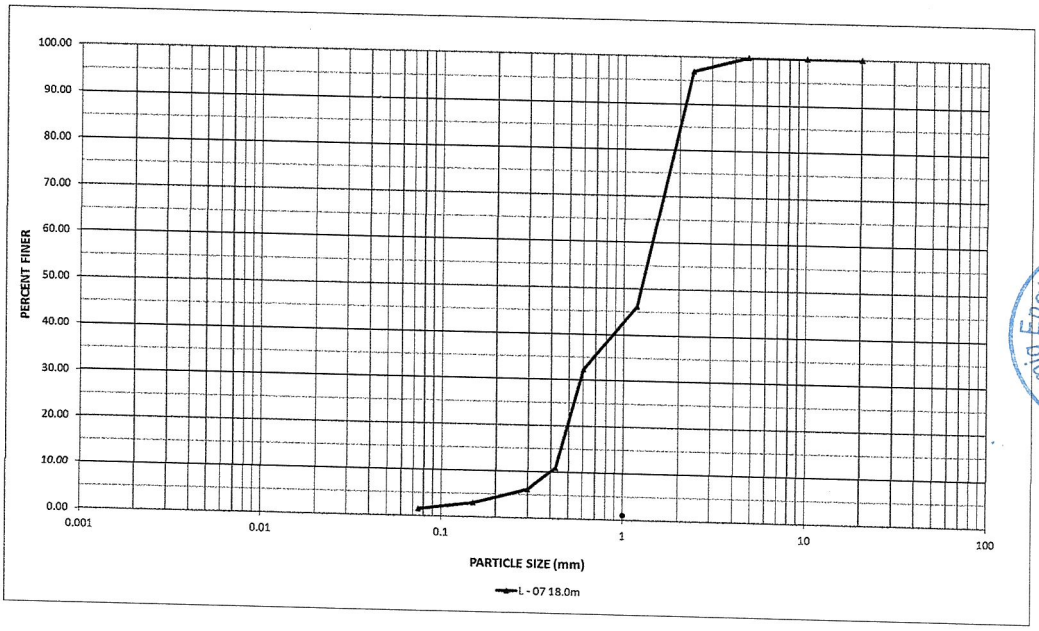
TEST REPORT

Certificate No & Date: DERC/R611/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 18.0m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.47
2.	Moisture Content	: 15.23 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 8.32
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	18.0m	100.00	10.77	1.54	-	-	3.66	0.55	SP

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GSTIN: 33AVBPJ7079E1ZO

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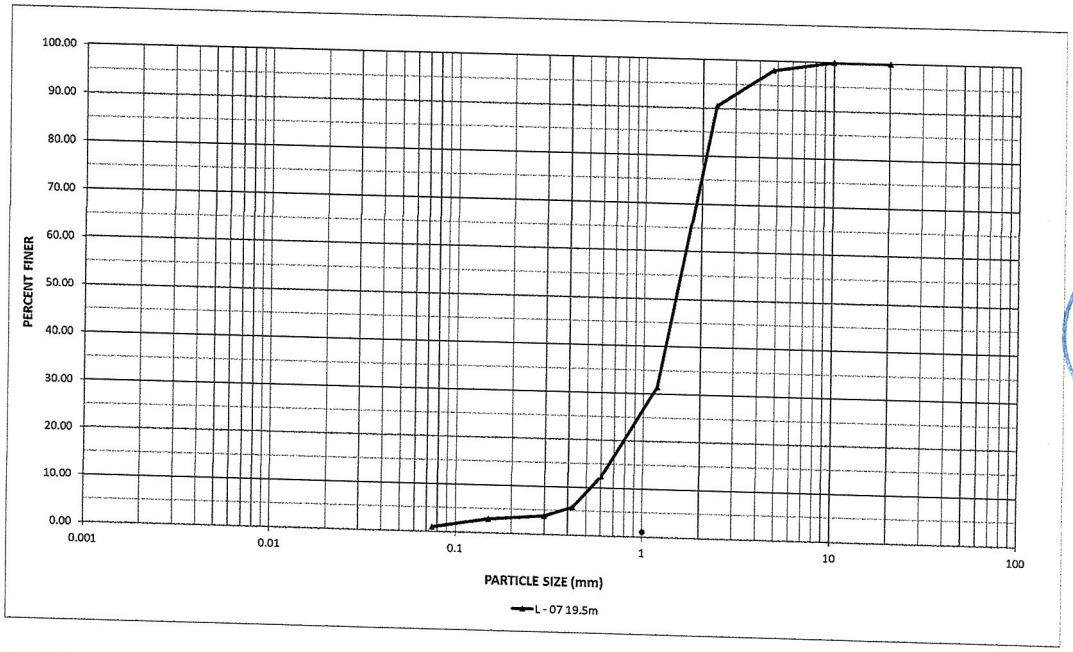
TEST REPORT

Certificate No & Date: DERC/R612/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 19.5m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.65
2.	Moisture Content	: 13.22 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 8.54
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	19.5m	98.10	5.71	0.95	-	-	3.11	1.65	SP

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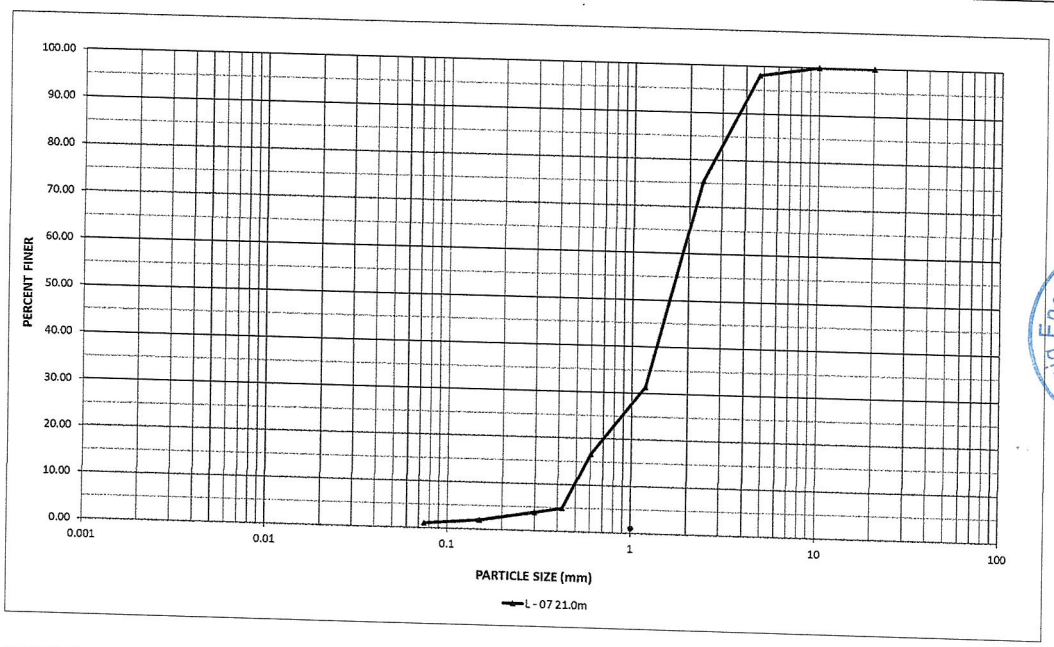
TEST REPORT

Certificate No & Date: DERC/R613/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 21.0m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.71
2.	Moisture Content	: 10.98 %
3.	Bulk Density	: 1.9 gm/cc
4.	pH	: 8.07
4.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 07	21.0m	98.04	4.90	0.98	-	-	3.80	1.52	SP

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TEST REPORT

Certificate No & Date: DERC/R614/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L7- 24.0 – 25.5m **Strata Description:** Rock **Testing Date:** 11-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.76
2.	Water Absorption	: 0.86 %
3.	Bulk Density	: 2.69 gm/cc
4.	Compressive Strength	: 57.81 N/mm^2.
5.	Core Recovery	: 40.66%.
6.	RQD	: 30.66 %.

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TEST REPORT

Certificate No & Date: DERC/R615/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	10-05-2022 to 11-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	7.50	0.5 1 1.5	44 97 132	0.319 0.703 0.957	32.55
2	9.0	0.5 1 1.5	40 99 134	0.290 0.718 0.972	34.27
3	10.5	0.5 1 1.5	36 90 125	0.261 0.653 0.906	32.83
4	12.0	0.5 1 1.5	36 80 128	0.261 0.580 0.928	33.72
5	13.50	0.5 1 1.5	43 92 133	0.312 0.667 0.964	33.12

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6	15.0	0.5 1 1.5	41 97 136	0.297 0.703 0.986	34.54
7	16.5	0.5 1 1.5	44 96 142	0.319 0.696 1.030	35.39
8	18.0	0.5 1 1.5	39 87 135	0.283 0.631 0.979	34.85
9	19.5	0.5 1 1.5	46 106 159	0.334 0.769 1.153	39.33
10	21.0	0.5 1 1.5	48 112 160	0.348 0.812 1.160	39.09

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 7.2m	Filling - Waste Material						
2	7.5	SP	4	4	31	_	19.09	5.76
3	9.0	SP	5	5	30	_	16.93	7.86
4	10.5	SP	5	5	35	_	33.27	9.23
5	12.0	SP	7	7	34	_	31.61	12.07
6	13.5	SP	16	16	35	_	41.38	20.19
7	15.0	SP	>60	>60	36	_	52.08	54.47
8	16.5	SP	>60	>60	38	_	73.03	56.21
9	18.0	SP	>60	>60	38	_	74.52	57.96
10	19.5	SP	>60	>60	39	_	91.70	59.71
10	21.0	SP	>60	>60	_	_	94.65	68.85
11	22.5	WR	>100	>100	_	_	_	70.59

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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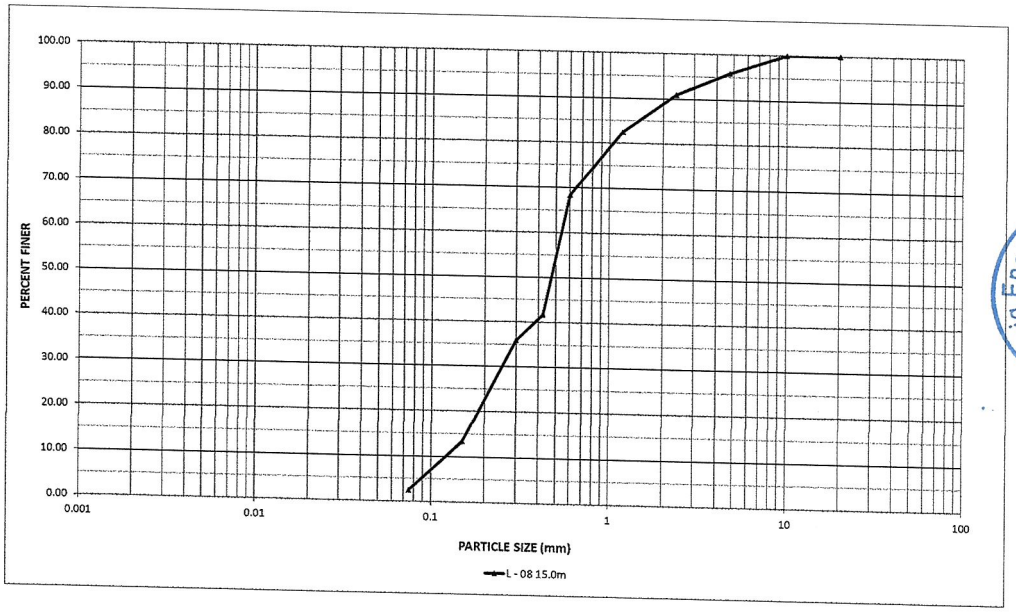
TEST REPORT

Certificate No & Date: DERC/R616/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L8 – 15.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.33
2.	Moisture Content	: 26.0 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.44
5.	Sieve Analysis	



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Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 08	15.0m	95.83	41.67	2.50	-	-	4.15	0.96	SP

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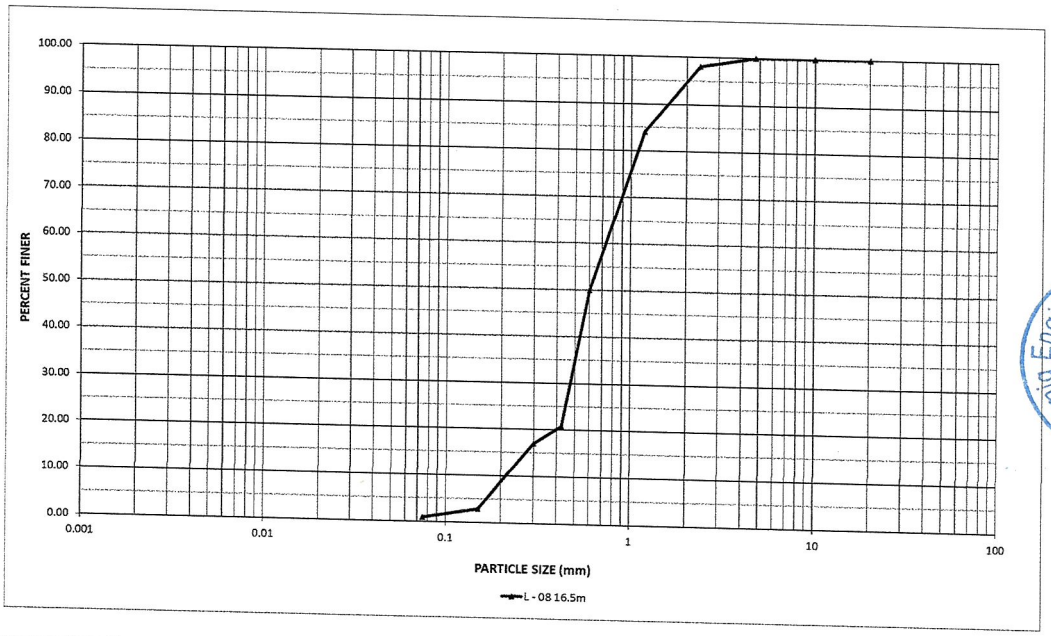
TEST REPORT

Certificate No & Date: DERC/R617/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L8- 16.5m **Strata Description:** Grayish Brown / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.43
2.	Moisture Content	: 15.78 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.51
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 08	16.5m	100.00	20.75	0.94	-	-	3.32	1.43	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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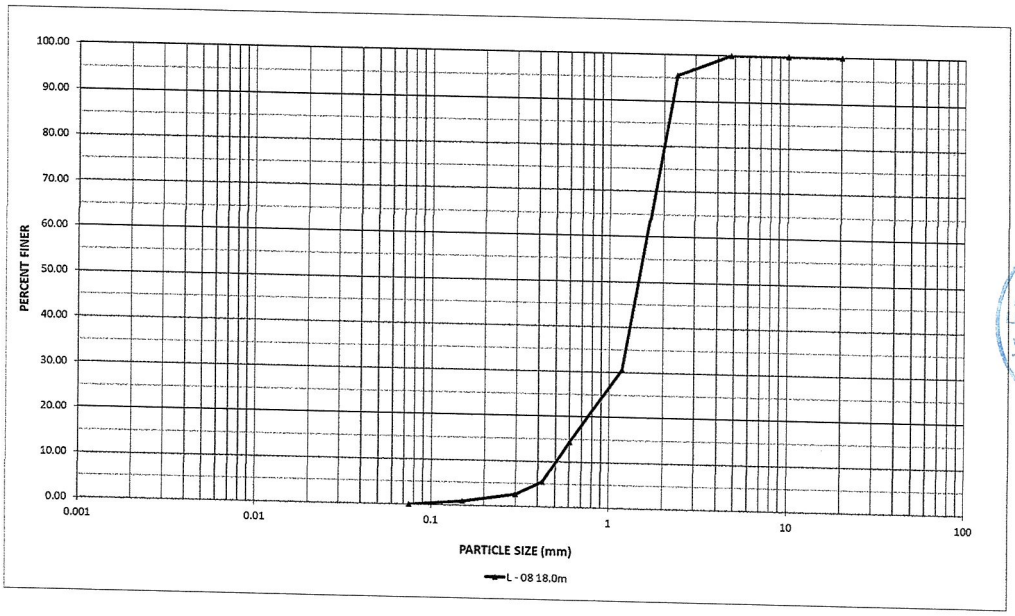
TEST REPORT

Certificate No & Date: DERC/R618/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L8- 18.0m **Strata Description:** Grayish Brown / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.47
2.	Moisture Content	: 9.22 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.41
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 08	18.0m	100.00	5.41	0.00	-	-	3.14	1.91	SP

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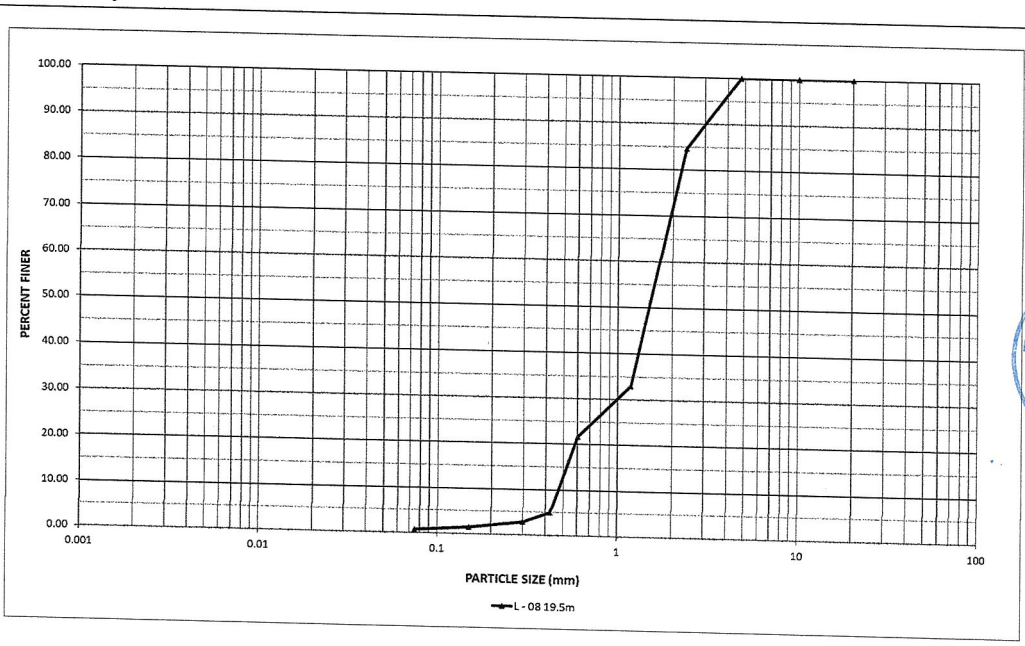
TEST REPORT

Certificate No & Date: DERC/R619/2022-23 & 12-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L8- 19.5m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.58
2.	Moisture Content	: 10.97%
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 8.05
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 08	19.5m	100.00	4.90	0.70	-	-	3.54	1.23	SP

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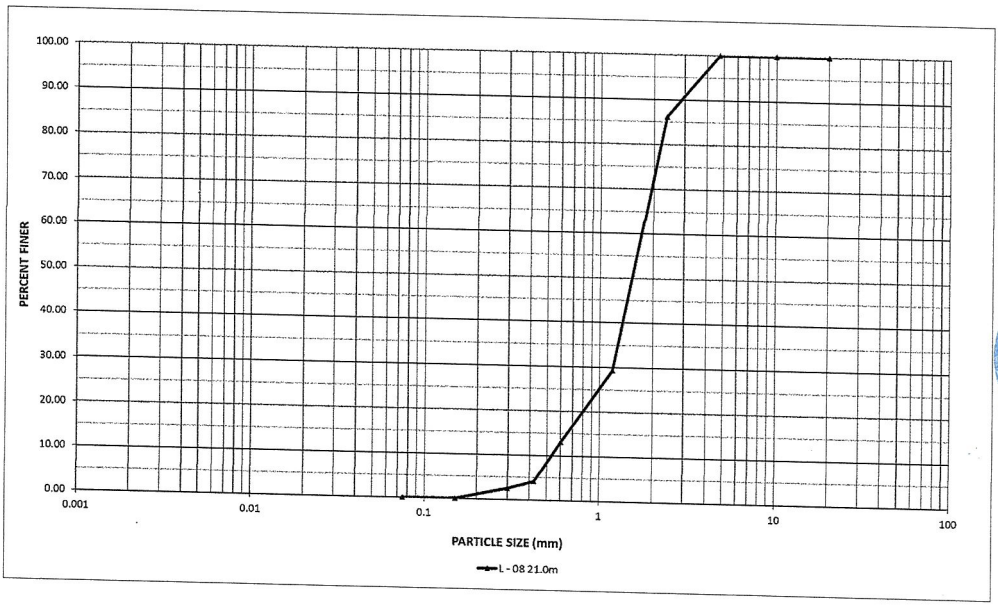
TEST REPORT

Certificate No & Date: DERC/R620/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L8- 21.0m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.56
2.	Moisture Content	: 7.90 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.96
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 08	21.0m	100.00	4.07	0.00	-	-	3.21	1.88	SP

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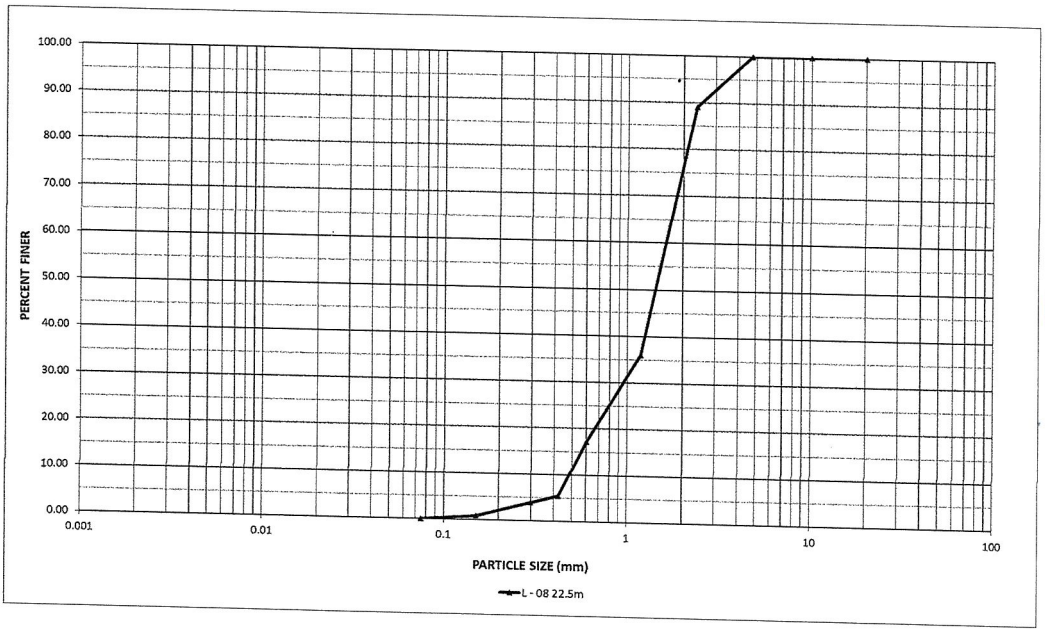
TEST REPORT

Certificate No & Date: DERC/R621/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L8 – 22.5m **Strata Description:** Gray / Sand **Testing Date:** 11-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.59
2.	Moisture Content	: 7.64 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.69
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 08	22.5m	100.00	5.47	0.00	-	-	3.20	1.13	SP

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TEST REPORT

Certificate No & Date: DERC/R622/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L8- 25.5m – 27.0m **Strata Description:** Rock **Testing Date:** 12-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.65
2.	Water Absorption	: 1.41 %
3.	Bulk Density	: 2.60 gm/cc
4.	Compressive Strength	: 54.98 N/mm^2.
5.	Core Recovery	: 26.33 %.
6.	RQD	: 14.6 %.

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GSTIN: 33AVBPJ7079E1ZO

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TEST REPORT

Certificate No & Date: DERC/R663/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	11-05-2022 to 12-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	15.0	0.5 1 1.5	53 107 148	0.384 0.776 1.073	34.54
2	16.5	0.5 1 1.5	44 98 143	0.319 0.711 1.037	35.65
3	18.0	0.5 1 1.5	43 95 144	0.312 0.689 1.044	36.22
4	19.5	0.5 1 1.5	44 92 148	0.319 0.667 1.073	36.99
5	21.0	0.5 1 1.5	46 104 160	0.334 0.754 1.160	39.57

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6	22.5	0.5 1 1.5	52 110 165	0.377 0.798 1.196	39.33

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 14.4m	Filling - Waste Material						
2	15.0	SP	33	20	34	_	36.41	22.60
3	16.5	SP	>60	>60	35	_	45.02	53.56
4	18.0	SP	>60	>60	36	_	56.73	54.94
5	19.5	SP	>60	>60	36	_	58.52	56.31
6	21.0	SP	>60	>60	39	_	94.65	57.69
7	22.5	SP	>60	>60	39	_	97.60	59.07
8	32.95	WR	>100	>100	_	_	_	67.84

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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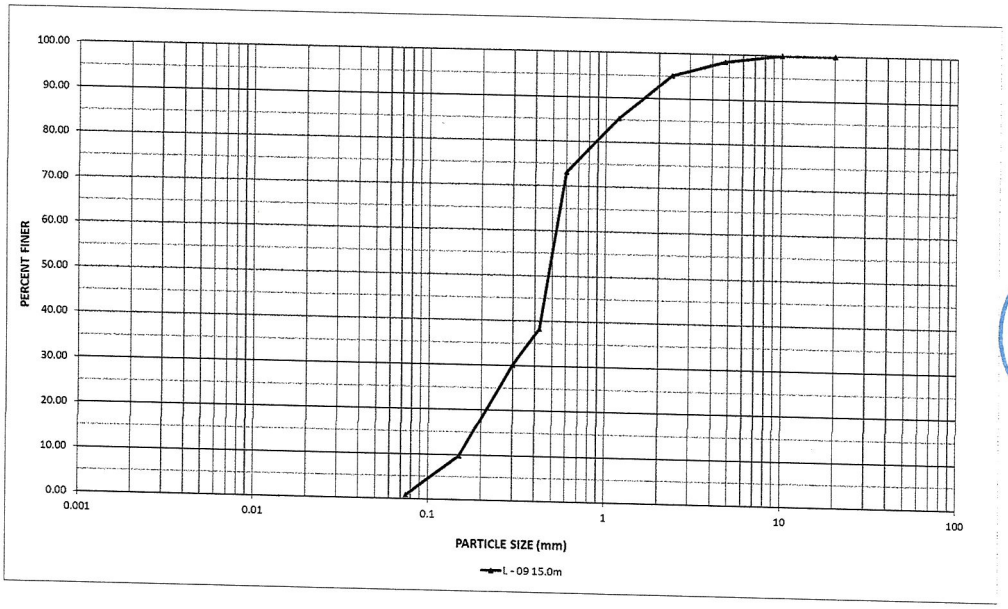
TEST REPORT

Certificate No & Date: DERC/R624/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L9 – 15.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.36
2.	Moisture Content	: 22.34 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.03
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 09	15.0m	98.37	38.21	0.81	-	-	3.31	1.06	SP

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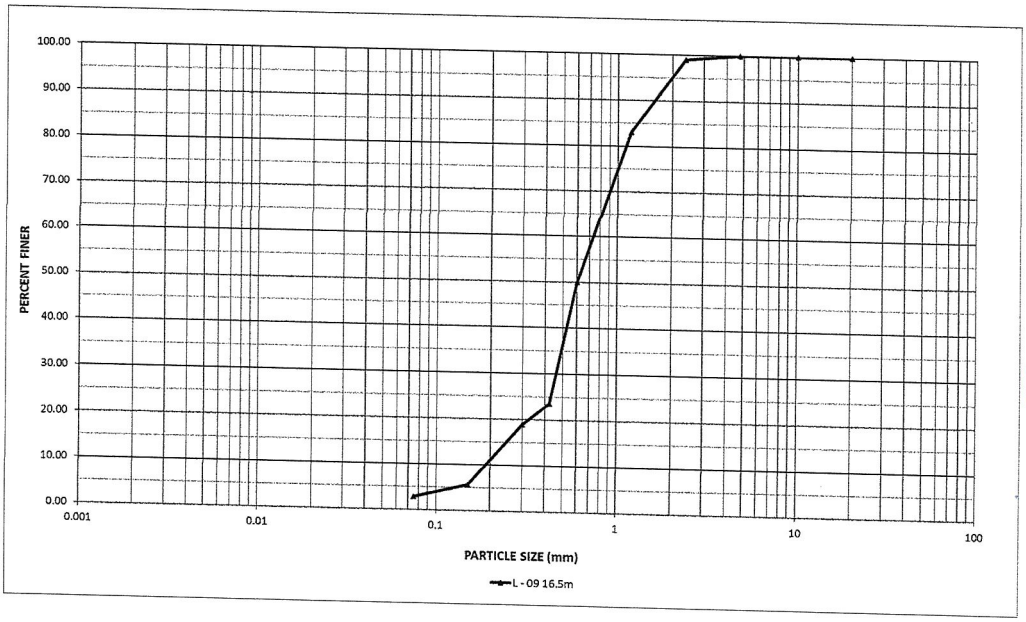
TEST REPORT

Certificate No & Date: DERC/R625/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L9 – 16.5m **Strata Description:** Gray / Silty Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.42
2.	Moisture Content	: 19.89 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 7.42
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 09	16.5m	100.00	23.58	2.83	-	-	3.89	1.57	SP

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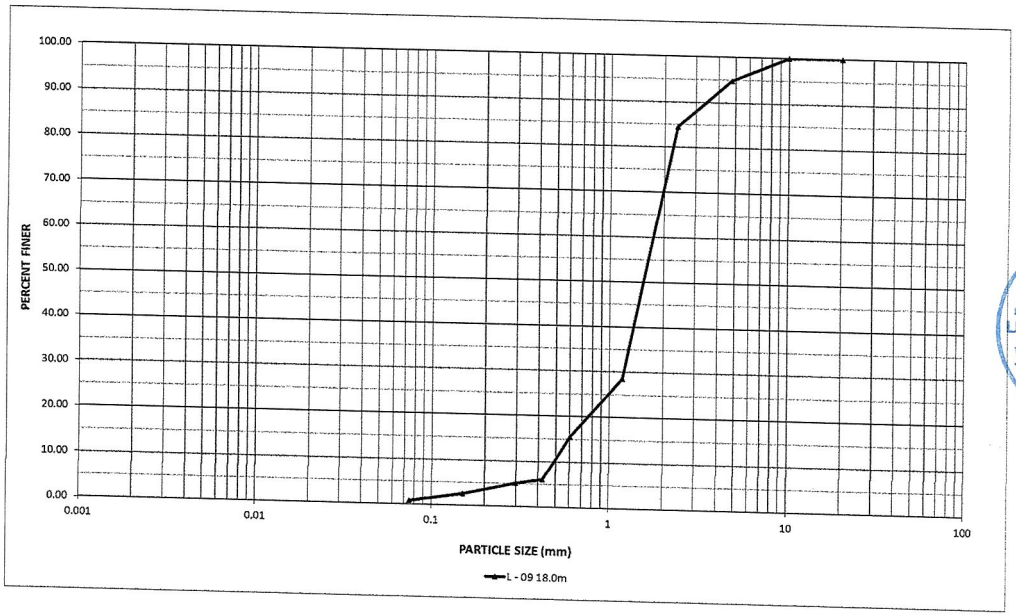
TEST REPORT

Certificate No & Date: DERC/R626/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L9 – 18.0m **Strata Description:** Gray / Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.50
2.	Moisture Content	: 17.62 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.65
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 09	18.0m	94.83	6.03	0.86	-	-	3.40	1.99	SP

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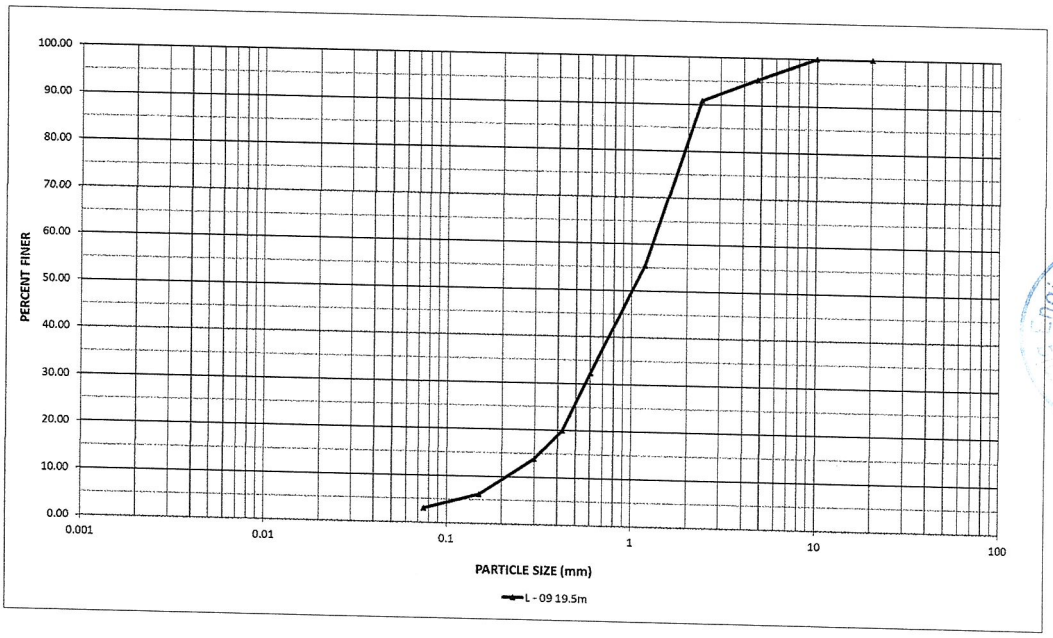
TEST REPORT

Certificate No & Date: DERC/R627/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L9- 19.5m **Strata Description:** Grayish Brown / Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.53
2.	Moisture Content	: 18.98%
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 8.33
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 09	19.5m	95.38	20.00	3.08	-	-	6.36	1.02	SW

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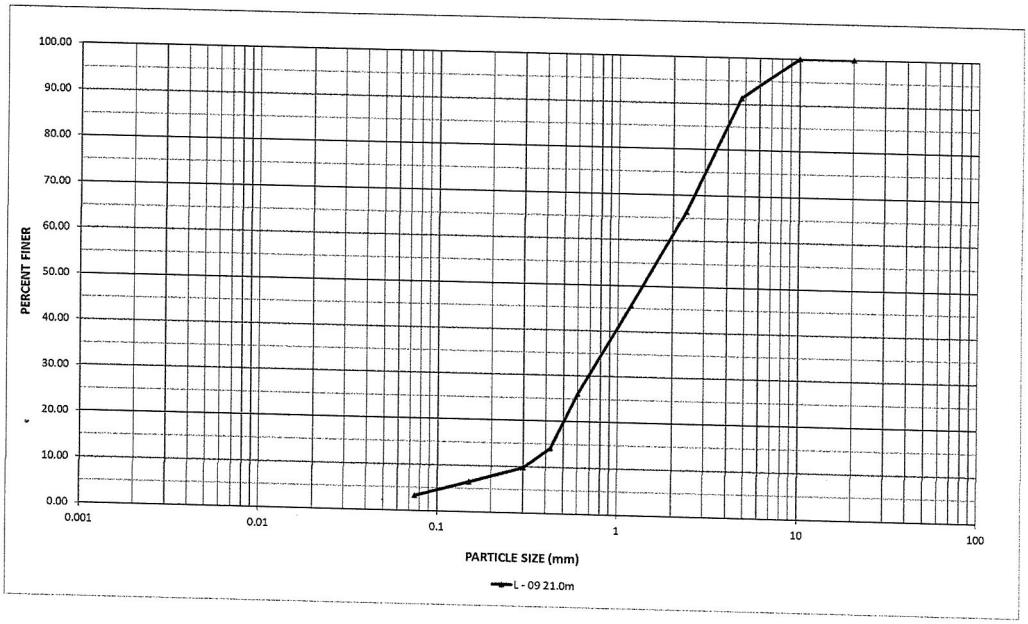
Certificate No & Date: DERC/R628/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L9 – 21.0m **Strata Description:** Grayish Brown / Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.49
2.	Moisture Content	: 13.22 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.95
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 09	21.0m	91.30	14.13	3.26	-	-	6.13	0.83	SP

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TEST REPORT

Certificate No & Date: DERC/R629/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L9- 24.0 – 25.5m **Strata Description:** Rock **Testing Date:** 12-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.68
2.	Water Absorption	: 1.50 %
3.	Bulk Density	: 2.52 gm/cc
4.	Compressive Strength	: 46.75 N/mm^2.
5.	Core Recovery	: 46.66 %.
6.	RQD	: 19.33 %.

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TEST REPORT

Certificate No & Date: DERC/R630/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	11-05-2022 to 12-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	15.00	0.5 1 1.5	43 93 135	0.312 0.674 0.979	33.72
2	16.50	0.5 1 1.5	42 90 133	0.305 0.653 0.964	33.40
3	18.00	0.5 1 1.5	46 106 153	0.334 0.769 1.109	37.79
4	19.50	0.5 1 1.5	48 97 159	0.348 0.703 1.153	38.81

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5	21.00	0.5 1 1.5	47 101 156	0.341 0.732 1.131	38.32

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 13.5m	Filling - Waste Material						
2	15.0	SP	23	16	33	_	31.19	19.65
3	16.5	SP	26	17	33	_	32.52	21.61
4	18.0	SP	>60	>60	37	_	66.21	54.79
5	19.5	SP	>60	>60	38	_	80.04	56.16
6	21.0	SP	>60	>60	38	_	83.35	57.54
7	22.5	WR	>100	>100	_	_	_	66.32

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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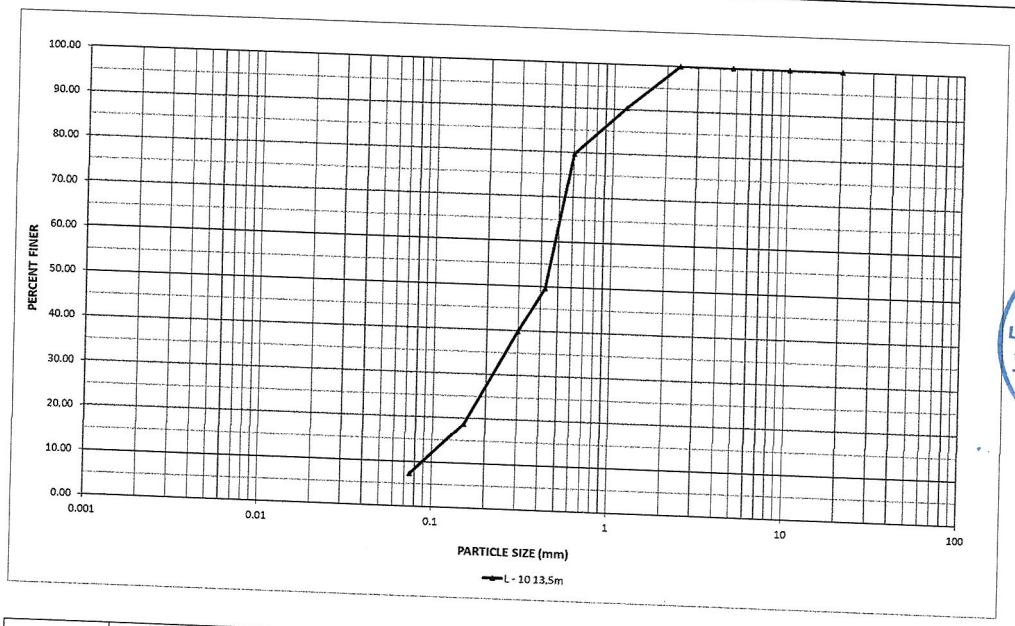
TEST REPORT

Certificate No & Date: DERC/R631/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L10- 13.50m **Strata Description:** Gray / Silty Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.36
2.	Moisture Content	: 15.67 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 6.32
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 10	13.5m	100.00	49.59	7.32	-	-	5.44	1.10	SP-SM

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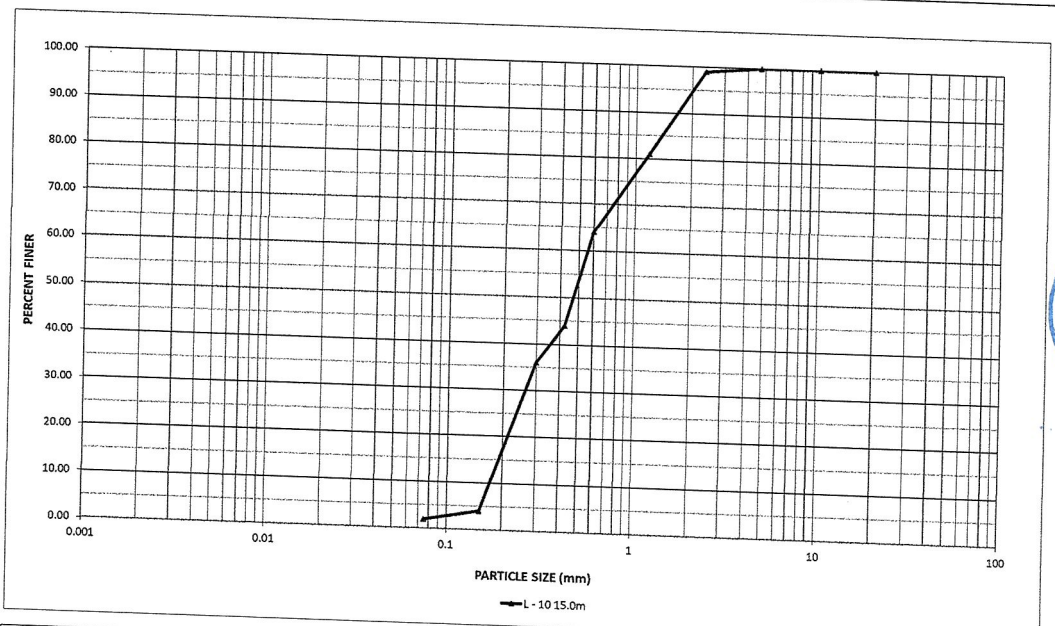
TEST REPORT

Certificate No & Date: DERC/R632/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L10 – 15.0m **Strata Description:** Gray / Silty Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.38
2.	Moisture Content	: 23.21 %
3.	Bulk Density	: 1.80 gm/cc
4.	pH	: 7.65
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 10	15.0m	100.00	44.00	2.00	-	-	3.29	0.71	SP

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Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
H.O. & Laboratory Address: #12, Indira nagar, Kovilpathagai, AVADI, Chennai - 600 062.
Mob: +91-9629819560 / +91-9788532418, **Web:** www.derc.org.in, **Email:** dercprojects@gmail.com

GSTIN: 33AVBPJ7079E1ZO

DYNAMIQ ENGINEERING RESEARCH CENTRE

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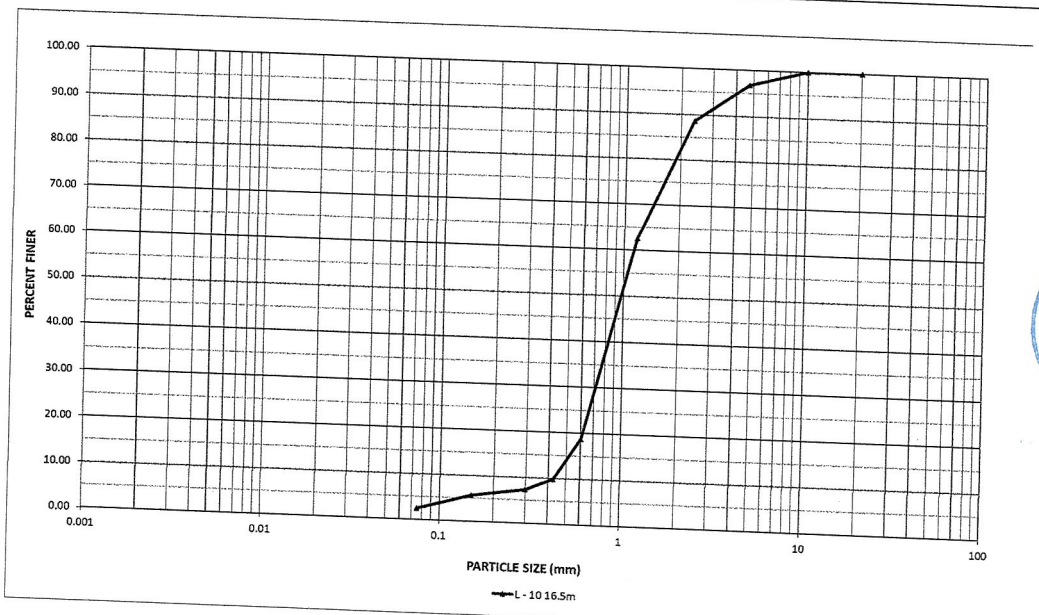
TEST REPORT

Certificate No & Date: DERC/R633/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L10 – 16.5m **Strata Description:** Grayish Brown / Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.40
2.	Moisture Content	: 19.88 %
3.	Bulk Density	: 1.85 gm/cc
4.	pH	: 8.21
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 10	16.5m	96.75	9.76	2.44	-	-	3.02	0.93	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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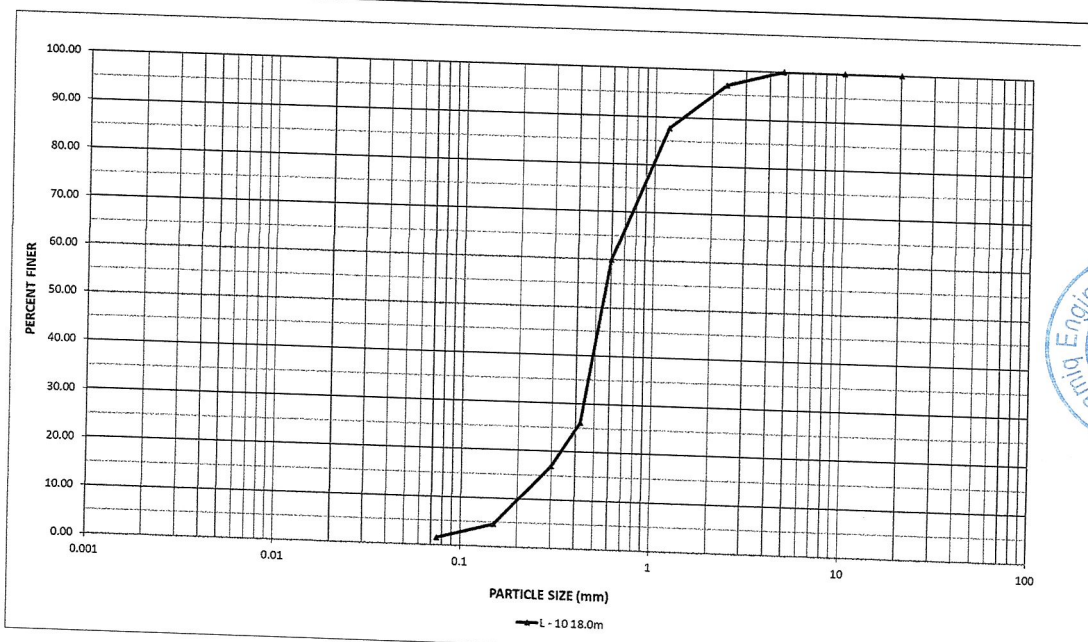
TEST REPORT

Certificate No & Date: DERC/R634/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L10 – 18.0m **Strata Description:** Grayish Brown / Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.35
2.	Moisture Content	: 17.66%
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.80
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 10	18.0m	100.00	26.15	1.54	-	-	5.45	3.07	SP

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GSTIN: 33AVBPJ7079E1ZO

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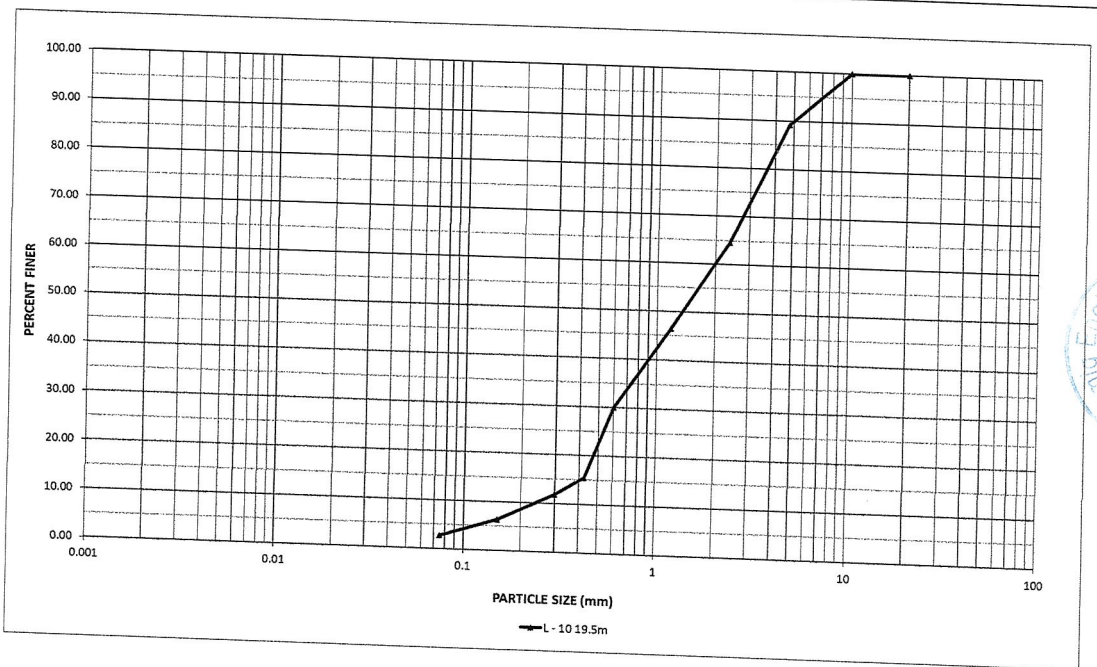
TEST REPORT

Certificate No & Date: DERC/R635/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L10- 19.5m **Strata Description:** Grayish Brown / Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.44
2.	Moisture Content	: 16.54 %
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 7.65
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 10	19.5m	89.09	15.45	2.73	-	-	8.70	0.78	SP

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
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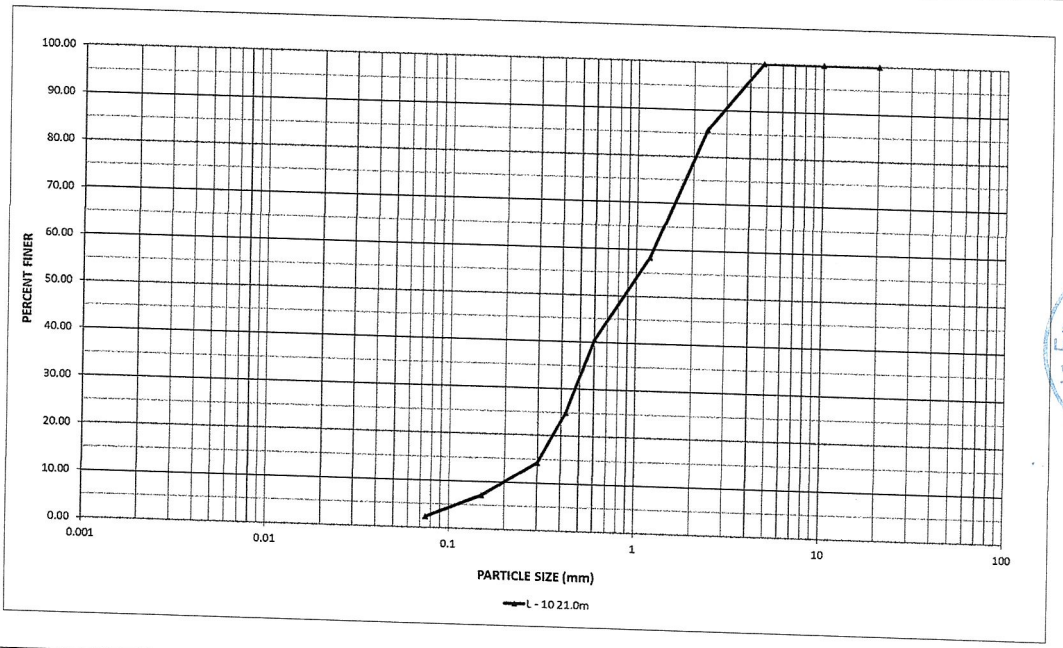
TEST REPORT

Certificate No & Date: DERC/R636/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L10 – 21.0m **Strata Description:** Brown / Sand **Testing Date:** 12-05-2022
Test method followed, if any	IS: 2720 (Part 3), IS: 2720 (Part 2), IS: 2720 (Part 1), IS: 2720 (Part 26).

CHARACTERISTICS OF SOIL

1.	Specific Gravity	: 2.50
2.	Moisture Content	: 19.88%
3.	Bulk Density	: 1.90 gm/cc
4.	pH	: 8.22
5.	Sieve Analysis	



Borehole No.	Depth (m)	% Passing			Atterberg Limit		C_u	C_c	IS Classification
		# 4	# 40	# 200	LL (%)	PI (%)			
L - 10	21.0m	100.00	25.00	2.38	-	-	6.50	0.89	SP

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TEST REPORT

Certificate No & Date: DERC/R637/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	**Sample ID:** Kodungaiyur – L10- 24.0m – 25.5m **Strata Description:** Rock **Testing Date:** 13-05-2022
Test method followed, if any	IS: 9143, IS: 2720 – Part 2, IS: 2720 – Part 3, IS: 11315 – Part 11.

CHARACTERISTICS OF ROCK

1.	Specific Gravity	: 2.65
2.	Water Absorption	: 0.92 %
3.	Bulk Density	: 2.68 gm/cc
4.	Compressive Strength	: 54.67 N/mm^2.
5.	Core Recovery	: 28 %.
6.	RQD	: 14.66 %.

Note: -

- ✓ This certificate refers only to the sample submitted for testing.
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TEST REPORT

Certificate No & Date: DERC/R638/2022-23 & 13-05-2022.

Issued To: **M/s. Greater Chennai Corporation,** Solid Waste Management Department, Ripon Building, Chennai – 600003.	
Test method	Direct Shear Test.
Testing Date:	12-05-2022 to 13-05-2022.
Test method followed, if any	IS: 2720 – Part 13.

S. No	Depth (m)	Normal Stress (kg/cm^2)	Proving Ring Reading (Div)	Shear Stress (kg/cm^2)	Ø (in Degrees)
1	13.50	0.5 1 1.5	39 87 132	0.283 0.631 0.957	33.99
2	15.0	0.5 1 1.5	44 90 139	0.319 0.653 1.008	34.54
3	16.50	0.5 1 1.5	48 103 154	0.348 0.747 1.117	37.54
4	18.0	0.5 1 1.5	46 98 145	0.334 0.711 1.051	35.65
5	19.50	0.5 1 1.5	53 108 164	0.384 0.783 1.189	38.84

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Mob: +91-9629819560 / +91-9788532418, **Web:** www.derc.org.in, **Email:** dercprojects@gmail.com

6	21.0	0.5 1 1.5	55 112 170	0.399 0.812 1.233	39.81

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Safe Bearing Capacity Calculation Based on Shear Consideration: -

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = C\,N_c\,S_c\,d_c\,i_c + q\,(N_q - 1)\,S_q\,d_q\,i_q + 0.5\,B\,\gamma\,N_\gamma\,S_\gamma\,d_\gamma\,i_\gamma\,W'$$

Where,

C = Cohesion in N/mm^2.

N_c, N_q, N_γ = Bearing Capacity Factors.

S_c, S_q, S_γ = Shape Factors.

d_c, d_q, d_γ = Depth Factors.

i_c, i_q, i_γ = Inclination Factors.

q = Effective Surcharge at the base level of foundation.

B = Width of the Footing,

W' = Correction factor of Water Table.

γ = Bulk unit weight of soil.

Safe Bearing Capacity Calculation Based on SPT Value Consideration: -

The allowable bearing pressure based on tolerable settlement has been established empirically by Terzaghi and Peck, 1948 and may be expressed by the equation.

Net Safe Bearing Capacity of the Soil:

$$Q_{Ult} = 3.5\,(N-3)\,[(B+0.3)/2B]2 * Rw * Fd + P$$

Where,

N = SPT N – Value.

B = Width of Foundation = Constant 1.

RW = Water Correction = Constant 0.5.

FD = Depth Factor = Constant 1.

P = Over Burden Pressure.

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GSTIN: 33AVBPJ7079E1ZO

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Safe Bearing Capacity of Soil through Shear and SPT Value

S. No	Depth (m)	IS Classification	Field N - Value	Corrected N - Value	Ø (in Degrees)	Safe Bearing Capacity (t/m^2)		
						Shear strength Consideration		SPT Value Consideration (t/m^2)
						UCC (t/m^2)	Direct Shear (t/m^2)	
1	0 – 12.9m	Filling - Waste Material						
2	13.5	SP	14	13	33	–	31.22	16.39
3	15.0	SP	13	12	34	–	36.41	16.88
4	16.5	SP	>60	>60	37	–	64.98	53.75
5	18.0	SP	>60	>60	35	–	46.46	55.13
6	19.5	SP	>60	>60	38	–	80.38	56.51
7	21.0	SP	>60	>60	39	–	94.65	57.88
8	22.5	WR	>100	>100	-	–	-	66.66

***SP** – Poorly Graded Sand, **SW** – Well Graded Sand, **WR** – Weathered Rock

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Dynamiq Engineering Research Centre CH-62.

A. RAMESH M.E
Quality Engineer
Dynamiq Engineering Research Centre
AVADI, Chennai - 600 062.

Registered Address: #4, Kulathumettu Street, Chozhampattu, Sankarapuram, Villupuram - 606 208
H.O. & Laboratory Address: #12, Indira nagar, Kovilpathagai, AVADI, Chennai - 600 062.
Mob: +91-9629819560 / +91-9788532418, **Web:** www.derc.org.in, **Email:** dercprojects@gmail.com

Annexure 16: Quotation for Environmental Monitoring of the Project

CHENNAI
Testing redefined
TESTING LABORATORY PRIVATE LIMITED

CIN : U74999TN2008PTC067568

QUOTATION

M/s. SANDHYA STRATEGIC INVESTMENT AND ADVISORY (SSIA),
Old No. 117, New No. 122, Luz Church Road,
Mylapore, Chennai – 600 004.
GSTIN No: 33ADOFS9478B1ZN

Quotation Number : CTL/Q/22-23/R 052
Date : 18.08.2022

Sub: Quotation for Environmental Monitoring & Water sample analysis.

Dear Sir/Madam,

We thank you for the kind enquiry send to us. We herein would be pleased to quote for the above referred work.

CTLPL is a professionally managed testing laboratory in the field of water, waste water, soil, Environmental Monitoring and food testing. CTLPL is a NABL accredited laboratory with far reaching quality system in place.

SCOPE OF WORK

S. No	Sample Particulars	Parameter/Test	No of samples	Cost per samples	Quantity required	Total Amount
1.	**AAQ (24 hrs. sampling)**	**Parameters:** CO,(NO2),(SO2), (PM2.5),(PM10), (O3),(Pb),(NH3), Benzo(a)Pyrene (BaP), (C6H6), (As), and (Ni)	**8**	**3,000**	**-**	**24,000**
2.	**DG Stack Monitoring**	**Parameters:** STACK HEIGHT STACK TEMPERATURE STACK VELOCITY STACK GAS FLOW RATE DIAMETER OF STACK OXIDES OF NITROGEN NOx (as NO2) SULPHUR DIOXIDE (SO2) PARTICULATE MATTER(PM) CARBON MONOXIDE (CO).	**2**	**1,700**		**3,400**
3.	**Ground water Monitoring**	**Parameters:** Arsenic Cadmium	**6**	**2,500**	**2 Liters**	**15,000**

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Chennai - 600 032 | Tamil Nadu | India | Telefax : +91-44-2250 1757
www.ctllabs.in
www.foodenvironmenttesting.com

QUOTATION

S. No	Sample Particulars	Parameter/Test	No of samples	Cost per samples	Quantity required	Total Amount
		Chromium(as Cr6+) Copper Cyanide Lead Mercury Nickel Nitrate as NO3 pH Iron Total hardness (as CaCO3) Chlorides Dissolved solids Phenolic compounds (as C6H5OH) Zinc Sulphate (as SO4).				
4.	**Surface- water Monitoring**	**Parameters:** pH @ 25°C Chloride as Cl- Total Dissolved Solids Total Hardness as CaCO3 Iron as Fe Sulphate as SO4 Nitrate as NO3 Cyanide as CN Phenolic Compounds as C6H5OH Dissolved Oxygen Copper as Cu Mercury as Hg Cadmium as Cd Total Arsenic as As Lead as Pb Zinc as Zn Total Chromium as Cr Nickel as Ni.	**5**	**2,500**	**2 Liters**	**12,500**
5.	**Leachate Monitoring**	**Parameters:** Suspended solids Dissolved solids (inorganic)	**3**	**3,000**	**2 Liters**	**9,000**

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QUOTATION

S. No	Sample Particulars	Parameter/Test	No of samples	Cost per samples	Quantity required	Total Amount
		pH value Ammonical nitrogen (as N), Total Kjeldahl nitrogen (as N) Biochemical oxygen demand (3 days at 270 C) Chemical oxygen demand, Arsenic (as As), Mercury (as Hg) Lead (as Pb), Cadmium (as Cd) Total Chromium (as Cr) Copper (as Cu), Zinc (as Zn) Nickel (as Ni) Cyanide (as CN) Chloride (as Cl) Fluoride (as F) Phenolic compounds (as C6H5OH).				
6.	**Noise**	Noise Levels (decibel)	**20**	**200**	**-**	**4,000**
7.	**Landfill gases**	H2S, CH4, CO, Volatile Organic Compounds.	**12**	**2000**	**-**	**24,000**
8.	**Soil**	**Parameters:** Moisture Colour Odour Particle size Bulk density Total organic carbon, Total Nitrogen (as N), Total Phosphates (as P2O5), Total Potash (as K2O), C:N ratio pH Conductivity (as dsm-1) Heavy metal content Arsenic as (As2O3) Cadmium (as Cd) Chromium (as Cr)	**6**	**3,000**	**-**	**18,000**

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CIN : U74999TN2008PTC067568

QUOTATION

S. No	Sample Particulars	Parameter/Test	No of samples	Cost per samples	Quantity required	Total Amount
		Copper (as Cu) Mercury (as Hg) Nickel (as Ni) Lead (as Pb) Zinc (as Zn).				
					Transportation & Sample collection Charges	**1,000**
						GST @ 18% Extra

GST NO: 33AACCH1190F1Z1

SAC Code: 998346 (Technical Testing & Analysis Services).

Sampling Details:

Type of Monitoring	Media to be covered	Number of samples to be taken
Ambient air Quality Monitoring	Ambient air quality within the KDG site and within periphery of 1 km radius outside the dumpsite.	1. 4 samples within dumpsite (one upwind, two downwind and one cross wind direction). 2. 4 samples outside the dumpsite which is within 1 km periphery of the dumpsite (one upwind, two downwind and one cross wind direction) 3. From DG set for stack monitoring **total- 10 samples**
Groundwater monitoring	Ground Water quality within KDG site and outside periphery of 500 m radius.	3 samples (two downstream and one upstream) to be collected within the site and 3 (downstream) samples to be collected from 500 m from the periphery of the site. (Take samples from nearby open wells if any) **Total: 6 samples**
Surface- water Monitoring	Surface Water quality outside periphery of 2 km radius.	Minimum of 5 Samples (both upstream and downstream, depending upon locations). 2 locations upstream and 3 locations downstream) **Total samples: 5 samples**
Leachate Monitoring	Leachate samples inside KDG site.	Leachate Collection system/Leachate treatment plant Total Samples: 3 samples

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QUOTATION

Type of Monitoring	Media to be covered	Number of samples to be taken
Noise	Within site and outside habitation which is nearby 500 m radius	Total of 20 locations over all (14 samples with in site and 6 samples with in 500m radius)
Landfill gases	H2S, CH4, CO, Volatile Organic Compounds	Within the dumpsite from various locations. (6 samples) and within 500 m radius (6 samples) total 12 samples
Soil	Organic matter, C, H, N, Alkalinity, Acidity, heavy metals and trace metal.	Project Site & Nearby Habitations of 100 m radius. Total samples: 6

Terms & Conditions:

Payment Terms **:** 100% Advance.

TAT : 6 to 7 Days

Sample Courier Address:

Chennai Testing Laboratory Pvt Ltd.
A-Super 19, TVK Industrial Estate,
Guindy, Chennai 600 032.

This quotation is valid for two months only.

Payment Mode:

By Card / Cash / Cheque in Favor of "CHENNAI TESTING LABORATORY PRIVATE LIMITED" / NEFT transfer – Bank details as mentioned below.

Account Details:

Bank Account Name	Chennai Testing Laboratory Private Limited
Address	Chennai Testing Laboratory Private Limited, A-Super 19, TVK Industrial Estate, Guindy, Chennai-600 032
Telephone Number	044-22501757
E Mail	Chennaitestinglab@gmail.com
Account Number	35664111809
IFSC Code / NEFT Code	SBIN0013361
Type of Account	Current Account
Bank Name	State Bank of India

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TESTING LABORATORY PRIVATE LIMITED
Testing redefined

CIN : U74999TN2008PTC067568

QUOTATION

Branch Name	SME Branch, Adyar
Bank Address	State Bank of India, 2 nd Floor, 5, First Cross Street, Kasturba Nagar, Adyar, Chennai – 600 020.

Thanking You
With Warm Regards
For Chennai Testing Laboratory Private Limited

A.Rajkumar
Authorized Signatory

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Hubert Enviro Care Systems P Ltd
A21, 3rd Phase, TVK Industrial Estate,
Guindy, Chennai - 600032
GST: 33AABCH5835N1ZD

QUOTE

PSTP51188
Aug 18, 2022

Stage Budgetary

Valid Till Oct 17, 2022

Sales Person Sowbakya V labsales

Amount ₹ 267,000.00

Bill To
M/s. Sandhya Strategic Investment and advisory
Kind Attn :Mr.Avinash Kumar
Contact No: (944) 203-4515
Old No. 117, New No. 122, Luz Church Rad, Mylapore,
Chennai-600004

Ship To
M/s. Sandhya Strategic Investment and advisory
Kind Attn : Mr.Avinash Kumar
Contact No : (944) 203-4515
Old No. 117, New No. 122, Luz Church Rad, Mylapore,
Chennai-600004

Scope of Work:

Hubert Enviro Care Systems P Ltd seeks to provide testing and analytical services mentioned below in line with your requirement.

Commercial Remuneration:

S.No	Item & Description	Frequency	List Price	Qty	Discount	Amount
1.	**"Ambient Air quality – 24 Hrs"** Sulphur Dioxide, Nitrogen Dioxide, Particulate Matter (PM10), Particulate Matter (PM2.5), Ozone, Pb, CO, NH3, Benzo (O) Pyrene, Arsenic, Nickel, Benzene Sample Location: 1. 4 samples within dumpsite (one upwind, two downwind and one cross wind direction). 2. 4 samples outside the dumpsite which is within 1 km periphery of the dumpsite (one upwind, two downwind and one cross wind direction) 3. From DG set for stack monitoring	Monthly	₹ 5,200.00	10	₹ 0.00	₹ 52,000.00

S.No	Item & Description	Frequency	List Price	Qty	Discount	Amount
2.	**Monitoring the measures of the Ground water monitoring** Arsenic, Cadmium, Chromium(as Cr6+), Copper, Cyanide, Lead, Mercury, Nickel, Nitrate as NO3, pH, Iron, Total hardness (as CaCO3), Chlorides, Dissolved solids, Phenolic compounds (as C6H5OH), Zinc, Sulphate (as SO4 Sample Location: 3 samples (two downstream and one upstream) to be collected within the site and 3 (downstream) samples to be collected from 500 m from the periphery of the site. (Take samples from nearby open wells if any)	Monthly	₹ 8,000.00	6	₹ 0.00	₹ 48,000.00
3.	**Monitoring the measures of the Surface water monitoring** Colour,Odour,PH,Temperature,Pesticides,Turbidity,COD,BOD,Fluoride,Iron,Arsenic,Faecal Coliform,Coliform Organism,Pesticides,K, Na, Ca, Mg, Cl2, SO4, DO Minimum of 5 Samples (both upstream and downstream, depending upon locations). 2 locations upstream and 3 locations downstream)	Monthly	₹ 8,000.00	5	₹ 0.00	₹ 40,000.00

S.No	Item & Description	Frequency	List Price	Qty	Discount	Amount
4.	**Leachate Monitoring** Suspended solids, Dissolved solids, pH value, Ammonical nitrogen, Total Kjeldahl nitrogen, Biochemical oxygen demand, Chemical oxygen demand, Arsenic, Mercury, Lead, Cadmium, Total Chromium, Copper, Zinc, Nickel, Cyanide, Chloride, Fluoride, Phenolic compounds	Monthly	₹ 6,000.00	3	₹ 0.00	₹ 18,000.00
5.	**Noise Monitoring** Day & Night Total of 20 locations over all (14 samples with in site and 6 samples with in 500m radius)	Monthly	₹ 1,250.00	20	₹ 0.00	₹ 25,000.00
6.	**Landfill Gases** H2S, CH4, CO, Volatile Organic Compounds	Monthly	₹ 3,000.00	12	₹ 0.00	₹ 36,000.00
7.	**Analysis of Soil Sample** Organic Matter, C, H N, Alkalinity, Acidity, Heavy Metals and trace metal	Monthly	₹ 4,000.00	6	₹ 0.00	₹ 24,000.00
8.	**Charges for Transportation**	Monthly	₹ 2,000.00	12	₹ 0.00	₹ 24,000.00
				Sub Total		**₹ 267,000.00**
				GST		**₹ 48,060.00**
				Total		**₹ 315,060.00**

Contacts:

Sowbakya V
Mobile: 9884401151
Email: labsales@hecs.in
Website: www.hecs.in

Ref: PCEI/LAB/125/22-23 **19th AUG 2022**

TO : Greater Chennai Corporation Office
53, Raja Muthiah Rd,
Kannappar Thidal,
Periyamet, Chennai,
Tamil Nadu 600003

Dear Sir,

SUB: OFFER FOR ENVIRONMENTAL MONITORING & WATER ANALYSIS - REG.

We are pleased to share our offer for Environmental Monitoring & water Analysis.

We have a state-of-the-art analytical laboratory accredited by the Department of Science and Technology, Government of India under the National Accreditation Board for Testing and Calibration Laboratories (NABL), New Delhi as per ISO/IEC 17025:2005 in the fields of Chemical & Environmental testing. We thank you and look forward to your confirmation to proceed with the work.

We thank you and look forward to your confirmation to proceed with the work.

Thanking you

For POLLUCARE ENGINEERS INDIA PVT LTD

Dr. S. SaiBabu
Managing Director
+919884873190

PRICE FOR ENVIRONMENTAL MONITORING & WATER ANALYSIS

Type of Monitoring	Media to be covered	Number of samples to be taken	Reference Cited	Parameters to be analyzed	UNIT PRICE	TOTAL PRICE
Ambient air Quality Monitoring	Ambient air quality within the ProjectSite and within periphery of 1 km radius outside the dumpsite.	4 samples within dumpsite (one upwind, two downwind and one cross wind direction). 4 samples outside the dumpsite which is within 1 km periphery of the dumpsite (one upwind, two downwind and one cross wind direction) **total- 10 samples**	Manual on Ambient air quality by CPCB. SWM Rules 2016	CO,(NO2),(SO2), (PM2.5),(PM10), (O3),(Pb),(NH3), Benzo(a)Pyrene (BaP), (C6H6), (As), and (Ni)	4500 x 10 samples	45,000
Groundwater monitoring	Ground Water quality within Project Site and outside periphery of 500 m radius.	4 samples (three downstream and one upstream) to be collected within the site and 3 (down stream) samples to be collected from 500 m from the periphery of the site. (Take samples from nearby open wells if any) **Total: 6 samples**	CPCB guidelines and checklist for evaluation of MSW Landfill & dumpsites. SWM Rules 2016.	As per IS 10500:2012 drinking water parameters and SWM rules, 2016	3500 X 6 Samples	21,000
Surface- water Monitoring	Surface Water quality outside periphery of 2 km radius.	Minimum of 5 Samples (both upstream and downstream, depending upon locations). 2 locations upstream and 3 locations downstream) **Total samples: 5 samples**	CPCB guidelines for Water Quality Monitoring- MINRAS/27/2007. SWM Rules 2016	IS 10500:2012 drinking water parameters and SWM rules, 2016	3500 X 5 Samples	17,500

Pollucare Engineers India Private Limited
: HIG - 6152, TNHB, Phase I & II, Kamarajar Road, Ayapakkam, Chennai - 600 077
: info@pollucareindia.com **www.pollucareindia.com**

Type of Monitoring	Media to be covered	Number of samples to be taken	Reference Cited	Parameters to be analyzed	UNIT PRICE	TOTAL PRICE
Leachate Monitoring	Leachate samples inside ProjectSite.	Leachate samples from various locations of the dumpsite. **Total samples: 3**	SWM Rules 2016	Parameters as per SWM rules 2016	4500 X 3 Samples	13,500
Noise	Within site and outside habitation which is nearby 500 m radius	Total of 20 locations over all (14 samples with in site and 6 samples with in 500m radius)	The Noise Pollution (Regulation and Control) Rules, 2000	Noise Levels (decibel)	500 X 20 Samples	10,000
Landfill gases	H2S, CH4, CO, Volatile Organic Compounds	Within the dumpsite from various locations. (6 samples) and within 500 m radius (6 samples) **total 12 samples**			8000 X 12 Samples	96,000
Soil	Organic matter, C, H, N, Alkalinity, Acidity, heavymetals and trace metal.	Project Site & Nearby Habitations of 100 m radius. **Total samples: 6**			2800 X 6 Samples	16,800
TOTAL PRICE						2,19,800
GST 18%						39,564
TOTAL PRICE FOR INCLUDING GST						**2,59,364**

NOTE : Also include the cost of training, audit, vehicles expenses and contingencies and provide us the final cost of the above mentioned works.

TERMS & CONDITIONS

- Full payment is to be made after Submission of Test reports .
- **NEFT/ Cheque** is to be made in the name of **POLLUCARE ENGINEERS INDIA PVT LTD.**
- Electrical supply provided client scope (AAQ) .
- GST TAX @ 18% will be extra.
- GST NO : 33AAJCP3355P1ZY.
- SAC for our services – 998346.
- Test report will be issued within 10 working days from the date of sampling through courier.
- Validity of this offer 90 days.

Pollucare Engineers India Private Limited
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: info@pollucareindia.com **www.pollucareindia.com**

Annexure 17: Quotation for Leachate Treatment Plant

REF: MC/QUOT/TN/ALGAE/5368 **11.10.2022**

M/s. SANDHYA STRATEGIC INVESTMENT & ADVISORY,
OLD NO. 117, NEW NO. 122, LUZ CHURCH ROAD,
MYLAPORE, CHENNAI – 600 004

KIND ATTN; MR. AVINASH, PROJECT COORDINATOR.

SUB: PROPOSAL TO TREAT 5,000 L/DAY LEACHATE AT YOUR FACILITY, USING SPECIALLY CUSTOMIZED INOCULUM TO BE DEVELOPED BASED ON YOUR LEACHATE EFFLUENT– REG

Dear Sir,

We thank you for the pleasant discussions you had with us regarding the above subject followed by the inspection of the effluent.

In connection with the above, we wish to inform you that we have collected your effluent samples and conducted trials in our lab and we are successful in identifying the nature and the type of Micro Algae required for the above effluent.

The major advantage of this treatment is that ther is no Need for an exhaustive plant for treating the leachate and Eco friendly solutions can be provided to treat the same

Hence, No Chemical Sludge Handling and Disposal of the same.

Based on the trials we have provided our concept of treatment for your kind perusal.

We would request you to kindly go through the same and let us have your confirmation enabling us to initiate the Pilot treatment process.

Thanking you and looking forward for the pleasure of working with you at all times

For Microclean Environmental Solutions,

R. Priya
Admin.

Division of Responsibilities:

For Microclean & Trinity Consortium:

a) Development of Inoculum
b) Growth of Algae at site
c) Furnish Project design/BoQ /provide technical advice
d) Initializing and Stabilizing Operations
e) Achieving key parameters after treatment (BOD, COD, DO, EC, TC, FC)
f) Supply of required Nutrition for one year
g) Keeping technical person at site/visiting site whenever necessary. Board and Lodge will be provided by us including to and fro travel expenses.
h) To prepare SOP and share with the client for operational part.
i) To analyze/ review operation/conduct testing pick up sample

Responsibilities for Client:

a) Supply of leachate at site
b) Tp provide all Tanks and Systems as in Annexure A.
c) Construction of total Project as per our design & advice including Boundary wall.
d) To take care of all local approvals as required
e) Provide land (700 Sq. Meters) & Electricity at site
f) Provide Local help for our team to discharge its responsibility
g) Provide test results conducted on treated Effluent/Leachate.
h) Provide Local transport to staff of us to commute / Take care of security and medical help of our staff.
i) To make payments to us as per agreed /stipulated terms to avoid any interruptions in operations.
j) To allow us to put up display board at Project site
k) To provide all help/supplies at site for smooth running of the Project.
l) Algal sludge disposal if same is not utilized as Bio fertilizer.

Our Terms and conditions on different aspects of the project:

Technological aspects

A. **Technical analysis & inoculum development:** In order to develop the Micro Algae consortia based on leachate to be treated, we will need 5L of sample. This may be sent to the address as conveyed to you. The consortia will be developed within 10 days after receipt of leachate sample. We will also need a detailed Analysis Report of the Leachate as well before we take up the development of Inoculum for said Leachate.

B. **Mass production of Inoculum:** This will be started at site after the site works has been completed, Agreement between us are being Signed and stipulated advance payment has been received from Client. Production of inoculum to treat 5000 L/day Leachate will take 2-3 weeks. Hence full operation will start after 3-4 weeks of receipt of inoculum at site.

C. **Technical Supervision for Growth of Algae (Inoculum) and Stabilization:** We will be depute our senior technical Manager to grow inoculum at site and stay there till operations are commenced & fully stabilized. This may take 4-5 weeks after initiating the Project. After stabilization of the process and achieving the desired results, an SOP will be formulated and handed over to the authorized person of the client at site. SOP will include procedure to carry on the operations further.

D. **Nutrition:** The treatment of Leachate may require Micro-nutrition of special type/plant growth hormones/bio-accelerators. We will not be under obligation to disclose its proprietary nutrition required for Growth of Algae.

E. **Algal Strains:** we create inoculum based on Leachate, its composition, Local conditions etc. This is our intellectual property which is not shared with any client.

The use of these algal strains as concoction (mixture) is not permitted at all except for specific site as agreed by us in writing.

F. **Review of Technical process:** The growth of algae will be reviewed from time to time. We will be sending our technical people to review or modify the process if required. We will have right to pick up sample of leachate/ treated effluent/algae for analysing the same for the betterment of process.

G. **Design Capacity:** The designed Project will have capacity to treat 5000 L/day

Project Construction aspects:

The design: The details of the Civil tanks and Systems BoQ for 5 kld required are enclosed in Annexure A. If constructed with Brick and cement plaster, the Civil construction is expected to last at least 7-10 years. So also, the pumps/motor, LED lights etc, provided needs to be protected from rain. You may create dug out ponds as well. If so, The pond has to be lined with HDPE genome sheet- 500 ppm+

A. **Land required**: The estimated land requirement will be around 700 Sq. Meters – Client Scope

B. **Boundary:** The tanks/equipments etc need to be protected. Hence, we strongly suggest creating fencing/boundary wall

C. **Time:** We expect the construction time of 3-4 weeks max for Project completion

D. **Transparent Roof:** To protect the project from rain etc/UV light, we suggest structure with acrylic sheets on key components of the Project. This decision will be subject to site selection and not mandatory as such.

E. **Automation**: We suggest to use timers/sensors to automate the project with regard to transfer of Leachate to Algal tanks, in between transfer of Algae from one tank to another, to final collection tank, stirring of Algae, LED lights on/off operation and transfer of Algal Sludge. We also suggest setting up of on-line testing of Parameters, particularly Dissolved Oxygen. This will reflect the condition of the treatment on Live basis. Hence the project will be at least 95 % automatic operation.

F. Estimated Cost for Civil: As per our estimate, the total project construction cost incorporating above features should not exceed Rs. 25 lakhs + GST Construction will be responsibility of the Client. However if super vision required from our side, the supervision Charges will be extra to cover the cost of travel, board, lodge and local transport etc.

Project Commercials - Cost for 1 year operation:

Total Service Charges for the above on account of Inoculum, Nutrition and Supervision for 1 year would be Rs. 36,33,000.00 Rupees Thirty Six Lakhs and Thirty Three Thousand Only + GST

Terms of Payment:

I. 50 % advance payment + GST within 7 working days of signing of the agreement.
II. 20 % upon start of treatment + GST
III. 25 % within one month of start of regular operations + GST
IV. 5 % after 12 months from the date of Contract + GST.

General Terms and Conditions:

a) **Force Majeure**: The Project completion / operations are subject to Force Majeure Condition. Force majeure includes any condition which is beyond the reasonable control of any party. Change in constitution of the company will not be considered as Force Majeure Condition

b) **Dispute Redressal:** All disputes will be resolved amicably. However, if the concerned parties are not able to resolve the differences, then Legal Law Channels of Land/courts will apply with Legal Jurisdiction at New Delhi

c) **Intellectual Property rights**: The inoculum supplied by us and the Algae grown out of it is subjected to our/PERC intellectual property rights. This can be used only and exclusively for specific site only. The Algal strains used in the inoculum are mixture of robust strains. The Client/ any third party is not permitted to use this concoction (Inoculum) for any project except for agreed site. For Any violation of this. Our Consortium has the absolute right to recover the consequential losses through Legal Channels available to Our Consortium.

d) **Validity:** This proposal/Offer is valid for 8 weeks from the date of this offer and there after subject to our confirmation in writing.

e) **Effective date of agreement:** The receipt of advance with LOI will be treated as the Effective date of start of agreement and all dates/time frame will be reckoned from that date

Head Office: #381, Kamraj Nagar, Samychettypalayam, Coimbatore – 641 047
City Office: # 13, N.G.N Street, Sidhapudur, Coimbatore – 641044
Ph: +91 422 – 252 8555. Mobile: +91 9865254858
Web: www.microcleanindia.com Email: info@microcleanindia.com

Annexure A – Client Scope.

1. **HRAP Ponds:**

   Size of Ponds would be 4x2 x0.75 M – 8 no
2. **Collection tank:**

   Collection tank will be 5x3x1 M – 1 No
3. **Treated Water tank:**

   Treated water tank will be 10x4x1 M
4. **Flatbed Algae biomass/sludge tank.**

   It will be 5x3x0.5 M
5. **Leachate Sludge tank**

   It will be 3x1.5x1 M
6. **Area Required**

   700 Sq. Meters
7. **Motor specs:**

   2 HP Chemical Pumps – 2 Nos.
8. **Pipes and Valves:**

   2 inches
9. **LED of desired frequency lights required - 100 KW will be 18**

Head Office: #381, Kamraj Nagar, Samychettypalayam, Coimbatore – 641 047
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Annexure 18: Heavy Metal Analysis Report

CHENNAI
Testing redefined
TESTING LABORATORY PRIVATE LIMITED

www.ctllabs.in
www.foodenvironmenttesting.com

CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-03672/2022-23 & 10.06.2022**		
Sample Number	**N-03672/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/360-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	130.15
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	261.90
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	293.62
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	66.56
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	440.45

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

A. RAJKUMAR
Technical Manager
(CHEMICAL)

The Report shall not be used to malign, defame and for any malicious purpose.
The Report is meant only for sole use of the addressee to promote his/her own business.

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CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-03673/2022-23 & 10.06.2022**		
Sample Number	**N-03673/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/323-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	80.94
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	139.85
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	170.38
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	53.88
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	345.96

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

A. RAJKUMAR
Technical Manager
(CHEMICAL)

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CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-03674/2022-23 & 10.06.2022**		
Sample Number	**N-03674/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/358-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	115.62
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	138.18
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	179.48
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	59.30
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	358.02

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

A. RAJKUMAR
Technical Manager
(CHEMICAL)

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CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-03675/2022-23 & 10.06.2022**		
Sample Number	**N-03675/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/359-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	96.99
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	151.56
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	192.65
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	70.35
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	335.93

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

A. Raj

Authorised Signatory

A. RAJKUMAR
Technical Manager
(CHEMICAL)

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CIN : U74999TN2008PTC067568

TEST REPORT.

Report Number and date	**CTL/CH/N-03676/2022-23 & 10.06.2022**		
Sample Number	**N-03676/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/326-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	78.11
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	130.77
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	135.18
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	49.18
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	312.41

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

A. RAJKUMAR
Technical Manager
(CHEMICAL)

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CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-03677/2022-23 & 10.06.2022**		
Sample Number	**N-03677/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/360-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	109.60
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	218.68
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	186.54
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	99.35
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	405.32

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

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TEST REPORT

Report Number and date	**CTL/CH/N-03678/2022-23 & 10.06.2022**		
Sample Number	**N-03678/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/323-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	87.26
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	152.04
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	265.34
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	78.20
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	379.45

BDL - Below Detection Limit; DL - Detection Limit;

*****END OF REPORT*****

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TEST REPORT

Report Number and date	**CTL/CH/N-03679/2022-23 & 10.06.2022**		
Sample Number	**N-03679/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/358-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	108.51
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	139.12
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	183.30
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	65.61
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	314.05

BDL - Below Detection Limit; DL - Detection Limit;

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TEST REPORT

Report Number and date	**CTL/CH/N-03680/2022-23 & 10.06.2022**		
Sample Number	**N-03680/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/359-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	129.05
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	157.02
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	174.16
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	87.01
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	252.18

BDL - Below Detection Limit; DL - Detection Limit;

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TEST REPORT

Report Number and date	**CTL/CH/N-03681/2022-23 & 10.06.2022**		
Sample Number	**N-03681/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: PCE1/SOIL/326-03-22**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	06.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	07.06.2022	**Analysis Completion Date**	10.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	113.55
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	111.80
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	158.44
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	53.30
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	273.42

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

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TEST REPORT

Report Number and date	**CTL/CH/N-04411/2022-23 & 18.06.2022**		
Sample Number	**N-04411/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: Location - 1**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	66.01
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	204.37
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	282.57
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	84.92
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	434.73

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

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TEST REPORT

Report Number and date	**CTL/CH/N-04412/2022-23 & 18.06.2022**		
Sample Number	**N-04412/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: Location - 2**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	71.70
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	105.62
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	187.17
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	56.01
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	361.42

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

A. Raj

Authorised Signatory

A. RAJKUMAR
Technical Manager
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TEST REPORT

Report Number and date	CTL/CH/N-04413/2022-23 & 18.06.2022		
Sample Number	N-04413/22-23		
Customer Name & Address	M/s. Sandhya Strategic Investment & Advisory (SSIA),		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	Legacy Waste Homogenous Sample		
Additional Information By Customer	Sample Mark: Location - 3		
Quantity Received	1 Kg	Sampled By	Customer
Date of Receipt	15.06.2022	Sample Condition	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	Analysis Completion Date	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	126.30
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	109.62
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	164.02
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	58.16
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	279.82

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

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TEST REPORT

Report Number and date	**CTL/CH/N-04414/2022-23 & 18.06.2022**		
Sample Number	**N-04414/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Homogenous Sample**		
Additional Information By Customer	**Sample Mark: Location - 4**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	114.73
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	83.93
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	198.38
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	63.76
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	492.71

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

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TEST REPORT

Report Number and date	CTL/CH/N-04415/2022-23 & 18.06.2022		
Sample Number	N-04415/22-23		
Customer Name & Address	M/s. Sandhya Strategic Investment & Advisory (SSIA),		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	Legacy Waste Homogenous Sample		
Additional Information By Customer	Sample Mark: Location - 5		
Quantity Received	1 Kg	Sampled By	Customer
Date of Receipt	15.06.2022	Sample Condition	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	Analysis Completion Date	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	54.68
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	99.82
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	128.66
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	70.64
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	398.44

BDL - Below Detection Limit; DL - Detection Limit;

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CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-04416/2022-23 & 18.06.2022**		
Sample Number	**N-04416/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: Location - 1**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	37.80
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	145.67
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	110.01
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	77.28
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	335.26

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

A. RAJKUMAR
Technical Manager
(CHEMICAL)

The Report shall not be used to malign, defame and for any malicious purpose.
The Report is meant only for sole use of the addressee to promote his/her own business.

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TESTING LABORATORY PRIVATE LIMITED
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www.ctllabs.in
www.foodenvironmenttesting.com

CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-04417/2022-23 & 18.06.2022**		
Sample Number	**N-04417/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: Location - 2**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	152.60
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	118.94
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	126.72
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	57.65
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	510.72

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

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TEST REPORT

Report Number and date	**CTL/CH/N-04418/2022-23 & 18.06.2022**		
Sample Number	**N-04418/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: Location - 3**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	112.80
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	78.97
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	131.66
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	53.22
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	295.71

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

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CIN : U74999TN2008PTC067568

TEST REPORT

Report Number and date	**CTL/CH/N-04419/2022-23 & 18.06.2022**		
Sample Number	**N-04419/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: Location - 4**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	123.50
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	138.60
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	152.82
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	82.47
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	528.42

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

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TEST REPORT

Report Number and date	**CTL/CH/N-04420/2022-23 & 18.06.2022**		
Sample Number	**N-04420/22-23**		
Customer Name & Address	**M/s. Sandhya Strategic Investment & Advisory (SSIA),**		
	Old No.117, New No.122, Luz Church Road, Mylapore, Chennai - 600 004.		
SAMPLE DETAILS			
Sample Description By Customer	**Legacy Waste Soil**		
Additional Information By Customer	**Sample Mark: Location - 5**		
Quantity Received	1 Kg	**Sampled By**	Customer
Date of Receipt	15.06.2022	**Sample Condition**	Good & Received in Packed Condition
Analysis Starting Date	16.06.2022	**Analysis Completion Date**	18.06.2022

Test Results:

The above sample tested as received, and results are as follows:

S.No	PARAMETERS	TEST METHOD	UNITS	RESULTS
1	Arsenic as As	Schedule - IV, Part D(12) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.1)
2	Lead as Pb	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	113.28
3	Chromium as Cr	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	110.76
4	Copper as Cu	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	128.73
5	Nickel as Ni	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	90.87
6	Cadmium as Cd	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:2.0)
7	Mercury as Hg	Schedule - IV, Part D(11) of FCO, 1985 (RA.2019)	mg/kg	BDL(DL:0.2)
8	Zinc as Zn	Schedule - IV, Part D(10) of FCO, 1985 (RA.2019)	mg/kg	592.74

BDL - Below Detection Limit; DL - Detection Limit;

END OF REPORT

For Chennai Testing Laboratory Pvt ltd

Authorised Signatory

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Technical Manager
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Hubert Enviro Care Systems (P) Ltd.
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E-mail : labsales@hecs.in

Laboratory Services Division
(Chemical & Biological Testing)
FSSAI Notified Laboratory
ISO 9001, 14001 & 45001 Certified.

TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/001/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 1 (Heavy Metals in Homogeneous)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	55.89	USEPA Method 3050B
3	Chromium as Cr	mg/kg	32.16	USEPA Method 3050B
4	Lead as Pb	mg/kg	11.99	USEPA Method 3050B
5	Zinc as Zn	mg/kg	38.03	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	11.06	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.4	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

HUBERT ENVIRO CARE SYSTEMS (P) LTD. Chennai 600 032

Authorized Signatory
S. Ravi
Vice President (Labs)

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TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/002/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 2 (Heavy Metals in Homogeneous)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	18.86	USEPA Method 3050B
3	Chromium as Cr	mg/kg	21.46	USEPA Method 3050B
4	Lead as Pb	mg/kg	12.29	USEPA Method 3050B
5	Zinc as Zn	mg/kg	43.87	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	5.49	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.61	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

HUBERT ENVIRO CARE SYSTEMS (P) LTD. Chennai 600 032

Authorized Signatory
S. Ravi
Vice President (Labs)

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Laboratory Services Division
(Chemical & Biological Testing)
FSSAI Notified Laboratory
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TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/003/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 3 (Heavy Metals in Homogeneous)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	21.31	USEPA Method 3050B
3	Chromium as Cr	mg/kg	20.63	USEPA Method 3050B
4	Lead as Pb	mg/kg	10.75	USEPA Method 3050B
5	Zinc as Zn	mg/kg	24.01	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	5.37	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.22	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

HUBERT ENVIRO CARE SYSTEMS (P) LTD. Chennai 600 032

Authorized Signatory

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Vice President (Labs)

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Laboratory Services Division
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FSSAI Notified Laboratory
ISO 9001, 14001 & 45001 Certified.

TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/004/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 4 (Heavy Metals in Homogeneous)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	105.38	USEPA Method 3050B
3	Chromium as Cr	mg/kg	30.88	USEPA Method 3050B
4	Lead as Pb	mg/kg	23.93	USEPA Method 3050B
5	Zinc as Zn	mg/kg	84.11	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	6.90	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.61	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

HUBERT ENVIRO CARE SYSTEMS (P) LTD. Chennai 600 032

Authorized Signatory
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Vice President (Labs)

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Laboratory Services Division
(Chemical & Biological Testing)
FSSAI Notified Laboratory
ISO 9001, 14001 & 45001 Certified.

TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/005/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 5 (Heavy Metals in Homogeneous)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	48.87	USEPA Method 3050B
3	Chromium as Cr	mg/kg	15.72	USEPA Method 3050B
4	Lead as Pb	mg/kg	16.49	USEPA Method 3050B
5	Zinc as Zn	mg/kg	63.15	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	8.36	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.38	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

HUBERT ENVIRO CARE SYSTEMS (P) LTD. Chennai 600 032

Authorized Signatory
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Vice President (Labs)

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TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/006/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 1 (Heavy Metals in Soil Part of the Waste Sample)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	31.94	USEPA Method 3050B
3	Chromium as Cr	mg/kg	22.84	USEPA Method 3050B
4	Lead as Pb	mg/kg	17.06	USEPA Method 3050B
5	Zinc as Zn	mg/kg	50.02	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	7.63	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.57	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

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Authorized Signatory
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Vice President (Labs)

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TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/007/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 2 (Heavy Metals in Soil Part of the Waste Sample)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	8.90	USEPA Method 3050B
3	Chromium as Cr	mg/kg	5.44	USEPA Method 3050B
4	Lead as Pb	mg/kg	6.93	USEPA Method 3050B
5	Zinc as Zn	mg/kg	21.85	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	2.51	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.45	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

HUBERT ENVIRO CARE SYSTEMS (P) LTD. Chennai 600 032

Authorized Signatory
S. Ravi
Vice President (Labs)

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Laboratory Services Division
(Chemical & Biological Testing)
FSSAI Notified Laboratory
ISO 9001, 14001 & 45001 Certified.

TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/008/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 3 (Heavy Metals in Soil Part of the Waste Sample)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022** Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	48.12	USEPA Method 3050B
3	Chromium as Cr	mg/kg	166.82	USEPA Method 3050B
4	Lead as Pb	mg/kg	50.12	USEPA Method 3050B
5	Zinc as Zn	mg/kg	31.58	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	23.45	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.35	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

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TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/009/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 4 (Heavy Metals in Soil Part of the Waste Sample)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022** Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	35.52	USEPA Method 3050B
3	Chromium as Cr	mg/kg	23.66	USEPA Method 3050B
4	Lead as Pb	mg/kg	25.68	USEPA Method 3050B
5	Zinc as Zn	mg/kg	108.02	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	5.26	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.45	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

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TEST REPORT

Name of the Client : **M/s. Sandhya Strategic Investment and advisory.,**
Report No. : **HECS/SD/010/140622**
Report Date : **17/06/2022**

Address of the Client : **Kodandhaiyur**

Sample Description : **SOIL**
Sample Mark : **L 5 (Heavy Metals in Soil Part of the Waste Sample)**
Sample Drawn By : **Hubert Enviro Care Systems (P) Ltd**
Sampling/received Date : **14/06/2022 -14/06/2022**
Analysis Commenced On : **14/06/2022**
Completed On : **17/06/2022**

S.No.	Parameters	Units	Results	Test Method
1	Cadmium as Cd	mg/kg	BLQ(LOQ 0.1)	USEPA Method 3050B
2	Copper as Cu	mg/kg	28.89	USEPA Method 3050B
3	Chromium as Cr	mg/kg	15.61	USEPA Method 3050B
4	Lead as Pb	mg/kg	10.14	USEPA Method 3050B
5	Zinc as Zn	mg/kg	37.33	USEPA Method 3050B
6	Mercury as Hg	mg/kg	BLQ(LOQ 0.1)	USEPA Method 245.5
7	Nickel as Ni	mg/kg	5.64	USEPA Method 3050B
8	Arsenic as As	mg/kg	0.30	USEPA Method 3050B

Note:- BLQ - Below the Limit of Quantification, LOQ- Limit of Quantification, mg/kg – milligrams per kilograms.

End of Report

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Annexure 19: Labour Management Plan Template

LMP shall be prepared by the contractor following the requirements of the ESS2 on Labour and Working Conditions. The LMP is a living document, which is initiated early in project preparation, and is reviewed and updated throughout development and implementation of the project. Outline for LMP is provided below which is indicative and shall be made specific to the sub-project.

Description	Mitigation Measures	Responsibility	
		Implementation	Supervision
Applicable Laws	The contractor should ensure the compliance of applicable Indian Labour Laws such as Factories Act 1948, Building and Other Construction Workers Act 1996, Inter State Migrant Workmen Act 1979, Contract Labour (Regulation & Abolition) Act 1970, Workmen Compensation Act 1923, Child Labour (Prohibition & Regulation) Act 1986, Minimum Wages Act 1948, Employee State Insurance Act 1948, Employees Provident Fund Act 1991, Payment of Wages Act 1936, Payment of Bonus Act 1965, Equal Remuneration Act 1976, Payment of Gratuity Act 1972 and other International Labour organization conventions as ratified by India.	Contractor	PMC/GCC
Applicable Licences	Labour Licence and all other statutory work permits including Contract Labour& Interstate Migrant Worker License. Workmen compensation Insurance / Accident Insurance, EPF and ESIC.	Contractor	PMC/GCC
Site layout	The location of the site, design and basic facility provision in the labour accommodation will be reviewed and approved by the PMC prior to the construction;	Contractor	PMC/GCC
Facilities	Maintain necessary living accommodation and ancillary facilities in functional and hygienic conditions;	Contractor	PMC/GCC

Description	Mitigation Measures	Responsibility	
		Implementation	Supervision
	Provide adequate number of toilets separate for men and women workers, bathing area and uncontaminated water for drinking, cooking and washing; Ensure adequate water supply in all toilets and urinals; The labour camp should have protection from heat, rain, flooding, insects, snakes and mosquitoes. It should have adequate provisions for emergency such as fire safety, security, etc; Require the non-discrimination and harassment and should be socialized/basis for training, and covers potential ethnic discrimination.		
Health and Safety	Provide first aid medical kit at labour accommodation; train the labour for usage of items in injury, emergency, coordinate with nearest government and private medical centers for the medical services, display the contact number of medical doctor(s) and keep a vehicle for emergency travel all the time; necessary HIV/AIDS prevention measures will be taken at labour camp; HIV/AIDS awareness program will be organized by the contractor's Environment & Safety Officer;	Contractor	PMC/GCC
Labour use	The total number of workers to be employed on the project, and the different types of workers: direct workers, contracted workers, temporary or seasonal workers and community workers. details of the migrant workers, labour camp location should be shared with local Police station as per regulatory norms.	Contractor	PMC/GCC

Description	Mitigation Measures	Responsibility	
		Implementation	Supervision
Grievance	Establish a mechanism for grievance redressal for both direct and contract labourers, disclose contact details of officials concerned. Sign boards and GRC name boards should be written in local, multilingual languages and English at the labour camp.	Contractor	PMC/GCC
Policies and Procedures	Provide workers with contracts with fair terms and conditions Require the contractor to preferentially engage unskilled local workforce form the local communities Make all contracted workers to follow the rules for on-site behaviour (with colleagues) and conduct in the community. Introduce disciplinary measures for violations and misbehaviours. Set the minimum age of project workers eligible for any type for work. Train the labour for environmental protection, occupational and community health and safety and gender equality. Follow the equal wages policy without any discrepancies or gender partialities. Ensure minimum legal labour standards as per ILO regulations (child/forced labour, no discrimination, working hours, minimum wages) are met with. Contractors shall implement codes of conduct concerning employment and workforce behaviour (including but not limited to safety rules, zero tolerance for substance abuse, environmental sensitivity of the area, dangers of sexually transmissible diseases and HIV/AIDS, gender equality and sexual harassment, respect for the beliefs and customs of the populations and community relations in general).	Contractor	PMC/GCC

Annexure 20: Indicative Structure for LTRIP

STEP 01

Establish Registered Body/ Society (RBS)

Handholding BY GCC & NGO

- Mutually beneficial – no labour/ legal issues for GCC
- Better bargaining & administrative power for ragpickers

STEP 02

Confidence Building Measures

GCC

- Final baseline survey with FGDs
- Ensure complete covid vaccination

STEP 03

Finalise LTRIP Implementation Plan

GCC & Ragpickers Cooperative

- Phased planning
- Age & Gender based strategy
- Integration of RAP principles based on ESS 5
- Joint working committee

STEP 04

Micro Interventions

Phase 1 by RBS with GCC support

- Complete Database
- Identity Cards – Aadhar
- Bank Account
- Health & Life Insurance

Resettlement

RCOP with GCC support

- Supply labor to Future Processing Facilities
- Financial assistance if required (skill development etc)
- Ensure Ragpickers Welfare

STEP 05

Micro Interventions

Phase 2 by RBS with GCC support

- Ensuring Access to Fresh Waste Site
- Skill Development Programs
- Final List for financial assistance if required

STEP 06