Project Implementation Manual for Kerala Solid Waste Management Project (KSWMP, P168633)

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Abbreviations and Acronyms

АТ	Annual Trigger	KILA	Kerala Institute of Local Administration
ASP	Aerated Static Piles	KLGSDP	Kerala Local Govt Service Delivery Project
BDW	Biodegradable waste	КМА	Kerala Municipality Act
BG	Basic Grant	KSAD	Kerala State Audit Department
BMW	Bio Medical Waste	KSPCB	Kerala State Pollution Control Board
BMWM	Biomedical Waste Management	KSWMP	Kerala Solid Waste Management Project
BoQ	Bill of Quantity	LAR&R	Land Acquisition, Resettlement and Rehabilitation
C&D	Construction and demolition	LCC	Life Cycle Cost
C&T	Collection and transportation	LDPE	Low-density Polyethylene
СА	Constitutional Amendment	LOA	Letter of Award
CAAA	Controller of Aid, Accounts and Audit	LSGD	Local Self Government Department
CAG	Comptroller and Auditor General	M&E	Monitoring and Evaluation
СВО	Community Based Organisations	MCF	Material Collection Facility
CBWTF/ CBMWTF	Common Biomedical Waste Treatment Facility	МНМ	Menstrual Hygiene Management
СКС	Clean Kerala Company	MIS	Management information system
CNG	Compressed Natural Gas	ММС	Minimum Mandatory Conditions
COVID 19	Coronavirus disease 2019	MoEF	Ministry of Environment and Forest
СРСВ	Central Pollution Control Board	MoEF & CC	Ministry of Environment, Forest & Climate Change
CPHEEO	Central Public Health and Environmental Engineering Organisation	MoU	Memorandum of Understanding
CS	Communication Specialist	MoUD	Ministry of Urban Development, Government of India
cum./ m3	cubic meters	MRF	Material Recovery Facilities
CTF	Common Treatment Facility	MSW	Municipal Solid Waste
DA	Designated Account	NBDW	Non-biodegradable waste
DBOT	Design Build Operate and Transfer	NGO	Non-governmental organization
DFBOT	Design Finance Build Operate and Transfer	NGT	National Green Tribunal
DESDU	District Environmental and Social Development Unit	0&M	Operations and maintenance

DLP	Digital Learning Platforms	РА	Participation Agreement
DMP	Disaster management plan	PAD	Project Appraisal Document
DPC	District Planning Committee	PD	Project Director
DPD	Deputy Project Director	PDO	Project Development Objective
DPMU	District-level Project Management Unit	PIC	Public Information Cell
DSWM	Decentralized Solid Waste Management	PIM	Project Implementation Manual
E&S	Environmental and Social	PIU	Project Implementation Unit
ED	Executive Director	РМС	Project Management Consultant
EIA	Environmental Impact Assessment	PPE	Personal Protection Equipment
EIRR	Economic Internal Rate of Return	PPP	Public Private Partnership
EoI	Expression of Interest	PPSD	Project Procurement Strategy Document
EPC	Engineering-Procurement and Construction	PSC	Project Steering Committee
EPR	Extended Producer Responsibility	PVC	Polyvinyl Chloride
ESDU	Environment and Social Development Unit	QA-QC	Quality Assurance-Quality Control
ESIA	Environmental and Social Impact Assessment	RAP	Result and Performance
ESMF	Environmental and Social Management Framework	RCC	Reinforced Cement Concrete
ESMP	Environmental and Social Management Plan	RDF	Refused Derived Fuel
ETP	Effluent Treatment Plant	RFQ	Request for Quotation
FAQs	Frequently Asked Questions	RFB	Request for Bids
FM	Financial Management	RFCTLARR	Right to fair compensation and land acquisition and resettlement and rehabilitation
FGD	Focus Group Discussion	RKDP	Resilient Kerala Development Program
FR	Feasibility Report	RPF	Resettlement Policy Framework
FRP	Fibre Reinforced Plastic	RRF	Resource Recovery Facility
FY	Financial Year	RRRR	Reduce, Reuse, Recycle and Recover
GAC	Grant Allocation Ceiling	Rs	Indian Rupee
GBV	Gender-based violence	RSLF	Regional Sanitary Landfill
GCL	Geosynthetic Clay liner	RFID	Radio Frequency Identification
GEWE	Gender Equality and Women's Empowerment	RWA	Residents Welfare Association

GHG	Greenhouse gas	SA	Social Assessment
GIS	Geographic Information System	SBCC	Social and Behavior Change Communication
GoI	Government of India	SDS	Social Development Specialist
GoK	Government of Kerala	SEA	Strategic Environmental Assessment
GPS	Global Positioning System	SESDU	State Environment and Social Development unit
GRM	Grievance Redressal Mechanism	SGIMS	Safeguards Information Management System
GRMS	Grievance Redressal Management System	SHG	Self Help Group
GS	Gender Specialist	SLB	Service level benchmarks
GSI	Geological Survey of India	SLF	Sanitary landfill facilities
GUR	Grant Utilization Report	SM	Suchitwa Mission
GVW	Gross Vehicle Weight	SPMC	State-level Project Management Consultant
HDPE	High-density Polyethylene	SPMU	State-level Project Management Unit
HSE	Health Safety and Environment	SPT	Standard Penetration Test
HCF	Healthcare Facilities	STEP	Systematic Tracking of Exchanges in Procurement
НКМ	Harith Kerala Mission	STSB	Special Treasury Savings Bank
HKS	Haritha Karma Sena	SUP	Single-use plastic
HRT	Hydraulic Retention Time	SWM	Solid Waste Management
IEC	Information Education Communication	ТА	Technical Assistance
IFR	Interim Financial Report	TDF-SMF	Tribal Development Framework- Social Management Framework
IG	Incentive Grant	TIFAC	Technology Information, Forecasting and Assessment Council
IMAGE	Indian Medical Association Goes Eco-Friendly	TNA	Training Need Analysis
IMD	Indian Meteorological Department	ToR	Terms of Reference
ІоТ	Internet of Things	TPD	Tons Per Day
IP	Indigenous People	TSC	Technical Support Consultant
IPF	Investment Project Financing	TSDF	Treatment Storage and Disposal Facilities
IRM	Institutional Responsibility Matrix	ULB	Urban Local Body
ISWM	Integrated Solid Waste Management	WSA	Waste-shed areas

IVA	Independent Verification Agency	WtE	Waste to Energy
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VOLUME 1: Project Implementation Manual (PIM)

Chapter 1. Project Overview

1.1. Brief status of current solid waste management (SWM) service delivery in Kerala

Kerala has 6 Municipal Corporations, 87 municipalities, 77 Taluks, 14 District Panchayats, 152 Block Panchayats and 941 Gram Panchayats¹ with a total population of 3.48 crores, as per 2011 census. As the census figures indicate, the state has been urbanizing more rapidly than the national average with an annual urban population growth of 6.5%. About 52% of the total urban population live in mid-sized Urban Local Body (ULB) having population ranging between 20,000 and 100,000 and the remaining 48% live in larger ULBs that have population greater than 100,000. The state, however, has not registered corresponding growth rates in the provision of urban infrastructure, particularly, the SWM related infrastructure and the service levels are substantially below the national level benchmarks. Though the state has decentralized 17 of the 18 urban functions to the ULBs [as mandated by the 74thConstitutional Amendment (CA)], and transfers a large portion of its budget to ULBs, it has not yet been successful in reaping the benefits of such fiscal and governance decentralization reportedly due to varied reasons and in this context, the SWM services are particularly constrained owing to lack of adequate infrastructure and service delivery systems across the value chain.

The total solid waste generation in Kerala is estimated at 3.7 million tons annually. Of the total waste generated, the total share of biodegradable and non-biodegradable waste (NBDW) is at 69% and 31 % respectively². The biodegradable waste (BDW) has a moisture content of about 70%. It is estimated that only ~20% of the BDW is treated at household or community levels, and the remaining ~80% is not properly treated and disposed. Similarly, about 60% of the NBDW is dumped illegally or burned, while the remaining waste is collected informally by rag-pickers. A minor fraction is recycled at the community level. The State has no engineered landfills and/or centralized waste management facilities for municipal waste. Consequently, a major fraction of municipal waste has been openly dumped in public spaces, low-lying lands and water bodies for many years now, resulting in creation of numerous illegal open dumpsites that pose serious environment and public health hazards.

Currently, the waste management system in the state focuses on the citizen responsibility of managing biodegradable waste at source under 'My waste, My responsibility' approach with a focus of instilling a sense of ownership and duty among citizens. The local government's involvement in handling of waste is restricted mostly to collection and recycling of non-biodegradable waste and collection of biodegradable waste from bulk generators. A recent survey conducted in 12 ULBs in the state indicated that about 10% households are practicing source treatment. Though the state appears to have achieved some efficiencies in waste segregation at source and in bringing a striking behavioral change and sense of responsibility among citizens regarding the need and methods of efficient and effective segregation, it still faces major challenges and issues in the existing waste management practices as listed below:

¹ Local self-governance, Kerala - website

² World Bank Waste Characterization Survey conducted in 12 cities across the state

- a) Restrictive policy which promotes source treatment for household biodegradable waste;
- b) Low adoption of good quality source treatment;
- c) Limited collection of waste largely restricted to NBDW while some NBDW types not collected;
- d) Unstructured contracting terms for private engagement;
- e) Inadequate audit and monitoring of waste management practices;
- f) Inadequate processing and disposal of waste;
- g) Offtake of shredded plastic is minimal owing to technology related issues in using them for road construction.
- h) Large quantities of the collected NBDW is either dumped in poorly maintained dump sites or are accumulating at the existing Resource Recovery Facility (RRF)/Material Collection Facilities(MCFs), which are not designed or equipped to handle the load efficiently;
- i) BDW collection and treatment is infrequent at most ULBs;
- For ULBs that collect and treat BDW, low off take of finished compost (poor quality or inconsistent quality/ demand) and accumulation of compost at treatment plants is an issue;
- k) The state notably lacks disposal sites complying to environmental regulations, with adequate leachate treatment/ gas collection facilities.

Public protests against SWM projects due to poor implementation of existing projects, potential for water contamination, presence of odour and disease vectors and relatively poor involvement of stakeholders in designing and explaining the project and its benefits has resulted in nearly no new project developments in Kerala state. Disaster Management Plans (DMP) and climate resilience planning also have only limited SWM inclusions and proper vulnerability assessments have not been carried out on existing sites.

The state in its efforts to build and support a better waste management system created multiple organizations at various times to fix a specific issue or aspect - entities like Haritha Kerala Mission, Haritha Karma Sena (HKS) under Kudumbashree Mission, Clean Kerala Company (CKC), Indian Medical Association Goes Eco-Friendly (IMAGE), etc. have been tasked with specific activities in the whole SWM value chain. However, this has not only interfered with the primary responsibility of waste management being with the local self-government institutions but diluted the accountability and spread of investments and resulted in the sector getting neglected. The super-imposition of state agencies and their non-accountability to the local self-governments has led to overlapping mandates lacking synchronized vision. In addition, the local self-government institutions are not adequately staffed and lack a dedicated SWM unit, to deal with SWM in an efficient, systematic and planned manner.

As for the regulatory framework for SWM in the state, existence of multiple laws, rules and acts relating to SWM and imprecise direction lead to lack of clarity among LSG staff on planning and needs in SWM sector. The state regulation and rules have noticeable inconsistencies with the National policies/ rules which requires immediate attention and alignment to the national policies.

1.2. Need for Kerala Solid Waste Management Project (KSWMP)

In order to address the constraints and problems facing the SWM sector, Government of Kerala (GoK) has been taking several institutional and fiscal measures including allocating 15% of its development grants to local governments to support their SWM activities. The government has recently notified an Integrated Solid Waste Management Strategy³ that encourages adoption of new technologies and systems for improving the SWM services in the state. The Key Principles of the new strategy revolve around (i) Demonstrate government leadership in waste management (ii) Provide modern, efficient, consistent and effective regulatory and monitoring system for waste management (iii) Provide an innovative, sustainable and cost efficient waste management system at the local level or regional level (iv) Develop mechanism for funding and devolution mechanisms for SWM projects and (v) Enhance education, awareness and technical understanding of waste managementamong waste practitioners, stakeholders and residents.

In the context of the implementation of the new strategy, the GoK, through Government of India (GoI), has negotiated with the World Bank for Investment Project Financing (IPF) to finance the Kerala Solid Waste Management Project (here after referred to as "**the Project**" in PIM. This forms part of the GoK's medium-term sector investment. The Project primarily focuses on improving the entire SWM value chain activities in Kerala by addressing key institutional, financial, service delivery and infrastructure constraints through appropriate technical assistance (TA) and Capacity Building and Project Investment interventions at ULB and Regional levels, by adopting an integrated service delivery value chain approach. Suchitwa Mission (SM) will be the Implementing Agency for the Project and the Project will be implemented by setting up a State Level Project Management Unit (SPMU) within SM.

1.3. Overview of the Project

The project is designed to provide a combination of technical and financial assistance as well as capacity building support to the participating ULBs and the state government along the full value chain to improve their institutional systems, organizational capacity, infrastructure and service delivery systems for SWM and will support a hybrid approach for service delivery improvements comprising decentralized waste management systems (at generator and community level) and centralized waste management/disposal systems (at local and regional level). The project provides the ULBs the flexibility to undertake a multi-year capital investment planning and implementation approach that is critical for addressing the core service delivery priorities at the local level. Owing to the demographic and geographic profile of the state, characterized by closely located medium and small-sized ULBs and peri-urban areas with high population density, the project will also support a regional approach for SWM and disposal in a technically and financially feasible and financially environmentally sustainable manner.

The Project has been categorized into 3 broad components for the purpose of implementation.

³G.O.(Rt)No.811/2020/LSGD dated 1/5/2020

- Component 1 Institutional Development, Capacity Building and Project Management
- Component 2 Grant support to ULBs for SWM
- Component 3 Development of regional SWM facilities

The Project and its three components are detailed in Chapter 2 of this document.

Project Development Objective (PDO) of KSWMP

A. PDO

The PDO is to strengthen the institutional and service delivery systems for SWM in Kerala.

B. Project Beneficiaries

The Project is expected to benefit the state government and the participating ULBs in improving and enhancing their SWM sector value chain at a regional and local level.

C. PDO-Level Indicators

The key PDO-level indicators are as follows -

- 1. Number of people with access to solid waste collection and disposal services
- 2. Solid waste disposed⁴ safely in engineered landfills (Tons per year)
- 3. Number of ULBs that accessed incentive grant(IG)s for improving SWM services.

1.4. Objective of Project Implementation Manual

The objective of the PIM is to detail the operational mechanisms and implementation arrangements for the Project to provide detailed guidance for Local Self Government Department (LSGD), Suchitwa Mission, , the PMU, and the participating ULBs in executing and implementing various components of the Project. It explains the implementation processes and provides the technical guidelines, operational procedures and reporting requirements. As this is an operational document for the Project, the PIM can be revised during the course of the Project, with the approval of the contracting authorities (the participating ULBs and Suchitwa Mission), to provide for any additional requirements/ changes that may be necessitated during the project implementation period.

1.5. Structure of the PIM

The PIM is divided into 3 volumes as below:

a) Volume 1 – the Project Implementation Manual covering 11 Chapters as described below.

⁴ Only rejects and inert

- b) Volume 2 the Procurement Manual that has to be read in conjunction with the PIM for Project procurement activities.
- c) Volume 3 Annexures/Appendices to the PIM which need to be read in conjunction with the PIM for further detailed guidance/ formats/ templates/ model agreements.

Volume 1 of the PIM is structured as below:

Chapter 1 – Provides a brief introduction and the overview of the Project

Chapter 2 – Provides detailed description of key project components, activities and interventions for supporting the SM, SPMU and the participating ULBs in undertaking identified policy/ regulatory, institutional and financing/ fiscal reforms, capacity building and technical assistance activities as well as service delivery and infrastructure investment interventions.

Chapter 3 – Details the Institutional Arrangements (at the state, district and local level) with a detailed Institutional Responsibility Matrix (IRM) and Project Approval Process for planning, designing and implementation of various activities and sub projects under all the 3 components of the Project.

Chapter 4 –Details the Technical Assistance and Capacity Building Activities which will be supported under the project and the mechanism for carrying out TA, Training and Capacity building activities with appropriate linkage to institutional, policy/regulatory, financial and service delivery reforms identified for improvement of SWM systems at the state and local level.

Chapter 5 – Provides details on formulation of Information Education Communication (IEC)strategy, components of IEC strategy, and Implementation mechanism for IEC including activities to be carried out and the timelines for such implementation.

Chapter 6 – Details Grant Management System for ULBs comprising the grant allocations and reallocations methodology and disbursement thereof; requirements for annual plan and budgeting, performance monitoring/reporting and compliances required for Annual Triggers (AT), performance/ results achievement assessment/ verification steps to be followed for providing grants to the ULBs based on an incentive-based financing approach.

Chapter 7 – Provides detailed Technical Guidelines with recommended technologies for planning, design and implementation of sanitary landfills, biomedical waste treatment facilities, construction anddemolition (C&D) waste, dumpsite remediation implementation and Technical Guidelines for segregation, collection and transportation (C&T) of waste and processing treatment of Municipal Solid Waste (MSW).

Chapter 8 – Details the operational framework for ULB level investments with stepwise guidance on preparation of SWM plan, guidelines on preparation of FR/TS and Detailed Project Report (DPR)s, guidelines for preparation of engineering design, bid process management and implementation supervision

Chapter 9 – Details operational procedures for regional SWM subprojects including guidelines for Waste Shed Area (WSA), operational procedures for regional disposal facilities and procedures for dumpsite remediation and biomining of dumpsites.

Chapter 10 – Provides Monitoring and Evaluation (M&E) Framework for the project based on the performance/ results framework agreed with the World Bank, including reporting system (financial as well as physical progress reporting).

Chapter 11 – Provides Financial management systems and procedures including budgeting, planning, financial reporting/accounting, fund flow/disbursements, monitoring and periodic reporting, external audit and internal control systems required to be followed by the implementation agencies at the state and local level.

Volume 2 of the PIM is the **Procurement Manual** which details out the procurement and contract management arrangements in compliance with the World Bank's New Procurement Framework for works, services and goods based on the kind of procurement activities envisaged at the state and local level. This would include mechanisms to prepare and update procurement plan, project procurement strategy document (PPSD) as well as operational mechanisms to manage procurement transactions on World Bank's STEP portal for seeking clearances and no-objections.

Volume 3 of the PIM contains all **annexures**, **formats**, **model agreements**, **Terms of Reference (ToR)** that form part and parcel of each chapter of Volume – 1 of the PIM. These have been appropriately cross referred/ linked in each chapter.

Chapter 2. Introduction

The project aims to adopt sector wide integrated value chain approach for enhancing the service delivery for waste management in Kerala. The project comprises of combination of technical and financial assistance to the participating ULB's and the state government to improve their institutional and organizational capabilities and strengthen the infrastructure for solid waste management (SWM). The project will provide technical assistance and incentive grants to ULBs for undertaking key institutional reforms critical to strengthening the ULB's capacity and investments in projects across the upstream and downstream value chain activities enhancing the SWM services. The project will support the 6 Municipal Corporations and 87 municipalities across all the 14 districts of Kerala. ULBs will have a to sign a Participation Agreement(PA) and comply with grant guidelines to be eligible for basic and incentive grants under the project. In addition to the investments at the ULB level, the project also envisions providing financing support to the regional projects for the downstream SWM activities.

2.1. Project Design

The project has been designed based on the following institutional and fiscal features:

- a) Unique geographical features of Kerala characterized by rapid urbanization, periurban areas with high density of population and closely located ULBs that require regional solutions for SWM activities in addition to the city level interventions.
- b) Decentralization of governance to LSGIs and presence of multiple institutional structures in SWM value chain leading to fragmentation of activities and poor accountability to citizens.
- c) Lack of resources and institutional capacities at any level of the government, more particularly with ULBs to implement the National SWM Rules 2016, ensuing orders issued by National Green Tribunal (NGT) and Kerala Municipality Act (KMA).
- d) In the aftermath of Coronavirus disease 2019 (COVID 19), an immediate need for ULBs to developinstitutional systems and undertake critical capital and maintenance expenditures required to sustain adequate waste management, sanitization, public hygiene and cleanliness activities for better health risk preparedness requiring commitment of substantial expenditure at ULB level.
- e) Inadequate biomedical waste management systems in urban areas to manage the medical waste in compliance with the national bio-medical waste management rules and the new national COVID-19 medical waste management guidelines issued by Central Pollution Control Board (CPCB).
- f) Need to support vulnerable groups such as waste-pickers, women Self Help Groups (SHG) involved in waste collection and management services, are exposed to health risks and economic risks related to loss of livelihoods, which need to be supported by the ULBs on a priority basis through additional protection and financing measures

and ensure enforcement of labour laws to safeguard the rights and health of the workforce engaged in end to end management of waste.

g) The GoK has undertaken policy actions under the Resilient Kerala Development Program(RKDP) for multi-year and resilient infrastructure investments at ULB level and an integrated SWM service delivery approach through a new SWM strategy. The KSWMP will build upon this enabling framework by providing policy, institutional, capacity building, and investment support at both city and state levels.

2.2. Components of the Project

The project comprises of 3 components namely (i) Institutional Development and Capacity Building (ii) Grant Support to ULBs for SWM and (iii) Development of regional SWM facilities as detailed in Figure 2-1 below.



Figure 2-1: Components of the Project

2.2.1. Component 1: Institutional development, capacity building and project management

The component will provide technical assistance and capacity building at state and local level for (a) undertaking SWM institutional and policy reforms; (b) planning, designing and implementing investment sub-projects for climate smart and disaster resilient SWM infrastructure and services improvement; (c) organizational development of participating ULBs for inclusive and sustainable SWM service delivery; and (d) awareness generation, gender inclusion and stakeholder engagement. This component will also provide project management, coordination and monitoring support at state, district and local levels. Lastly, this component will also provide technical support to LSGD, SM and participating ULBs for (i) developing guidelines and systems for COVID-19 related waste management, sanitization and public hygiene practices to be rolled out across all urban areas, and (ii) carrying out social awareness generation, sensitization and training programs for all the key stakeholders and citizens. The activities envisaged under this component are: a) **Technical Assistance to LSGD, SM and SPMU –** the following activities for Technical Assistance and Capacity Building will be undertaken in this sub-component:

Updating the state's SWM operating guidelines.

Drafting revisions to KMA and Rules, and drafting Government Orders for model SWM organizational structures at ULB level.

Updating annual planning guidelines periodically to facilitate multiyear investments for SWM.

Developing guidelines for public space cleaning and sanitization in the context of COVID-19, as well as guidelines for compliance with safety standards for labor-force involved in waste management activities in the aftermath of COVID-19 crisis.

Developing guidelines and operating procedures for unorganized sanitation workers including access to safety equipment, information on SWM practices and technologies, and access to finance.

Standardize operating procedures for ULBs to follow, to partner with Kudumbashree and/or HKS women and other groups for SWM services.

Strengthening the organizational capacity of SM and its institutional systems to assume its role as lead agency in SWM.

Strengthening the SM's capacity to monitor and supervise all activities at the ULB level.

Strengthening the SM's capacity to monitor and supervise compliance of labor laws and labor influx management plan.

Supporting design, implementation and management of regional SWM facilities, and coordinating all the participating ULBs and peri-urban LGs in the use of these facilities.

The TA will also provide support to LSGD, SM and SPMU to carry out the following activities:

strengthening the inter-institutional coordination mechanisms between LSGD, Kerala State Pollution Control Board(KSPCB) and Environment Department and the functioning of the state level monitoring committee.

strengthening the district level monitoring systems including the functioning of district level monitoring committee.

developing and operationalizing comprehensive SWM data collection and information management systems to strengthen reliable data collection and analysis for service performance and compliance monitoring

- **b) Technical Assistance to ULBs –** the following TA and capacity building activities will be provided to ULBs.
 - i. Technical support to strengthen the organizational capacity for SWM delivery services

- ii. Technical support to achieving the eligibility criteria and institutional results to access the full incentive grants under component 2
- iii. Drafting SWM by-laws in compliance with national SWM rules and state SWM strategy
- iv. Preparing city-wide long-term SWM Plans to identify the priority investments and service delivery targets for the project
- v. Strengthening the financial systems including cost recovery mechanisms.
- vi. Support for ULB annual fiscal planning, budgeting, fund utilization and reporting.
- vii. Technical support for sub-project planning, designing and implementation including incorporating climate change mitigation measures into sub-project design; and
- viii. Establishing clear mechanisms for ULBs to formally engage with Kudumbashree groups as service providers of solid-waste management, including collection and transportation
 - ix. Support enforcement of labour laws applicable to the unorgranised workforce and labour influx management plan.
 - x. Developing ULB systems for undertaking COVID-19 waste management, cleanliness/sanitization activities, and strengthening the systems for ensuring the safety and health risk reduction of the sanitation workers including women
 - xi. Technical support for the following activities:

to institutionalise ULB level enforcement committee and compliance mechanisms for SWM service delivery.

expanding the technical staff (health inspectors etc.) to be able to do site visits, spot checks and compliance monitoring

adopting technology-based systems to identify waste hotspots in each ward and undertake close monitoring

implementing punitive measures such as spot-fine system as per KMA's provisions

deploy advanced tools like Global Positioning System(GPS) enabled waste collection vehicles for real-time monitoring,

share information amongst citizens and communities to foster voluntary compliance with the SWM regulations.

prepare a baseline report on gender inclusion⁵ including (i) number of women engaged in the value chain of SWMs; (ii) existing income levels and skills (iii) opportunities for socially excluded women to access other verticals of SWM value chain including business opportunities, for regular monitoring of the gender inclusion interventions at the local level

Deploy the software tool on Labour laws compliance in ULBs to track the compliance of labour laws and take actions in accordance with the law.

- c) Training and awareness generation: This sub-component will provide training activities for SWM and COIVD-19 related topics and issues at all levels through a multi-channel training delivery mechanism that includes (i) digital platform based e-Learning toolkits and certification (ii) class-room based workshops and (iii) exposure visits to other ULBs for knowledge sharing and learning. Following sub-activities are included in this activity:
 - i. SPMU will conduct a detailed training need analysis (TNA) at the beginning of the project to identify training needs and capacity development requirements.
 - ii. SM/SPMU will prepare annual training plans based on TNA and a detailed training calendar for delivery.
 - iii. SM will procure the services of an external agencies/consultants for design, development and implementation of digital learning platform; development of online and class-room course content for general SWM and specific KSWMP related topics and to deliver classroom and on-line trainings on the key priority areas identified through training needs-assessment.
 - iv. Plan and deliver the trainings and monitor the effectiveness of the trainings held.
- d) IEC support: This activity will also support communication and awareness generation activities through the implementation of a state-wide communication and awareness generation strategy. The strategy will focus on (i) overall state-wide awareness generation about the project interventions, national regulations, need and importance of good SWM services; and (ii) subproject specific communication and consultation with the residents and communities to enhance social consensus, acceptance and ownership of the proposed interventions. The strategy will also reach all the stakeholders including elected local representatives, ward members, community representatives, households, service providers and adopt a communications approach consisting of a multitude of instruments such as broadcasting, interactive communication, and influencer driven techniques.
- e) Project Management support: This activity will provide project management, coordination and monitoring support to the implementing agencies. A dedicated State-level project management unit (SPMU) will be established at SM and District-level project management units (DPMU) at each of the 14 districts to cover all their respective ULBs. Further, a dedicated Project Implementation Unit (PIU) will be

⁵SPMU will have to organise this with external consultants appointed for the purpose

established in each ULB. Project management activities will support the implementation, coordination, and monitoring of all project activities including appraisal of State and ULB level investments and due diligence, quality control and reporting on fiduciary, environmental and social safeguards and technical aspects of the investments. A Project Management Consultant (PMC) team will be hired to support project management functions at the SPMU and DPMU levels.

2.2.2. Component 2: Support to ULBs for SWM

The component will provide financial assistance to the participating ULBs for improving the local level SWM systems and capacities comprising a mix of decentralized (generator level and community level) systems and centralized (city level and regional/cluster-based) systems. This component will finance the SWM activities including (a) primary collection and transportation systems for solid waste (b) source segregation and treatment for BDW at decentralized level, (c) Rehabilitation of the existing MCFs/RRFs and development of new integrated Material Recovery Facilities (MRF), (d) development of BDW management facilities, (e) closure/remediation of existing dumpsites and development of disposal cells as interim disposal facility, (f) public space cleaning, sanitization, waste removal activities as well as cleaning & sanitization of government offices, hospitals, community level waste recycling/processing facilities, (g) protective gears, equipment, masks, chemicals, disinfectants etc. for sanitation & waste management workers, (h) operations and maintenance (0&M) payments for performance-based contracts & tipping fee for regional disposal and (i) implementation of environment and social risk mitigation actions as per Environmental and Social Management Framework (ESMF)-Tribal Development Framework-Social Management Framework (TDF-SMF)-Resettlement Policy Framework (RPF). ULBs will be responsible for implementation of the activities envisioned under this component.

The project will follow the GoK's current system of annual planning, budgeting and disbursement that is being used for providing fiscal transfers to the local governments under the current planning guidelines. Prior to beginning of each fiscal year, the ULBs will identify the investment sub-projects from their SWMP to be taken up for implementation in that year and include their proposed capital expenditures under the Annual Development Plan. The Approved Annual Development Plan for the project will include the annual budget for the ULBs to design and implement SWM subprojects under this project, which they can access subject to qualifying the eligibility criteria and ATs.

ULBs will have to sign a Participation Agreement to confirm their participation and to avail financial assistance (in the form of grants) under this component. Grants will be allocated to ULBs on a per-capita basis, based on indicative sector investment needs in SWM for the project duration and as per allocation methodology described in Chapter 6 of this PIM. The grants will be disbursed to ULBs based on the current GoK's systems and processes. ULBs will be informed on their Grant Allocation Ceiling (GAC) for the project period right at the beginning of the project, so that they can undertake a multi-year investment planning exercise to prepare city-wide 5-year SWM plans; as described in Chapter 6, the GAC may undergo a change in year 2 and year 4 of the project . During the project period, the ULBs can incur eligible expenditure within its authorized grant ceiling, phased as per SWM master plan, only subject to the compliance with the ATs described below. Grants will be provided to ULBs

under this component through a two-tranche system as per the eligibility criteria listed in Table 2-1 below.

- a) Basic Grants (BG), immediately upon signing the PA; these will be limited to 40% of the GAC as informed to ULB at the beginning of the Project.
- b) Incentive Grants, of up to 60% of the GAC, upon fulfillment of conditions evidenced by a verification from an Independent Verification Agency (IVA) which will be appointed by SM for this purpose).

Grant allocation	Eligibility Criteria			
cening				
Basic Grants (40%)	Available once ULBs sign a Participation Agreement			
Incentive Grants	(a) ULBs must have fulfilled all following three conditions:			
(40%)	1. Prepared a 5-year city-wide plan for climate-smart and			
	disaster-resilient SWM, which has been approved by SM			
	2. Issued SWM by-laws that incorporate the principles of GoK's			
	new SWM strategy			
	3. Confirmed access to/use of facility for safe disposal of waste			
Incentive Grants	5% grants on fulfilling each of the following four conditions:			
(20%)	(b) Hired top two-level staff as per SWM org. structure approved by			
	GoK			
	(c) Signed performance-based contracts for waste collection and			
	transportation services			
	(d) Plan developed for levying user charges and O&M budgeting			
	(e) Implemented M&E including grievance redressal mechanism			

Table 2-1: Eligibility Criteria of Grant Allocations

The grants so allocated will finance ULBs investments, categorized into Track 1 and Track II activities, as listed in Table 2-2 below:

Table 2-2: Track I and Track II activities

Track I Activities (to be funded from Basic Grants)		Track II activities (to be funded from Incentive Grants)	
1.	Expansion of the coverage of decentralized	1.	Establishing/strengthening primary
	BDW management systems (generator and		waste collection and transportation
	community level).		systems.
2.	Upgrading of the existing MCFs/RRFs	2.	Developing new waste management/
3.	Closure remediation of existing dumpsites		processing facilities and new MRF/
	and development of incremental disposal		Recycling facilities for NBDW.
	cells as interim facility.		
4.	Routine public space cleaning/sanitization		
	and other waste management activities		
	related to COVID-19 like procurement of		

Track I Activities (to be funded from Basic Grants)	Track II activities (to be funded from Incentive Grants)
 protective gears, and equipment for sanitation workers, 5. Financial support (including viability gap funding) to existing women SHGs engaged for ongoing waste collection services, O&M support for tipping fee for regional disposal facilities. 	

ULBs will have to comply with five ATs (conditions to incur expenditures), relating to compliance with:

- a) Environmental and Social Safeguards systems as per ESMF
- b) External statutory audit
- c) Procurement systems as per project procurement manual
- d) Technical guidelines detailed in this PIM, particularly, Chapter 7, Chapter 8 and Chapter 9 and national/state regulations.
- e) Eligible investment menu (broadly the activities listed in Table 2-2)

Compliance with ATs will be annually checked by the DPMUs for all ULBs to ensure that the sub-projects are part of the eligible investment menu and are designed and implemented in compliance with basic technical, fiduciary and safeguards systems as outlined in this PIM, ESMF-TDF-SMF-RPF and procurement manual. DPMUs will submit the AT compliance reports for all ULBs to the SPMU, who will then in consultation with ULBs determine the annual plan size and authorize the grant funding for the next Financial Year (FY). Any non-compliance with ATs can directly result in withholding of grants.

2.2.3. Component 3: Development of regional SWM facilities

This component will finance, inter alia: (a) regional processing and recycling facilities; (b) regional C&D waste management facilities; (c) transfer stations and regional sanitary landfills for municipal solid waste disposal; and (d) closure/remediation of existing waste dumpsites and development of incremental disposal cells as interim safe disposal facility. These downstream activities aim at completing the value chain. This component will be implemented and managed by SPMU with administrative sanctions for individual projects being given by LSGD and technical sanction by the Project Director (PD). In implementing this component due compliance with the National SWM Rules 2016 and the guidelines issued by CPCB and the new SWM strategy of GoK will be ensured. This component will also finance the biomedical waste management facilities to expand the state's capacity to deal with increased volumes of biomedical waste in the context of COVID-19 pandemic. A cluster approach will be adopted for the planning, design and development of regional facilities.

Chapter 7, Chapter 8 and Chapter 9 detail the technical guidelines and operational procedures that will have to be followed in implementing the regional projects under this component. The Responsibility Matrix at Annexure A.3.2 in Volume 3 provides the institution wise

responsibility for assigned activities. The sub-projects that will, inter-alia, be supported under this component are:

Regional solid waste disposal systems: A cluster approach will be adopted for the planning, design and development of the regional sanitary landfills. For each of the regional landfills, a WSA will be established around the land parcel being identified by the government and the WSA will define the number of ULBs and other local governments in the peri-urban areas, from which the respective landfills will receive the residual waste for safe disposal. The selection of the land for the development of the regional landfill will be done in adherence with siting specifications as detailed in National SWM rules, 2016, Environmental and Social Management Framework (ESMF-TDF-SMF-RPF) and any other relevant national/state level regulations/guidelines. The WSA for a regional solid waste disposal system will be planned by SM around the identified land parcels, based on population distribution/projections, haul distance and municipal solid waste generation. The landfill facility will be designed to cater to the disposal requirements of the WSA for 15-20 years and landfill cells will be developed in phased manner. Once the WSA is identified, SM will organize the regional waste disposal agreement amongst the participating ULBs and other peri-urban LGs to establish the institutional and financial arrangements for the development, operations and maintenance and cost-sharing of regional disposal facility. Kerala being prone to natural disaster necessitates that the sanitary landfills designed be climate smart and disaster resilient.

SPMU will carry out detailed technical due diligence (ESMF-TDF-SMF-RPF) and feasibility assessments (technical, financial, and environmental including CC benefits) for these sub-projects which will include the following:

- a) technical solutions based on necessary field investigations and test results,
- b) technical viability and financial sustainability assessment for the entire WSA and the planned regional waste disposal system,
- c) the institutional framework and implementation modality for the development, operation and management of the landfill facility,
- d) financial arrangements for capital investments and O&M expenses to ensure the sustainability of the system and
- e) regional coordination systems within the WSA for storage and secondary transportation of the residual waste to landfill facility.

Regional municipal waste processing/recycling facilities: Within the planned WSAs, regional processing and/or recycling facilities can be planned, depending on the land availability and waste generation profile of the participating ULBs. The regional processing facilities can be developed for various waste streams – BDW, NBDW, non-recyclable waste etc. The regional approach will be encouraged for those participating ULBs who either are not able to identify land parcels for land-based facilities in their geographic jurisdictions, or where the individual ULB specific facilities may not be operationally and financially sustainable due to inadequate waste generation. These regional facilities can be planned either for the entire WSA or sub-areas within the WSA depending on technical feasibility and financial sustainability. SPMU will lead the planning, design and implementation of such facilities including the inter-municipal coordination arrangements. As part of the preparatory activities, SPMU will undertake all the necessary technical studies including feasibility assessment, implementation readiness assessment, safeguards screening, resilient

engineering designs, environment and social impact assessment, procurement document preparation etc. Implementation supervision, contract management and reporting will also be carried out by SPMU.

Regional medical waste and C&D waste management: This activity would support the planning and development of state level waste management/recycling facilities for medical waste and C&D waste. The focus of supporting the medical waste management systems would be primarily to strengthen the capacity and systems of the state and ULBs to be able to manage COVID-19 related waste issues. Accordingly, integrated system will be developed for medical waste management including collection, transportation, treatment and safe disposal, as per national rules and CPCB/KSPCB guidelines including the COVID-19 medical waste management guidelines. For C&D waste, the focus would be on strengthening the waste collection and transportation systems and development of recycling/treatment facilities as per the national rules for C&D waste. The sub-projects under this category will be implemented by SPMU in consultation/support with relevant state level institutions/agencies that hold the statutory mandate for the same; for example, the biomedical waste facilities will be implemented in consultation with KSPCB, IMAGE either solely (by SPMU) or in association with a private operator. As part of the preparatory activities, the respective SPMU duly assisted by the PMC and in consultation with relevant state level institutions/agencies will have to undertake all the necessary technical investigations/surveys/studies including feasibility assessment, implementation readiness assessment, safeguards screening, resilient engineering designs, environment and social impact assessment as laid down in this PIM and ESMF-TDF- SMF-RPF; procurement and contract management will be carried out as per project procurement manual and implementation supervision/reporting will be done as laid down in this PIM.

Closure/remediation of existing dumpsites: The SPMU will undertake planning, design and implementation of these sub-projects duly assisted by PMC and in support with the participating ULBs. Within the identified WSAs, all the existing dumpsites will be identified and screened based on the rapid risk assessment which will comprise of set of basic technical, environment and social criteria, as detailed out in Section 9.3 of this PIM. The selection of dumpsite for remediation will also be contingent on the access to a waste disposal facility for the rejects from the dumpsite – which can either be a disposal cell in the existing dumpsite or a regional sanitary landfill. Thus, the implementation of the closure system for existing dumpsites can only be initiated after such facilities / improvements for safe disposal of the residuals are established. Once the dumpsites have been shortlisted based on the rapid risk assessment, SPMU will undertake necessary technical investigations and fields surveys of dumpsites as per national rules, technical guidance in PIM and ESMF to assess the volume of the waste assessment and waste compositional analysis (including soil contamination assessment). The dumpsite will be considered for remediation only if the soil is free of any contamination (devoid of heavy metals, chemicals, or other toxic substances) and minimum of 75 percent material recovery [solid/ rocks or recyclables (metals)] is envisioned.

Depending on the results of the technical investigations and field surveys, the selected dumpsites can be remediated and/or closed in an engineered way through any of the following approaches: (a) biomining, (b) waste removal and transportation to the new landfill

for safe disposal, (c) reshaping and capping using impermeable cap system or (d) combination of the above approaches.

Biomining as remediation option will be considered only if (a) the soil is free of any contamination (devoid of heavy metals, chemicals or other toxic substances) (pre-identified number of lab tests will have to continue to take place throughout the process) (b) there is substantial land reclamation potential through biomining, that will be used for establishment of waste management facilities (c) there are adequate downstream linkages for the management/disposal waste being bio-mined.

Once the technical solution for the remediation is selected, SPMU will undertake (a) detailed technical investigations, technical and financial feasibility analysis (b) preliminary engineering design and (c) Environmental and Social Impact assessment to prepare the sub-projects and then, undertake the implementation. The capital expenditure items will include site preparation works and equipment.

2.3. Climate-smart and disaster-resilient interventions

Based on the technical assessment of the Project and Kerala being prone to natural disasters, the Project components have been designed to assist the participating ULBs in mainstreaming climate change and disaster risk management throughout an entire investment cycle, in line with the second core objective of the WBG Action Plan on Climate Change Adaptation and Resilience (2019). SWM infrastructure financed through component 2 and component 3 will incorporate improved planning, design, construction and O&M of facilities adapting to climate change vulnerability risks (see Table 2-3 below). Project activities will also contribute to addressing increased leachate treatment needs and waste collection around waterways with flooding risks, preventing waste from blocking drains and causing flooding. For climate change mitigation, capacity building measures under component 1 are aimed at actions to reduce greenhouse gas (GHG) and other emissions. Investments will also be designed as to reduce emissions related to transportation and disposal of waste including landfill gas capture. Table 2-3 below captures the list of climate smart and resilient interventions planned under the Project.

Components/	Project activities
indicative amounts	
Component 1	
IEC and citizen engagement	• Educate citizens and communities on climate impacts/ risks/ behaviours
program	• IEC activities and technical support to make decentralized systems efficient at HH level
	• Conduct capacity building of SM and ULBs for disaster management for preparation of ULB-specific Disaster Management Plans and consider disaster resilience as an integral part of planning, design, implementation and operation of SWM facilities.
	• Conduct climate resilience capacity building activities for SM and ULBs for preparation and implementation of climate resilient

Table 2-3: List of climate smart and resilient interventions planned under the Project

Components/	Project activities	
indicative amounts		
	 SWM investment plans. Funding for identification and implementation of adaptation and mitigation actions to embed and enhance climate resilience and lower carbon footprint of municipal SWM sector. 	
Component 2		
Reducing emissions from Transportation	 Plan and implement efficient transportation through switching to fuel-efficient vehicles. Strengthen decentralized waste management especially for organic fractions to reduce the need for transportation to far-off sites. 	
Reducing emissions from untreated organic waste	• Plan and implement community level facilities for HH not having decentralized facility for organic waste	
Expanding waste collection (US\$ 40 million)	• Expand waste collection systems up to 100% HHs to avoid littering of waste and serve to prevent waste from blocking drains and causing flooding.	
Component 3		
Regional Landfills	• Capture or flare the gas generated from decomposing organic waste. Although the landfills are mostly for inert waste, they are likely to receive contaminated waste such as plastics with food which cannot be efficiently put to reuse or recycle. The main impact in terms of GHG reduction will come from large scale introduction of sanitary landfilling and thus collection of landfill gas.	
Dumpsite remediation	• Remediate identified dumpsites to reduce GHG emissions by mining Refused Derived Fuel (RDF) and composting organics and significantly reducing leachate, given that solid waste dump sites have been recognized as major GHG emission sources in developing countries.	
Floods resilience	 Upgrade/develop SWM facilities to withstand rising levels of flooding. This is critical to improve floods resilience, since large parts of Kerala are prone to flooding and risks are increasing with more frequent and peak rainfall incidents and rising sea levels. Properly designed landfills and dumpsite remediation will also reduce the quantity of waste finding its way to water bodies thereby blocking the natural waterways and exacerbating flooding 	

Chapter 3. Institutional and Governance Framework for Project Implementation

The 12th schedule of the Constitution of India (Article 243) vested the functions and responsibilities relating to the SWM in Urban Local Bodies and required each state to lay down appropriate policies, procedures, rules and regulations for SWM. Accordingly, the Kerala Municipality Act (KMA 1994) and its related rules, provide necessary legal and operating framework for ULBs to undertake the functions relating to the SWM. The Solid Waste Management Rules 2016⁶ issued by the GoI laid down exhaustive rules and mandated the Secretary-in-charge of Urban Development Department in the state governments to make state level policies, plans and oversee their implementation. The SWM Rules, amongst others, have also mandated the Urban Local Bodies to formulate the long term strategic and annual operating plans for SWM and be responsible for entire SWM value chain activities including setting up, operation and maintenance of storage, processing facilities and operation and maintenance of those facilities. The ULBs have also been made responsible for Information and Communication and Citizen Engagement activities in the SWM operations. Accordingly, GoK framed its SWM policies and rules and decentralized various SWM value chain activities to multiple institutions with the LSGD, GoK, functioning as the Policy formulation and oversight department for SWM and the Suchitwa Mission (SM) providing necessary technical support to the LSGD, ULBs and other agencies responsible for implementation of SWM activities. The existing institutional architecture with its processes for SWM activities at LSGD, SM & ULBs will be largely used in the implementation of the KSWMP (the Project); KSWMP's specific activity and process flows and approvals as laid down in the Project Appraisal Document (PAD), PIM and the Project Agreements, will suitably get embedded into the existing workflows of LSGD, SM & ULBs and will complement the current institutional arrangements and processes.

3.1. Overall Proposed Institutional Framework for implementation of the Project

The Project will be implemented under a three-tiered implementation framework – a State Level Project Management Unit (the SPMU) within SM, District Level Project Management Units (the DPMUs) in all districts and the ULBs. The SPMU will be suitably assisted by a Statelevel Project Management Consultant (SPMC) with its district level DPMC teams. District level Technical Support Consultants (TSC) hired by SPMUs will provide technical support to ULBs in that district. The ULBs will join the Project by signing a PA as attached at Annexure A.3.1 in Volume 3 and will receive grants based on, them meeting the Eligibility Criteria and

⁶These rules shall apply to every urban local body, outgrowths in urban agglomerations, census towns as declared by the Registrar General and Census Commissioner of India, notified areas, notified industrial townships, areas under the control of Indian Railways, airports, airbases, Ports and harbors, defense establishments, special economic zones, State and Central government organisations, places of pilgrims, religious and historical importance as may be notified by respective State government from time to time and to every domestic, institutional, commercial and any other non-residential solid waste generator situated in the areas except industrial waste, hazardous waste, hazardous chemicals, bio medical wastes, e-waste, lead acid batteries and radio-active waste, that are covered under separate rules framed under the Environment (Protection) Act, 1986.

compliance with Annual Triggers. The existing institutions in the SWM sector such as CKCL, Kerala Institute of Local Administration (KILA), District Planning Committee (DPC), District HKS, HSS, Kudumbashree Mission and others may be used as supporting agencies as deemed necessary by the SM and SPMU to work in conjunction with DPMUs and ULBs. The following figure exhibits the overall institutional roles for the Project.



Figure 3-1: Overall Institutional Framework for the Project

The supporting state, district, and city level institutions such as KILA, CKC, IMAGE, IKC, HSS, HKS, Kudumbashree Mission, KSPCB, KSPB are not implementing agencies for the Project. Their status vis-à-vis the Project is as below:

- **1.** Service Providers like HSS/HKS/Kudumbashree (as identified in Institutional Responsibility Matrix) will only provide services under service contracts for which these agencies may be paid against their bills/workorders/contracts.
- 2. Entities like CKC (for Solid Waste), IMAGE [for Bio Medical Waste (BMW)], etc. (as further identified in the Institutional Responsibility Matrix) only provide collection, transportation & treatment of waste. These entities may also provide specific sub-project related consulting services to SPMU/ULBs for which they will be paid from Project.
- **3.** KILA, as the state level training institution, will provide services to SPMU/ULBs in conducting training needs assessment and delivering training related to general topics (classroom & digital using its platform) for which KILA will be paid from the Project funds.

The GoK has accorded its permission for the Project vide its G.O.(Ms). No. 20/2020/LSGD in the name of Kerala Urban Service Delivery Project and the name was subsequently changed to Kerala Solid Waste Management Project by the G.O. (Rt).No.1420/2020/LSGD dated 29.7.2020.Suchitwa Mission was appointed as Implementing Agency by G.O. (Rt).No.779/2020/LSGD dated 24.4.2020 and the Executive Director (ED) of Suchitwa Mission was appointed as the Project Director of KSWMP vide G.O. (Rt).No.912/2020/LSGD dated 19.5.2020. Sanction was also accorded to the Project Director to take further action to implement the Project according to the guidelines of the Bank, vide G.O. (Rt) No.1460/2020/LSGD dated 5.8.2020. However, none of these G.Os have clearly devolved the

powers to the Project Director to take administrative and financial decisions under the Project as envisioned in the PAD and PIM. It may therefore be necessary for the LSGD to issue necessary orders delegating administrative and financial powers to the Project Director to facilitate a seamless implementation of the Project.⁷

An "Institutional Responsibility Matrix" detailing the component wise and activity wise responsibilities of project implementing institutions and the supporting agencies is annexed at Annexure A.3.2 in Volume 3. The role and responsibilities of various Project entities are described below:

3.2. State Level Institutional Arrangements

3.2.1. State Level Committees for Project Implementation & Oversight

3.2.1.1. Project Steering Committee (PSC)

GoK will set up a high-powered PSC for periodic monitoring, strategic oversight, and resolution of key issues on fast track basis. The Committee will be Chaired by the Chief Secretary, GoK and will comprise of the following members:

a) Permanent Members:

- Principal Secretary, LSGD
- Secretary, Environment Department
- Secretary, Revenue Department
- Secretary, Finance Department

b) Invitees (invitation will be need based):

- Principal Director, LSGD
- Director of Urban Affairs
- Secretary, Urban Affairs
- Chairman, Kerala Pollution Control Board
- Secretary, Planning Board
- District Collectors
- Director, Town & Country Planning
- Chief Town Planner, Town and Country Planning
- Chairman, Municipal Association
- Director of Panchayats
- Heads of the HKS/HSS/Kudumbashree Missions/ CKCL
- Chairman, Mayor's Chamber
- Chairman, Municipal Chairman's Chamber

The ED of the SM in his capacity as Project Director, KSWMP, will be the convener of the committee and will coordinate the functioning of the committee. The Project Director's office will be the official secretariat for the PSC. The PSC will have the following functions:

a) The committee will review project progress and ascertain performance of different components from time to time.

⁷SM to discuss and finalise with the LSGD under advise to the World Bank.
- b) The committee will take note of any key inter-ministerial or inter-departmental or inter-ULB issues/conflicts tabled at its meetings and will suitably advise the SM and other stakeholders for resolution including conflict redressal.
- c) Ensure smooth coordination amongst different departments/agencies involved in the implementation of the Project.
- d) Provide strategic advice relating to the Project implementation and management.
- e) Help resolve key issues and approvals on fast track basis to ensure timely interventions and smooth implementation.

The committee will meet quarterly and the meeting agenda including supporting documents, if any, will be circulated to the committee members at least 7 days in advance. The meetings can either be held in person or by video conference as per the convenience and decision of the committee members. A record of the proceedings of each meeting will be prepared by the Project Director and will be signed by the Chairperson of the committee.

3.2.1.2. Technical Approval Committee

Suchitwa Mission will set up a Technical Committee for the purpose of the sub project approvals. This committee will be chaired by the Project Director and will have the following members:

- a) Deputy Director, SPMU
- b) Director SWM, SM
- c) 2 or 3 outside subject matter experts
- d) Chief Environmental Engineer, Pollution Control Board
- e) Chief Engineer LSGD

The Deputy Director SPMU will act as the convener of the committee and will coordinate the function of the committee. The committee will have the following functions:

- a) Review the SWM Plans of ULBs along with the due diligence reports of SPMU(as forwarded by SPMU to the Committee) and provide recommendations to the Project Director for Plan Approvals.
- b) For component 2sub-projects requiring Technical Sanction by Project Director, review the technical due diligence/feasibility conducted by SPMU along with the DPRs/Technical Assessment Reports sent by ULBs and provide recommendations to the Project Director for Technical Sanction.
- c) For component 3 sub-projects, review the technical due diligence/feasibility conducted by SPMU together with the respective project's DPRs/Technical Due Diligence Report/s (as forwarded by SPMU) and provide recommendations to the Project Director for Technical Sanction.

3.2.1.3. Site Selection Committee

Suchitwa Mission will set up a Site Selection Committee for the purpose of evaluating and selecting sites for city and regional sanitary landfills and other sub-projects requiring sites for hosting the SWM facilities. This committee will be **chaired by the Deputy Director of SPMU** and will have following members:

a) Deputy Director- SPMU

- b) SWM Experts/Engineer of SPMU
- c) Secretary, ULB (where the site is located)
- d) Municipal Engineer, ULB (where the site is located)
- e) Representative of the district collector
- f) Senior Engineer/Senior Official from PCB

In addition, , SPMU may invite any of the following officials to the Committee meetings/site inspections:

- a) Senior Engineer/Senior Official from TCB
- b) Senior Official from Forest Department
- c) Senior Official from Archeological department
- d) Senior Official from Airport Authority
- e) Senior Official Police Department
- f) Senior Engineer/Senior Official Groundwater Board
- g) Senior Engineer/Senior Official Technical Institute/College
- h) Senior Engineer/Senior Official Landfill design expert/s
- i) Other officials based on the particular requirements of the site

The Site Selection Committee will have the following functions:

- a) Site survey and selection as per the safeguards requirements provided in ESMF
- b) Recommendations to the respective departments for approvals
- c) Report to SPMU and ULB on site finalisation and to begin acquisition process

3.2.1.4. Audit Committee

The LSGD will set up an Audit Committee for monitoring of project accounts and expenditure and exercise oversight on audit of project components expenditure and Interim Financial Report(IFR)s as detailed in Chapter 11 of this PIM. The committee will be chaired by the Project Director and will have following Members:

- a) A member from Comptroller and Auditor General(CAG), Kerala
- b) Director, Kerala State Audit Department (KSAD)
- c) Deputy Director-SPMU
- d) A representative (of the rank of Asst Secretary & above) from Finance Department

The Audit Committee will meet once in 6 months to conduct the following:

- a) Review of six-monthly IFRs and the monthly GURs as referred to in Chapter 11
- b) Review of internal controls employed at SPMU and ULBs and provide suggestion to improve the control environment.
- c) Review internal audit reports as submitted by Internal Auditors as per terms included in Chapter 11.
- d) Review of status of audit of ULBs for compliance with grant conditions.
- e) Review of annual audit of Project Financial Statements as referred to in Chapter 11 prior to their submission to Bank.

The SPMU will be the official secretariat for the Audit Committee and its functions will be coordinated by the Deputy Director – SPMU.

3.2.2. Local Self Government Department, GoK for Policy and Oversight

The LSGD, which is responsible for implementation of SWM Rules 2016 of GoI and formulation of State SWM policies and rules, will be responsible for overall supervision of the implementation of the Project and ensuring that the project development objectives are met. In particular, the LSGD will be responsible for the following:

- Issuance of new SWM Policies, Rules & Operating Guidelines in line with the SWM Strategy 2020 notified by GoK.
- Set up Committees as envisioned in the PIM.
- Revision of KMA and its Rules in line with the SWM Strategy 2020 notified by GoK and the SWM Rules 2016 of GoI.
- Delegation of Powers to PD
- Provide Administrative Sanction for Component 3 sub-projects
- Exercise overall Project oversight & monitoring to ensure timely implementation of the Project and delivery of the PDO.

The inter-ministerial and inter-institutional issues including inter-ULB issues, that may arise from time to time in implementing the Project will be addressed and resolved by the LSGD to enable smooth implementation of the Project. Suchitwa Mission as the designated Implementation Agency for the Project will report to LSGD. LSGD will issue necessary Government Order (GOs) as it may deem necessary, from time to time, to operationalize the Project implementation arrangements and to empower and delegate necessary powers to various agencies involved in the Project implementation. The entire Project cost will be budgeted under the LSGD annual budget and allocations/allotments will be given by it to SM and ULBs as envisaged under Chapter 11 of this PIM.

3.2.3. Suchitwa Mission – Primary Implementation Agency

The Suchitwa Mission under LSGD will be the Implementation Agency for the Project and will be responsible for the implementation, management, coordination and monitoring of the Project at the state level. The Executive Director (ED) of SM has been appointed as PD and a dedicated SPMU will be established under the PD supported by a full-time Deputy PD and a team of core technical staff for carrying out SWM functions of the Project primarily relating to (i) SWM Engineering (ii) Project implementation, procurement and contract management, (iii) environment safeguards, climate change and disaster resilience, (iv) social development, gender, labour, communication and stakeholder engagement, (v) financial management, and (vi) M&E including Management Information System (MIS). The requisite staffing and other capacities for SM to act as Implementing Agency will be created under the SPMU. The Technical Sanctions for sub-projects under components 1 and 3 will be given by the Project Director on the recommendations of the Technical Approval Committee set up for the purpose. In view of a high level Project Steering Committee set up at State level for the Project, the existing Governing Body and the Executive Committee of SM will not play any active role in the Project Implementation except where the Project Director of SM opts to refer any issue/project etc. to these committees for any resolution/approval.

The SM, with approvals/sanction from LSGD, will set up (i) State Level Project Management Unit (SPMU) along with District Level Management Units (DPMU) in all districts, hire staff for these units as per the organization structures given below and (ii) hire PMC as per the ToR attached at Annexure A.3.3 in Volume 3 for the implementation of the Project.

The Project Director will be specifically responsible for the following activities:

- a) Supported by SPMU, will be responsible for overall implementation of the Project
- b) Supported by SPMU, provide support to LSGD (i) in formulation/updating SWM Policies, Rules & Regulations; (ii) in carrying amendments to KMA; (iii) in updating of ULB annual planning guidelines to include multi-year projects; (iv) in constitution of Committees as envisioned in the PIM.
- c) Redesign organizational structure of SM as may be needed for the Project; set up SPMU& DPMUs and hire staff for SPMU
- d) Provide Technical Sanction for sub-projects under components 2 and 3 (refer Project Approval Matrix as in section 3.7 herein(for this purpose, the PD may coordinate with other departments/wings like LSGD Engineering wing (for civil works sanction) and District Level Technical Committees set up by LSGD Engineering wing (for engineering aspects other than civil works).
- e) Provide approval for all Procurement Contracts under components 1 and 3.
- f) Determine the Grant Allocation Ceiling for each ULB, provides approval for allocation of grants, reallocation of lapsed grants amongst other ULBs and determine the amounts to be recovered at the end of the Project for non-compliance.
- g) Responsible for dealing with LSGD/ Controller of Aid, Accounts and Audit (CAAA) and the World Bank for timely fund releases and other project financial arrangements.
- h) Provide necessary secretarial assistance to the Project Steering Committee and ensure the committee meetings are held once a quarter and its decisions are implemented.

3.2.4. State Level Project Management Unit (SPMU)

The State Level Project Management Unit (SPMU) established within SM and headed by a Project Director and supported by a Deputy Project Director (DPD), will be responsible and accountable for the all the aspects of the Project including its implementation, management, monitoring and evaluation, IEC and capacity building and provision of technical assistance to ULBs and other identified agencies and stakeholders. SPMU will function through its own office set up in SM and through 14 DPMUs, one in each district. The SPMU will facilitate day to day decisions for implementation of all the three components of the project, in particular the activities under component 1 and component 3 of the Project will be directly executed by the SPMU with technical support from the PMC and under the supervision of the Project Director. Additionally, SPMU will provide technical support, due diligence and supervision in respect of sub-projects and activities undertaken directly by ULBs under Component 2.

The SPMU, duly assisted by PMC teams, will be responsible for the following activities:

Detailed list of Activities for which SPMU will be responsible under the Project

Detailed list of Activities for which SPMU will be responsible under the Project General Project Management and Procurement (all components of the Project)

- a) Responsible for overall Implementation, Management, Monitoring including safeguard compliance and Coordination of all Project activities.
- b) Assist the LSGD and SM in SWM Policy formulation/updates including framing operating guidelines as required from time to time; promulgate Rules and Regulations that may be required from time to time for delivery of the Project outputs and outcomes.
- c) Assist LSGD in amending KMA and its rules.
- d) Hire consultants for conducting Environmental and Social Impact Assessment (ESIA) for all sub-projects under component 3 and for component 2 sub-projects categorized as E1 and having land/R&R/tribal population issues (the ULB-PIU and TSC will be responsible for ESIA in respect of other projects).
- e) Hire district level Technical Support Consultants to provide technical support to ULBs for component 2 project activities.
- f) Hire technical consultants for design and development of eLearning Platform and course design and content development for the capacity building activities under Component 1 of the Project.
- g) Hire IVA for verification of eligibility of ULBs for grants under the Project in accordance with the Grant Management System as detailed in Chapter 6 of this PIM.
- h) With assistance from PMC and other specialist consultants, provide training and capacity building activities relating to SWM for SM/SPMU/DPMU project staff, ULB-PIUs, and all other stakeholders.
- i) Prepare first 18-month procurement plan for all components of the Project (in respect of component 2, the 18-month plan will be prepared by ULB, reviewed by DPMU and approved by SPMU) and obtain Bank's clearance through Systematic Tracking of Exchanges in Procurement (STEP). Subsequently update (at regular intervals or annually), project procurement plan in STEP to reflect project's actual procurement needs.
- j) Manage STEP on behalf of all ULBs.
- k) Prepare PPSD framework and updating the same with specific investments as and when they are identified.
- Responsible for all procurements (of goods, works and services) under component 1 and 3 of the Project.
- m) With respect to procurements under component 2, review and approve all bid documents, bid evaluation reports, and contract documents prior to issuance/signing of the same.
- n) Provide necessary quality control on all activities under all components of the Project and ensuring timely implementation of the Project as a whole and in accordance with the PIM.

Financial Management & Reporting (all components of the Project)

- a) Prepare annual operating plans including budgets, procurement plans and work programs and obtaining necessary approval from Project Director for their implementation ; exercising necessary budget control and reporting on actual versus budgets & resulting variances, if any.
- b) Review SWM Annual Plans of ULBs for their inclusion in in GoK's budget.
- c) Prepare consolidated Annual Plan/s and KSWMP Annual Budget/s (end of March) & submission to Bank's team for in-principle no-objection; based on the in-principle no-

Detailed list of Activities for which SPMU will be responsible under the Project

objection, prepare and submit disbursement requests to CAAA for onward submission to Bank for withdrawal of funds from the Bank.

- d) Coordinate with the LSGD and the Dept of Finance, GoK and the Bank to ensure timely fund releases to the Project.
- e) Maintain project accounts for fund releases and expenditure incurred therefrom including preparing periodical reconciliation of receipts with expenditure incurred.
- f) Review and approve the monthly Grant Utilization Reports (GUR) received from ULBs (through DPMUs) and ensure expenditure as reported is eligible for inclusion under the Component 2.
- g) Prepare six-monthly IFRs and submit the same to the Bank through CAAA for banks internal accounting and facilitating fund releases by the Bank
- h) Hire Internal Auditors and ensure the internal audit of project activities and expenditure and external audit of project financial statements⁸ are conducted timely and all audit observations are properly addressed and resolved. (refer Chapter 11 for details).
- i) Ensuring compliances with the Bank's reporting requirements and cycles as captured in this PIM and the Project and Financing Agreements.

Managing Grants and sub-projects under Component 2

- a) Carry due diligence of SWM Plans and provide recommendations to Technical Approval Committee/Project Director for approval.
- b) Manage the entire grant system and annual budgeting and planning for Component 2.
- c) Finalise the verification protocols with IVA; review the IVA reports and verify if eligibility criteria have been met by ULBs for grant allocation and disbursements.
- d) Determine and inform the SWM Annual Plan Size for ULBs.
- e) Set expenditure Limits.
- f) Determining satisfaction of Annual Triggers by ULBs and noncompliance of AT based on DPMU's review report.
- g) Determining corrective actions to be taken by ULBs and restoration of suspended amounts/sub-projects etc.
- h) Conduct sub-project appraisal/technical feasibility of sub-projects of ULBs for providing Technical Sanction by Project Director as per Project Approval Process laid down in section 3.7 and no objection from the Bank (where required).
- i) Monitor the implementation of environmental and social safeguards as identified under ESIA assessments.
- j) Monitor all sub-projects undertaken by ULBs as per guidelines laid down in Chapter 10 of this PIM.

Planning, design and implementation of sub-projects under component 3

- a) Identifying and inventoryingall existing dumpsites for remediation; identification of land parcels; carry out consultations with concerned district authorities.
- b) Determine the technical feasibility of the identified dumpsites and land parcels for processing and disposal facilities, along with implementation readiness, conduct Environmental and Social(E&S) screening in coordination with respective ULBs.
- c) Preparation of a tentative list of sites based on technical feasibility and siting criteria and ESMF-TDF-SMF requirements.

⁸ the IFRs and in particular, the IFRs for the second half of the financial year that contain information for the whole year will be the project financial statements for this purpose.

Detailed list of Activities for which SPMU will be responsible under the Project

- *d)* Carry out preliminary resource cost estimates (for the identified projects) and obtain Administrative Sanction from LSGD. (*this cost estimate will feed into the Annual Plan of SM for component 3 projects*)
- e) Procurement of technical consultants for preparation of DPRs, FRs, ESIA, etc. by following the Procurement guidelines as laid down in Procurement Manual attached at Volume 2 of the PIM.
- f) Conduct ESIA assessments for sub projects in association with technical consultants hired for the purpose; identify environmental risks and mitigation mechanisms, social safeguards required and ensure the same are included in the sub-project proposals.
- g) With support from PMC, conduct technical and financial due diligence of sub projects and prepare detailed reports and submit the same to the Technical Approval Committee for review and recommendation to Project Director.
- h) For projects requiring no objection from the Bank, submit the technical documentation to the Bank and coordinate with the Bank for its no-objection.
- i) Based on recommendations from Technical Approval Committee and no objection from the Bank, assist the PD in providing Technical Sanction for the sub-projects prior to commencement of procurement.
- j) Undertake procurement process for works contracts preparation of tender documents, invitation for bids, bid evaluation, selection of contractors, execution of contracts and commencement of implementation.
- k) Contract management including monitoring of works, verification and validation of contractors' bills for works completed, compliance of labour laws, bill process and preparation of treasury bill for payment to contractors.
- Monitor the implementation of environmental and social safeguards as identified and included in project plans under ESIA assessments. This includes result and performance(RAP) including labour management plan preparation, implementation and monitoring.
- m) Carry out M&E assessments for all sub-projects as per guidelines laid down in Chapter 10 of this PIM.
- n) In consultation with ULBs, prepare O&M guidelines for the assets/facilities put into operations and monitor their implementation.

The SPMU will be managed by the Project Director with assistance of Deputy Director having adequate SWM related experience and expertise, either assigned by the state government or seconded from other line departments. The Deputy Director will be supported by a team of experts recruited for SPMU (*distinct from PMC staff*) as shown in the organization chart below. To assume the responsibilities as detailed above, SPMU will be delegated necessary powers by SM. Its organization will be structured and staffed with adequate numbers possessing required skill sets in SWM related engineering and service delivery functions. The operational cost of the SPMU will be met from the funds made available under component 1 of the Project. The SPMU's Organization structure will be as below:



Figure 3-2: Organization structure for SPMU

Note: SM has already received approval for a few of the above posts. Approval for others will be taken up as the need emerges. Based on the GoK approval, some positions may be merged/carved out and their JD expanded/restricted

The roles of each functional wing and the key tasks assigned to the functional staff are described below:

A. SWM Engineering

This is the core technical wing of the SPMU and will play lead role in planning, executing, monitoring, controlling and closing of SWM projects for the development of regional facilities such as regional processing and recycling facilities; transfer stations and regional landfills for municipal solid waste disposal and closure/remediation of existing waste dumpsites as contemplated under component 3 of the Project. Supported by the PMC teams, this wing will carry out all project lifecycle activities – from planning to conceptualization to DPRs, from appraisals to approvals, from procurement to contract management and implementation. In addition, this wing, in conjunction with PMC teams, will also be responsible to provide/arrange to provide (i) the Technical Assistance and Capacity building contemplated under the Component 1 of the Project (ii) conduct appraisal of SWM plans of ULBs and recommend their approval (iii) review SWM by-laws of ULBs and (iv) conduct due diligence/feasibility of ULB sub-projects sent for the Technical Sanction of the Project Director and generally assist ULBs in improving their SWM systems and capacities.

This wing will be initially staffed with one each of, SWM Expert, SWM Engineer and Urban Sanitation & Technical Expert with relevant qualifications in SWM and skill sets that include planning, project design and engineering, and DPR preparation, project management and citizen engagement. They may be either recruited independently on contract or may be brought in on secondment/deputation from other departments under a Memorandum of Understanding (MoU) with that department or in accordance with the deputation rules of the GoK. Based on the number of regional projects, plan size, and the workloads, the staffing will be ramped up gradually. The PMC's team of experts will be responsible for carrying out day-

to-day activities and will facilitate periodic formal training sessions to ensure a gradual and steady increase of capacity in the capacity of this wing.

The key tasks that will be assigned to the staff within this wing will be as under:

Key Tasks Assigned to Project Managers, SWM Experts and SWM Engineers

Project Manager –assisted by PMC staff, the Project Manager will be responsible for the following activities:

- a) Day to day administration and implementation of regional SWM projects' activities under Component 3 of the Project. Amongst others, these activities will include the following:
 - Perform technical feasibility of the identified dumpsites and land parcels for processing and disposal facilities, along with compliance with the siting criteria and ESMF requirements.
 - Where required recruiting the technical consultants for preparation of sub project DPRs, FRs, tender documents etc. for hiring works contractors
 - Conduct detailed technical and financial due diligence and prepare detailed reports to the approving authorities (the Dy Director/SPMU and Project Director – SM) for technical sanction.
 - Monitoring implementation of works and handover of completed assets to 0&M
- b) Assist the SM in engaging with other departments such as LSGD, District Level Technical Committees etc. for technical sanction involving civil, and other technical works.
- c) Prepare Annual Works Plans and Project Budgets and obtain approval of the Project Director.
- d) Monitoring, recording and reporting progress against the Annual Work Plan and Budgets

 such reports to be submitted to the Project Steering Committee through the SPMU and the Project Director.
- e) Engage and coordinate with other departments in GoK and other stakeholders to ensure all project approvals/permits/licenses/sanctions etc. are received in time to facilitate seamless project implementation.
- f) Organize and conduct stakeholder discussions/citizen engagements in planning the projects along with other responsible SPMU wings.
- g) In respect of grants allocated to ULBs, [in conjunction with Financial Management (FM) expert], review and accept IVA report.
- h) Coordinate with other SPMU Wings to ensure inter departmental activities that may overlap with project management functions are addressed and resolved.
- i) Ensure project records (including all procurement documents) are maintained in accordance with the project management protocols and are stored either physically or digitally (or both) for the whole of the Project. The Project Managers will be the custodians of these records.

SWM Expert: assisted by PMC staff, the SWM Expert will be responsible for the following:

- a) Conduct detailed technical and financial due diligence and prepare detailed reports to the approving authorities (the Dy Director/SPMU and Project Director SM) for technical sanction for all projects submitted by ULBs through DPMUs.
- b) Assist the Project Manager in vetting the designs and drawings, DPRs, FRs, etc. prepared by technical consultants for all component 3 projects.
- c) Vet the SWM Plans as submitted by ULBs for the approval of SPMU/SM.
- d) Provide inputs to ULBs on SWM by-laws in line with the GoK's new SWM strategy and

Key Tasks Assigned to Project Managers, SWM Experts and SWM Engineers

plans.

- e) Monitoring, through DPMUs, ULB performances for component 2 of the project including review of the monthly Grant Utilization reports from ULBs and ensuring the expenditure is in eligible to be incurred under the component 2 of the Project.
- f) Coordinate with other SPMU Wings to ensure inter departmental activities that may overlap with project management functions are addressed and resolved.
- g) Participate in stakeholder discussions/citizen engagements conducted by ULBs and ensure the emerging issues from such consultations are properly addressed/resolved by the ULBs.
- h) Review the current SWM systems and practices in the entire SWM value chain activities, identify problems/facilities lacking in the current systems and formulate new practices/new facilities in line with the SWM Rules 2016 and the GoK SWM strategy and Plans.
- i) Assist the SM and LSGD in reviewing the SWM strategy of the GoK, from time to time, and suggest suitable improvements/enhancements considering, a strategic long-term approach for the SWM in the state.
- j) Assist ULBs in formulating their strategies and plans for waste minimization, collection, treatment, and waste disposal solutions based on emerging trends, practices and city needs.
- k) Ensure all ULBs and other supporting agencies in SWM, comply with the SWM Rules and other SWM regulations in collection, transportation, handling and disposal of all types of solid waste.
- l) Promote schemes for reuse and recycling, of clean technologies, recovering and reducing the hazardousness of waste, and sending less waste to landfill.
- m) Provide guidelines/instructions for the handling of all types of waste including detailed instructions for the equipment needed when managing waste, as well as any safety procedures for ULBs and other agencies that provide SWM services.
- n) Assist SM and LSGD in ensuring sufficient regional and city level capacities are created for SWM management
- o) Assist in the development of IEC materials for communication strategy by SM/SPMU.
- p) Assist in capacity building activities of the SM at state and ULB level, conduct/arrange to conduct workshops; seminars, training programs to other government agencies,Nongovernmental Organization (NGOs), HKS/HSS/Kudambashree staff and disseminate results.

<u>SWM Engineers</u>:assisted by PMC staff, the SWM Engineer will be responsible for the following:

- a) Develop project concept notes, project design and drawings, Bill of Quantities(BoQs) with appropriate cost estimates, site selections, DPRs etc.
- b) Assist the Project Managers in conducting citizen engagement and stakeholder consultations, project due diligence and in providing project approvals.
- c) Assist the Project Managers and SWM Experts in their respective activities.
- d) Periodically visit the project and operating sites, measure quantities of work, record measurements and verify items / work quantities executed in the contractors' statements, prepare variation statement for review by Project Manager.
- e) Along with PMC consultants, supervise the commissioning of project facilities constructed

Key Tasks Assigned to Project Managers, SWM Experts and SWM Engineers

under the Project; ensure all approvals for compliance with various laws and regulations including environmental clearances have been obtained for operating the site.

- f) Maintain project records, monitor project progress and prepare the periodical progress reports for the SM and the Project Steering Committee.
- g) Assist the Project Managers and FM Expert in budget preparation and implementation.
- h) Provide administrative support for projects by collecting data, providing project documentation, training staff, or performing other general administrative duties.
- i) Prepare/direct the contractors to prepare site specific health and safety protocols required for collection, transportation and treatment of all types of waste.
- j) Assist the Procurement Specialists in project procurements and contract management.
- k) In conjunction with SWM Experts and the PMC consultants, periodically inspect ULBs and other institutions' SWM facilities to evaluate their operational effectiveness and to ensure their ensure compliance with environmental regulations and other SWM regulations of the state.

<u>**Urban Sanitation & Technical Expert –**</u> assisted by PMC staff, the Technical Expert will be responsible for the following:

- a) Technical design review, quality assurance, implementation monitoring and coordination support to design and implement infrastructure projects
- b) Day-to-day monitoring, evaluation, implementation co-ordination and management of field level activities.
- c) Co-ordinate planning, control and management of the work of a multidisciplinary team at the field level.
- d) Put in place a reporting system with the ULBs, ensure its smooth transfer and monitor regular information inputs.
- e) Monitor progress, evaluate results, and support the ULBs in the identification and resolution of constraints.
- f) Assist/advice the ULBs in conducting procurement activities in compliance with agreed guidelines for WB funded projects and assist them in resolving matters pertaining to disagreement with contractors / consultants.
- g) Prepare and update overall project implementation schedule and submit to Deputy Project Director / Project Director.

B. Procurement and Contract Management

The Procurement and Contract Management Wing will be responsible for all Project procurements including the preparation and submission of the project procurement plan in STEP system. This wing be responsible for carrying out procurements under Components 1 and 3, including the procurement of TSC and other technical consultants for ESIA and DPR/FR activities. The Project procurement will follow the Bank's "Procurement Regulations for IPF Borrowers for Procurement in Investment Project Financing - Goods, Works, Non-Consulting Services and Consulting Services," dated July 2016 revised November 2017 and August 2018 ("Procurement Regulations") and the additional provisions stipulated in the Legal Agreement will be applicable for the procurement of Goods, Works, Non-Consulting Services. The Bank's Standard Procurement Documents will be used for all contracts and for the selection of consultants and the procurement will adhere to the guidelines laid down in Volume 2 of the PIM – the Procurement Manual.

The e-procurement system (https://etenders.kerala.gov.in/nicgep/app) of GoK - designed, developed and hosted by National Information Center will be used for all works, goods and non-consultancy services. For procurement of consultancy services, the use of e-procurement will be subject to Bank's no-objection based on capacity building on e-procurement. The Government e-Marketplace set-up by Ministry of Commerce, Government of India will be used in lieu of Request for Quotation (RFQ) as needed and as provided under the Procurement Plan.

This wing will be initially staffed with one Procurement Specialist with relevant skills and experience in Bank related procurements. This specialist may be either recruited independently on contract or may be brought in on secondment/deputation from other departments under a MoU with that department or in accordance with the deputation rules of the GoK. Based on the number of regional projects, plan size, and the workloads, the staffing will be ramped up gradually. The PMC's team of experts will be responsible for carrying out day-to-day activities and will facilitate periodic formal training sessions to ensure a gradual and steady increase of capacity in the capacity of this wing.

Key Tasks assigned to Procurement Expert and Consultants

Assisted by PMC staff, the Procurement Expert will be responsible for the following:

- a) Represent Project Management Unit (PMU) on all procurement matters.
- b) Responsible for preparation of Project Procurement Strategy for Development (PPSD) document.
- c) Preparation of annual procurement plans and budgets responsible for drafting procurement plan based on PPSD and timely updating it during the life of Project. Inputs shall be obtained from other team members of PMU and ULBs for prioritizing the urgent procurement.
- d) Responsible to manage end-to-end procurement processes for Works, Goods, Non-Consulting and Consulting Services including the contract management activities and ensure that procurement procedures are carried out in accordance with the procurement plan and procurement regulations of the World Bank.
- e) Customize the Bank's standard procurement documents and ensure these documents are used for all procurement under the Project.
- f) In accordance with the Procurement Plan, invite bids, analyze and prepare bid comparative statements and other supporting documents for bid evaluation by the Project Manager and Dy. Director of the SPMU. Minute the bid evaluation proceedings and circulate.
- g) Participate in the negotiation and contractor selection process along with the Project Manager, Dy. Director and Project Director. Minute the proceedings of negotiation and circulate for information.
- h) Prepare necessary procurement memoranda and submit to the approval of the Project Director through the Dy. Director for contract award. Ensure the Bank's no-objection is obtained where necessary prior to issuance of Letter of Award (LOA).
- i) Post the PD/Bank no-objection, prepare contract documentation and arrange it to be executed by PD/appropriate authority.
- j) Organize all contract documentation bids to signed contracts and the work order/s, and ensure a copy is sent to the Projects and FM wings for their necessary use and follow up.
- k) In conjunction with SMW Engineers and Project Manager, monitor the execution of the

Key Tasks assigned to Procurement Expert and Consultants

- contract and the performance of the contractors. Organize and conduct periodical review meetings with the contractors and minute the proceedings.
- Monitor procurement activities undertaken by the ULBs to ensure full compliance with World Bank requirements. Responsible for training ULBs and providing them necessary hand holding support. This include but not limited to following activities.
 - a. Irrespective of value, review all procurement documents and award recommendations before issuing to bidders or sending to World Bank for prior review.
 - b. Conduct random checks of procurement practices followed by the ULBs
 - c. In conjunction with training consultants, conduct workshops to create awareness among district level officers, functionaries and representatives at ULB level regarding procurement policy framework, relevant procedures and processes as well as on specialised procurement topics.
 - d. Monitor and analyse contract performance against agreed benchmarks and through reporting mechanism.
 - e. Expedite the procurement activities including contract management related activities.
- m) Maintain systematically the procurement related documents for audit/review by the World Bank as well as the CAAA.
- n) Monthly progress report containing the list of activities planned for the reporting period, progress towards the target and the result of targeted activities shall be furnished to DPD/PD on a monthly basis.
- o) Review Annual Trigger compliance with respect to procurement activities by ULBs.

C. State Environmental and Social Development (SESDU)

A state level ESDU will be set up within SPMU which will be staffed with (i) one Environmental Engineer (ii) one Social Specialist (iii) one Gender Specialist (GS) and (iv) one Communication Specialist (CS) to mainstream the ESMF activities into the main project components for all projects planned under components 2 and 3 of the Project. Besides, the ESMF wing will also be responsible for providing necessary Technical Assistance and Training to ULBs and other stakeholders. Till such time SPMU is adequately staffed as suggested in the PIM, PMC's team of E & S experts will carry out day-to-day activities and will facilitate periodic formal training sessions to ensure a gradual and steady increase of capacity in the capacity of this wing. The main role and responsibilities of the staff of the S-ESDU will be:

Key Tasks Assigned to Environment Expert

Assisted by PMC staff, the environment Expert will be responsible for the following:

- a) Co-ordinate the Preparation of the Strategic Environmental Assessment (SEA)-Environment Monitoring Framework (EMF)
- b) Prepare and Disclose the EMF including guidelines for impact identification (for goods, works and consultancy contracts), project screening checklist, broad mitigation plans, guidance to prepare detailed impact assessment for projects, supervision mechanisms, monitoring requirements, training/capacity building needs, and budgetary provisions in contracts. This shall comply with all National / State regulations, local bylaws and

Key Tasks Assigned to Environment Expert

guidance, and the World Bank Operational Policies and Safeguards requirements.

- c) Review the investment proposals (sub-projects) and ensure that environmental issues are properly addressed by the development of a project-specific environmental analysis including (but not limited to) land use, natural habitats, pest management, physical/cultural resources, forests, the safety of dams, public consultations, and occupational health and safety
- d) Oversee the preparation of Environmental Impact Assessment (EIA) with Environmental Management Plans (EMPs), Monitoring Plan and Training needs and inclusion of Environmental Management Plan and budget requirements in Contract documents to facilitate the implementation of mitigation measures.
- e) Provide expert guidance to the beneficiaries in the preparation and successful implementation of the project environmental assessment instruments/documentation, including preparation of environmental impact/risk assessments and environmental management plans.
- f) Provide expert advice to the PMU team with regards to strategies and approaches to effectively and efficiently comply with relevant World Bank environmental safeguard operational policies and requirements
- g) Coordinate and share information with World Bank project staff and consultants providing environmental safeguard cross-support
- h) Carry out site supervision visits during the implementation of sub-projects and other activities related to the Project.
- Ensure that safeguards documents are prepared on time and disclosed well in time before the start of works and that all required clearances/permits/licenses are obtained for projects. This shall comply with all National / State regulations, local bylaws/ guidance, and World Bank Safeguards requirements.
- j) Conduct/co-ordinate Stakeholder consultations and consensus-building as outlined by the EMF and required by National / State regulations and World Bank guidelines
- k) Manage the environmental consulting firm engaged for specific projects.
- Ensure the contractor has environmental experts in their team, prepare and follow Contractors Environmental Management Plans (C-EMP); as outlined in EMF and maintain required permits/licenses/incident and grievance registers
- m) Monitor the fulfillment of the project-specific environmental requirements and environmental safeguards policies with respect to all project activities, in all direct and indirect contracts; ensure proper reporting by monitoring agencies at various levels (district/site), and maintain database and follow-up
- n) Assist and advise local bodies from time to time in monitoring and managing contractors" activities that may have environmental impacts, if any. Conduct random audits for EMF compliance during various project stages
- o) Develop, undertake and support training programs on Environmental monitoring and management arrangements developed in the Project.
- p) Report the status and progress of institutional arrangements and functioning of environmental arrangement along with any impacts that should be addressed. These should be reflected in the Project Progress Report to be submitted to the Deputy Project Director / Project Director.
- q) Ensure that environmental assessment is an integral part of the planning of all project

Key Tasks Assigned to Environment Expert

supported schemes

- r) Ensure development/procurement and availability of IEC materials supporting the environmental management framework to selected LSGs, relevant functionaries, and community institution partners.
- s) Ensure including the necessary activities related to the environmental safeguards, such as training, studies, etc. in the project procurement plan if relevant.
- t) Assist PMU/Municipalities in operationalizing the methods, procedures, and systems for introduction of environment compliance practices into the existing systems of the LSGs.
- u) Ensure that all legal and regulatory provisions relevant to the environmental safeguards are satisfactorily met through the project processes.
- v) Ensure that environmental assessment is an integral part of the planning of all project supported <u>schemes.</u>

The Environment Expert will effectively:

- a) Maintain full documentation of safeguards requirements and status of the same; for projects under different stages of planning and implementation,
- b) Submit the report on random audits on EMF Compliance during various project stages to the Deputy Project Director / Project Director of the PMU,
- c) Prepare and submit monthly progress report containing the list of activities planned for the reporting period, progress towards the target and the result of targeted activities shall be furnished to DPD/PD,
- d) Carry out any other tasks assigned by the Deputy Project Director / Project Director from time to time.

Key Tasks Assigned to Social development and gender Expert

Tasks Assigned to Social development and gender Expert: assisted by PMC staff, the Social development and gender Expert will be responsible for the following:

- a) Preparation of safeguard documents:
 - Coordinate the preparation of safeguard documents Resettlement Management Framework, Tribal Development framework to comply with state laws and Bank's Operational Policies on Indigenous People (IP) Development Plan and Involuntary Resettlement to enhance access to benefits and minimize and mitigate adverse impacts.
 - Coordinate gender analysis for gender informed project design including identification of gaps and actions with monitoring indicators.
 - Based on gender analysis, develop a detailed plan that identifies opportunities and entry points for mainstreaming gender into the project.
 - Coordinate estimate on impact to land assets and non-land assets for titleholders and non-titleholders
 - Assess risks and opportunities for affected people. Identify strategies and options to restore livelihoods and quality of life.
 - Review RAP prepared by the SIA consultants and finalizes the same
 - Coordinate implementation of labour influx management plans and gender action plan.

Key Tasks Assigned to Social development and gender Expert

- Providing training to government personnel and contractors in preparing and managing resettlement activities and function as a resource person for LA and R&R.
- Coordinate with Contractor and Independent Authority to mitigate construction induced impacts
- Disclosure of project information in public spaces and through relevant media.
- Coordinate with implementing partners resolution information dissemination of Grievance Redressal Mechanism (GRM) system and reporting on complaints
- Coordinate the monitoring report prepare monthly monitoring report.
- Submit semi-annual safeguards monitoring reports to WB
- Coordinate preparation of stakeholder engagement plan to develop citizen feedback mechanism including grievance management for the project.
- Identify agencies, community-based organizations, and women's associations or groups to support project implementation.
- Coordinate the detailed preparation of labour influx management action plans.
- Coordinate disclosure of safeguard documents both in local and English language prior to project appraisal.
- Provide inputs from the safeguard instruments and gender strategy for the Operational Manual.
- Ensure that the GRM system is set-up
- Mainstream training modules on gender, participation, systems on transparency, grievance management, social mobilization and other social issues in the training plans and calendar.
- Ensure indicators to monitor social development outcomes are included in the M&E system.
- b) Implementation.
 - Develop quarterly plans to detail the activities to implement the action plans on social safeguard management and gender.
 - Organise orientation and sensitization workshop for the implementing partners on the "process" of planning and implementing safeguard management plans. gender action plans, labour influx management plans and labour welfare laws.
 - Support district teams to review all sub projects to ensure equal and equitable benefits to men and women and suggest modifications or new activities within the project (as needed) that could increase gender equity.
 - Provide support to district teams on social and gender inclusive planning, implementing and monitoring of activities.
 - Support district teams to review sub-projects to ensure compliance with safeguard documents.
 - Ensure preparation of municipal level tribal action plans to comply with Tribal Development Framework.
 - Organise quarterly workshops with support organisations and social specialists at district level to facilitate cross learning from sub-project planning for the first year of implementation and six-monthly after the first year.
 - Mainstream social development and gender issues in training materials, manuals, documentation of case studies
 - Co-ordinate programs that promote gender equality, address violence against women

Key Tasks Assigned to Social development and gender Expert

and advance rights of girls and women.

- Coordinate with the government departments, NGOs and other stakeholders to promote interventions to address gender-based violence (GBV).
- Coordinate implementation of labour influx management plans and compliance with labour laws. l. Coordinate dissemination of information of the GRM system in the project area.
- c) Monitoring and reporting.
 - Monitoring the indicators on gender and citizen engagement
 - Ensure data collection to track performance of each social development outcome.
 - Ensure disaggregated (gender, social and economic profile) baseline data is collected and analysed at the planning stage.
 - Coordinate studies for thematic analysis.
 - Monthly progress report containing the list of activities planned for the reporting period, progress towards the target and result of targeted activities to achieve social development outcomes shall be furnished to DPD/PD on a monthly basis.
 - Any other tasks assigned by the Deputy Project Director / Project Director from time to time.

D. Finance & Accounts Wing

The Finance and Accounts wing of the SPMU will be responsible for implementation of the finance management systems including maintaining Project accounts and periodical financial reporting. The SPMU will recruit an experienced finance management specialist with suitable qualifications and experience who will be responsible for overall FM coordination and monitoring project activities and for managing FM arrangements for components 1 & 3 for the project including (a) ensuring compliance with financial covenants in the Project Agreements; (b) initiating disbursements from the World Bank, sending funding advance claims to the CAAA and managing such funds and monitoring transfer & availability of funds to other levels such as ULBs; (c) providing financial and audit reports to the World Bank; (d) ensuring management of payments and accounting functions of the project; and (e) coordinating and managing the internal and external audit process and any other requirements as necessary. In addition to the Finance Management Specialist, the F&A wing will have a Project Accountant who will be mainly responsible for maintaining the project accounts, coordination with the Treasury for payments and preparing necessary project financial progress reports to other stakeholders. The PMC's team of F & A experts will be responsible for carrying out day-to-day activities and will facilitate periodic formal training sessions to ensure a gradual and steady increase of capacity in the capacity of this wing. The key roles and responsibilities of the staff are as below:

Key Tasks assigned to FM Expert and FM Assistant

The FM Expert along with FM Assistant will be responsible for the following:

a) Establish financial systems for planning, budgeting, implementation, management, and monitoring of all activities in the project with effective MIS, in close liaison with LSGD, Executing Agencies, Municipalities and World Bank; ensure that the project's financial management system operates within the state's PFM system and complies with the requirements laid down in the Project's legal agreements and this PIM.

Key Tasks assigned to FM Expert and FM Assistant

- b) Assist the Dy. Director, SPMU and the SWM Projects Wing, in preparation and implementation of annual plans including the budget for the components 1 and 3 of the Project; prepare monthly budget versus actual expenditure reports and circulate the same for necessary action.
- c) Open and operate (in accordance with the delegation of authority approved by the Project Director) a Special Treasury Savings Bank (STSB) Account for receiving the funds from the Bank and GoK and making payments to suppliers/contractors/vendors/beneficiaries from this account by following the state treasury rules and mechanisms. Ensure all project expenditure is expended from this account.
- d) Customise "Sankhya" for Project Accounting or assist in procuring any other off-the-shelf accounting software for the PMU. Maintain project accounts for components 1 & 3 and ensure the project's fund releases and expenditures are properly tracked using separate revenue and expenditure lines/heads of accounts or cost centres or both as considered appropriate.
- e) Assist in refining/reviewing the financial management and accounting systems of Municipalities for accounting of Component 2 funds for which ULBs have direct responsibility.
- f) Prepare six monthly IFRs in the specified formats of the Bank and with approval from the Project Director, transmit the same to CAAA and the Bank; send funding advance and reimbursement claims to the CAAA for the Bank's share and to GoK, for government share and initiate disbursement of funds to the SPMU's STSB; manage and monitor the funds so received.
- g) Receive and review the Grant Utilization Reports from ULBs (for component 2) and ensure the expenditure is in line with the relevant project agreements and is eligible to be financed from the grants released under component 2 of the Project.
- h) Prepare a consolidated grant utilization reports for all participating ULBs showing the total releases and utilization (on various expenditure lines) at state level.
- i) Close follow up on the status of compliance by Municipalities on meeting any Minimum Mandatory Conditions (MMC) relevant for FM (e.g. timely audit of Municipalities & clean/qualified audit opinions etc.) as required by the project to release block/performance grants. Suggest any enhancements to improve the process & compliance as required.
- j) Ensure an effective internal control system is designed and implemented for the Project and the internal audits are carried out in accordance with the arrangements agreed with the Bank. (refer section 11 – Financial Management Systems
- k) Keep accurate and reliable records for all expenditure incurred and assets acquired using the Project funds and the records in the custody of authorised personnel of the SPMU/ULBs.
- Keep accurate records for the assets created and/or acquired using the Project's funds, including details of cost, identification and location of assets; they are properly tagged and verified periodically and matched with books of accounts.
- m) Periodically reconcile the fund releases from the Bank and GoK with the expenditure incurred; reconciliation to include a reconciliation project statements with those of treasury statements/ reports and account for differences if any, with proper authorization from Project Director/appropriate authority.

Key Tasks assigned to FM Expert and FM Assistant

- n) Prepare monthly projects financial progress reports including comparison of budgets to actuals are provide the same to appropriate authorities for review and necessary corrective action.
- o) Prepare annual Project Financial Statements and get the same audited by theComptroller and Auditor General(CAG) in accordance with the External Audit arrangements for the Project (refer Chapter 11 – Financial Management Systems); the PFS are:
 - The IFRs for the second half year which will include the releases and expenditure for the whole year.
 - Statement of Sources and Uses of Funds
 - Statement of Uses of funds by project Components/ sub-components
 - Summary sheet for expenditure by category of expenditure
 - A consolidated statement showing the aggregate grants and expenditure against those grants of ULBs. Statements annually:
- p) Ensure all reports due to be submitted to the Bank are submitted timely.

E. <u>Project M & E</u>

The M&E wing will be responsible for the results monitoring and periodic evaluation of each component of the Project and the Project as a whole in accordance with the detailed M&E system laid down in Chapter 10 of this PIM. In association with the IT, the M&E will create a robust and appropriate management information system (MIS) required to collect data and monitor the project progress and the results. Data will be generated/collected at the ULB level and the information will be publicly accessible online. The collected data at the ULB level be reported to the SPMU through the DPMUs. The M&E wing in the SPMU will have the overall responsibility of results monitoring and evaluation for the project. The M&E capacity across different tiers of the government, being inadequate, needs to be strengthened through appropriate capacity building initiatives under component 1 of the Project. This will be organized by the M&E wing through PMC and M&E experts.

The PMC's team of M&E experts will be responsible for carrying out day-to-day activities and will facilitate periodic formal training sessions to ensure a gradual and steady increase of capacity in the capacity of this wing. Initially, the M&E will be staffed with one M& E Specialist with relevant qualifications and skill sets that will preferably include SWM related project monitoring and evaluation management and the staff strength will be increase based on the demand and workload. They may be either recruited independently from the market or may be brought in on secondment/deputation from other departments under a MoU with that department or in accordance with the deputation rules of the GoK.

The key tasks assigned to the M&E staff are:

Key Tasks for M&E Specialist and Consultants

The M&E expert duly assisted by PMC staff will be responsible for the following:

- a) Review existing M&E systems, tools and indicators in use at SM/GoK and establish the M&E system and strategy, including design, data-collection formats, data collection, dataanalysis, and reporting format and systems specific for KSWMP.
- b) In conjunction with SWM experts, develop an overall framework for monitoring of project

Key Tasks for M&E Specialist and Consultants

activities and its results that will include collection and analysis of data, measurement of outputs and outcomes, preparation of periodical progress reports and execution of the M&E plans.

- c) Develop a database for the project performance indicators, collect appropriate data from the sources, and maintain the database and prepare reports to meet the reporting requirements of the Project.
- d) Track and analyze progress towards agreed activities, results, and outputs of each of the Project components in line with the monitoring framework
- e) Flag potential risks or challenges emerging from monitoring information
- f) Review all ToRs submitted by ULBs for carrying out various M&E activities as designed in the project in consultation with the Deputy Project Director / Project Director.
- g) Review all survey reports, results against agreed indicators including utilization of funds, adherence to environment and social safeguards/ESMF, community response, prevailing socio-economic conditions of the beneficiaries, etc. and carryout random audits of the results and report the same to the Deputy Project Director/ Project Director.
- h) Review the progress of implementation of the activities agreed to in each component by the ULBs and evaluate/assess the impact of the interventions and recommend actions to be taken for improvement if any required by any specific ULB, to facilitate better delivery of services by ULBs.
- i) Analyze the positive and negative impacts of the project interventions (including rehabilitation & resettlement if any) initiated by the State and other agencies engaged in implementation of the project activities.
- j) Train relevant PMU / PIU Staff in data collection procedures as required during project implementation; review the data and reports submitted by ULBs via DPMUs and ensure the same are properly updated in MIS tools (refer Chapter 10 for MIS tools) and the dashboards reflect the data correctly.
- k) Support systems development that links all municipalities to the state level system so that data is uploaded on-line from the field.
- l) Ensure GRM system both via Toll free number and web-based is linked to the MIS system
- m) Ensure all MIS tools are duly implemented and are operating effectively to generate real time data as contemplated under the Project. Ensure compliance with requirements laid out in chapter 10.
- n) Ensure baseline studies are carried out as contemplated in the Project and covers all the required parameters.
- o) Monthly progress report containing the list of activities planned for the reporting period, progress towards the target and the result of targeted activities shall be furnished to DPD/PD on a monthly basis
- p) In association with S-ESDU, ensure the data for ESMF monitoring is properly captured in the data collection procedures as well as the IT enabled system for data collection, analysis and reporting.
- q) Collect data and information, analyse the data and prepare reports Project Leadership for identifications of problems and action needed in implementation and for impact evaluation.
- r) Share the information, as needed, with relevant stakeholders for action and problem resolution.

Key Tasks for M&E Specialist and Consultants

s) Plan and conduct/arrange to conduct the mid-term and final evaluation and assessment of the Project and interact with the Bank and other stakeholders for course correction, if any.

F. Public Information Cell (PIC)

The PIC will be responsible for all Project related IEC activities as detailed inChapter 5 of the PIM. The PMC's team of IEC experts will be responsible for carrying out day-to-day activities and will facilitate periodic formal training sessions to ensure a gradual and steady increase of capacity in the capacity of this wing. Initially, this wing will be staffed with one IEC expert with relevant qualifications and skill sets that will preferably include SWM related communicated strategies. The staff strength will be increased based on the demand and workload. They may be either recruited independently from the market or may be brought in on secondment/deputation from other departments under a MoU with that department or in accordance with the deputation rules of the GoK.

The key tasks assigned to the PIC staff are:

Key Tasks assigned to PIC staff

Tasks assigned to Journalist/ Communication specialist:

- a) Focal Point for all Communications under the project (will have counterparts in DPMU)
- b) Coordinate overall Communication Strategy
- c) Plan, hire and monitor the media agencies, prepare budget, implement, and document/report on all the activities
- d) Overall PR activities
- e) Review and archive major news reports related to SWM daily and respond to negative reports
- f) Maintain response record
- g) Organize/ facilitate press meets, media briefing sessions, press release, panel discussions, celebrity engagement, etc. as directed by ED
- h) Prepare media kits with project related information, documents, and picture/video clips
- i) Carry out communication need assessment for different stakeholder groups.
- j) Develop communication strategy to establish a systematic approach to stakeholder engagement. This includes identification of stakeholders, assess their interest and to enable stakeholders' views to be taken into account in project
- k) Design and promotes participation of all the stakeholders in the project.
- l) Develop and standardise appropriate information for disclosure and dissemination required under the Right to Information Act for suo-motto disclosure
- m) Develop and standardise messages on each of the component for disseminating information to facilitate participation of beneficiaries that is required beyond the law.
- n) Map the stakeholders to develop appropriate IEC material that for different stakeholder groups. Develop IEC material based on the need assessment and ensure that, it reaches all the stake holders through different communication channels.
- o) Support the production of user-friendly and high-quality IEC material (such as handouts, posters, brochures, video documentary films and photo documentation, success stories booklet etc.) in Malayalam and English for communication of the project activities to the

Key Tasks assigned to PIC staff

public and stake holders.

- p) Develop formats for and systems for citizen feedback to report back to the stakeholder and its documentation.
- q) Document good practices as part of knowledge management and dissemination project progress reports.
- r) Prepare monthly newsletters both in English and Malayalam on project progress and forth coming activities.
- s) Prepare regular press/media releases to ensure high visibility of the project.
- t) Prepare regular information e-bulletins on the project (Malayalam and English versions) and ensure wide dissemination
- u) Represent the project in meetings and deliver presentations on behalf of the project.

Tasks assigned to Web & Social Media cum Graphic Designing Expert:

- a) Create/ manage social media accounts, (Facebook, Instagram, Twitter, YouTube Cannel, etc.) for the Project, and popularize it
- b) Create graphics, videos, other publicity materials for social media campaigns or any other publicity activities required by the SPMU
- c) Organize social media live broadcast for ED or any designated officer
- d) Conduct social media surveys on various topics related to SWM

3.2.5. Project Management Consultant

The SM will hire a Project Management Consultant (PMC) that will provide project management, coordination and supervision activities support to SPMU and DPMU (through separate district teams). The PMC team of experts will help the SPMU/DPMU staff by carrying out the day to day project activities by suitably engaging the SPMU staff on the job and also providing formal periodic trainings to ensure a gradual and a steady increase in the capacity of the SPMU and SM.

The PMC will primarily be responsible for the following activities:

- a) Carry out all the project management activities under all components of the Project Component 1 and 3 to be directly done with SPMU and Component 2 activities to be executed at ULBs through DPMU and TSCs
- b) Support in Administration of the ULB grants under component 2.
- c) Implementing all the SWM focused institutional and policy reforms.
- d) Developing SM as a State level nodal sector agency for SWM.
- e) Planning and implementing formal training activities under component.
- f) In association with SPMU and DPMUs, plan, design and implement and supervise all the investment sub-projects under component 3 including upstream sub-project identification, design of clusters, identification of land parcels for disposal facilities, undertake readiness assessment and screening, and hiring of specialized technical consultants for sub-project specific detailed design and ESIA.
- g) Implementing and supervising all the investment projects under component 3, and
- h) Review and appraise project documents such as DPRs, FR and bid documents, ESIA/ (Environmental and Social Management Plans (ESMP)/TDP-SMP/RAP), fiduciary,

environment and social safeguards reports, and physical and financial progress reports, utilization certificates prepared by ULBs.

A detailed Terms of Reference for PMC is attached at Annexure A.3.3 in Volume 3. The PMC will be staffed, amongst others with SWM Experts, SWM Engineers, Project Managers, E&S specialists, Environmental Engineers and Social Safeguards specialists.

3.3. District level institutional arrangements

3.3.1. District Collector

The role of the District Collector in the Project will be as below:

- a) As the chairman of the DPC, chairs the meetings of the DPC which accord approval to the Annual Plan of the ULBs and hence to the sub-projects under Component 2 of the Project.
- b) Will provide necessary administrative support in land identification and approval for its use by ULBs/SPMU for sub-projects under Components 2 and 3 of the Project.

3.3.2. DPMU

To monitor and coordinate the activities of ULBs and to lend support to SPMU for forward and backward integration of Project activities, the SM will set up DPMUs, in each of the 14 districts (or have some DPMUs managing more than 1 district based on the number and size of ULBs in the respective jurisdiction of DPMUs) of the state, housed in the District Collector's office. The DPMUs will report to SPMU (Deputy Director) and will support the SPMU in all its project implementation and design responsibilities, including, ULBs assessments for grant eligibility and oversight on all Component 2 sub-projects and activities which are assigned to ULBs. DPMUs will not have any "approval" responsibilities under the project, instead would provide a Quality Assurance-Quality Checks (QA-QC) on all component projects referred to it by ULB and/or SPMU. The DPMUs will also be responsible for carrying out all the periodic monitoring and reporting, including both physical and financial progress, of all the activities at the ULB level DPMUs will be assisted by district level PMC teams. DPMUs will work closely with the District Collector's office and District Planning Committee (DPC) as per the government systems and procedures.

The role and responsibilities assigned to DPMUs are as below:

Role & Responsibilities of DPMUs

- 1. In association with district PMC teams, support SPMU in planning and implementation of projects under component 3 of the Project including providing Inter-ULB co-ordination support and inter institutional support at the district level for all project activities.
- 2. In association with the district PMC teams and the district TSC, assist the District Collector in land identification and acquisition and related coordination with various bodies including the landowners and implementation of social safeguards that may become necessary based on the ESIA.
- 3. Assist SPMU in hiring the district level TSC teams to provide end-to-end specialized technical support to the ULBs in (i) annual fiscal planning, budgeting and reporting (ii) sub-project planning, design, procurement and contract management and project

Role & Responsibilities of DPMUs

implementation for sub-projects under component 2 of the Project.

- 4. Supervise the district PMC and district level TSC in timely implementation and monitoring of projects' progress.
- 5. Review the sub-projects' technical assessment documentation as received from ULB/TSCs, conduct QA-QC and forward the same to SPMU technical and financial due diligence and approval.
- 6. Coordinate with the ESIA technical consultants for conducting the ESIA for the identified projects under components 2 and 3.
- 7. Verify compliance with ATs and subproject guidelines annually for all ULBs to ensure that the sub-projects are part of the eligible investment menu and are designed and implemented in compliance with basic technical, fiduciary and safeguards systems as outlined in PIM, ESMF and procurement manual. DPMUs will submit the AT compliance reports for all ULBs to the SPMU
- 8. Review the M&E data and reports as received from ULB/TSCs, consolidate at the district level and forward the same to SPMU for its review and approvals.
- 9. In association with PMC and TSC teams, prepare an 0&M roadmap and 0&M procedures including ToRs for the contractors hired for 0&M for the commissioned projects under components 2 and 3.
- 10. Assist SPMU in planning and conducting capacity building activities at district, ULB and other stakeholder institutions participating in the project implementation.

The district level PMC teams will assist DPMUs in day to day activities relating to the Project and will be responsible for carrying out day-to-day activities and will facilitate periodic formal training sessions to ensure a gradual and steady increase of capacity in the capacity of the DPMU. The organization structure of DPMU will be designed as per Figure 3-3 below. Initially, each DPMU will be staffed with one District Coordinator and One SWM Engineer, in addition to the staff provided by PMC to the district level PMC teams. Depending on the need and based on the demand, the DPMUs staff strength be increased to include other experts such as (i) financial management expert, (ii) M&E expert (iii) Environmental expert and (iv) Social Experts.



Figure 3-3: Organization Structure of DPMU

The key tasks assigned to the experts employed by the DPMUs are:

Key Tasks Assigned to DPMU Staff

The SWM Engineer/Expert will work with/oversee the PMC M&E team in their day to day activities in the following:

Tasks relating to Component 1 projects

a) Provide administrative support to SPMU and other capacity building agencies as hired by SPMU, in conducting training and capacity building workshops/seminars/Focus Group Discussion (FGD),etc. at various ULBs and/or other locations as may be decided by SPMU in the respective districts.

Tasks relating to Component 2 projects

- b) Participate in the citizen engagement and stakeholder consultations including Ward Sabha meetings, and provide necessary advice to ULBs and D-PMC teams as needed.
- c) Review project proposals and plans from ULBs and advise on their inclusion in respective ULB's Annual Plans.
- d) Review the sub project technical documents (DPRs, FRs etc.) as received from ULBs, and conduct a QA-QC and advise SPMU on their feasibility and eligibility to be included in the project; if the projects fail the QA-QC, advise ULBs on enhancements/corrections that may make the projects credit and operational worthy.
- e) Along with district PMC inspect the project and operational sites for monitoring of project progress and operation of sites and provide necessary technical advice as needed and report to SPMU counterparts.
- f) Advise as needed the project contractors, TSCs and ULBs to prepare site specific health and safety protocols required for collection, transportation, treatment and disposal of all types of waste as may be needed.

Tasks relating to Component 3 projects

- g) Provide technical and administrative support to Project Managers, SWM Experts and SWM Engineers in SPMU in developing project concept notes, project design and drawings, BoQs with appropriate cost estimates, site selections, DPRs etc. for the Component 3 regional investment projects.
- h) Serve as liaison with district administration authorities on all issues pertaining to solid waste program requirements.

Financial Management Expert

- a) Coordinate with ULBs in their preparation of grant utilization reports and forward the same to SPMU for their review and record.
- b) Check the AT compliance of the participating ULBs for SPMU.
- c) Coordinate with ULBs on their external audit compliances to ensure the audits are done in time and the reports are transmitted to SPMU.

M&E Expert

- a) Work with ULBs to develop and roll-out data collection formats and tools to ensure ULBs collect and transmit data in proper format and content.
- b) Provide oversight on ULBs for data collections, data transmittal and submission of progress reports as to DPMU/SPMU as per the project report calendar defined in section 10 of the PIM
- c) Prepare progress and monitoring reports to SPMU as per the project reporting calendar.
- d) Provide administrative support to SPMU and other capacity building agencies as hired by SPMU, in conducting training and capacity building workshops/seminars/FGDs etc. at various ULBs and/or other locations as may be decided by SPMU in the respective

Key Tasks Assigned to DPMU Staff

districts

Environmental Expert and Social Experts

- a) Undertake a monthly visit to subprojects to ensure compliance with ESMPs, TDP-SMP-RAP and guide and support PIUs/ TSC/ Support Organization/ Contractors to oversee safeguards management including compliance of labour laws
- b) Review monthly progress reports by PIUs to resolve any issues
- c) Coordinate with the TSCs in screening and categorization of the sub project using the screening tools as presented in the ESMF
- d) Prepare quarterly progress reports on ESMF implementation (based on the monthly reports of PIUs and their observations during monthly visits) and submit to S-ESDU
- e) Review EIA and SIA reports submitted by ESIA consultants: .
 - a. Review screening & confirm categorization and social risk
 - b. Review e3 and complete report incl screening, categorization and use of generic emp
 - c. finalise e2 and send to SPMU for approval
 - d. Review social risk high, substantial, medium and low and prepare the report.
 - e. review, comment, update e1, send to SPMU for review and onward submission to bank
- f) Collect and provide data and reports for impact evaluation to the M&E wing of the SPMU.
- g) Attend field visits undertaken by S-ESDU and the WB as part of the monitoring of the subprojects
- h) Provide administrative support to SPMU in conducting IEC and capacity building activities in the respective districts.

The number of staff for various positions in DPMU will be decided in consultation with SM. The DPMU staff may either be recruited independently from the market or may be brought in on secondment/deputation from other departments under a MoU with that department or in accordance with the deputation rules of the GoK.

3.3.3. District Planning Committees

The District Planning Committees are the statutory authority for approval of ULB plans, consolidation thereof into a district plan and submission to state government for state level planning and inclusion of proposals in the state budget under appropriate budget codes. The SWM annual plan as prepared by ULBs with assistance from TSC will be integrated into ULB's overall annual plan and will be submitted to DPC for consolidation and approval.

3.4. City Level Institutional Arrangements

3.4.1. ULBs

ULBs will be primarily responsible for implementation of the project activities under Component 2 of the Project and will receive grants from the Bank and the GoK, (in addition to their normal fund allocations), for improving their local level SWM systems and capacities. In addition, all participating ULBs will be provided technical assistance for, inter alia (a) strengthening the organizational capacity for SWM; (b) drafting SWM bye-laws in compliance with national SWM rules and state SWM strategy; (c) preparing city-wide long-term SWM Plans to identify the priority investments and service delivery targets for the project; (d) strengthening the financial systems including cost recovery mechanisms; (e) achieving the eligibility criteria and institutional results to access the full incentive grants under component 2; (f) annual fiscal planning, budgeting, fund utilization and reporting; (g) sub-project planning, designing and implementation; (h) incorporating climate change mitigation measures into sub-project design; and (i) establishing clear mechanisms for ULBs to formally engage with C&T contractors or HKS/ Kudumbashree groups as service providers of solid-waste management, including collection and transportation. The TA will be provided by a combination of institutions including SPMU/PMC/TSC acting in consortium with external agencies/specialist consultants for specific tasks. In order to participate in the project grants, ULBs will be required to sign a Participation Agreement(see Annexure A.3.1 in Volume 3 for template) and should satisfy the eligibility criteria to access grant allocations under the Project (as detailed in Chapter 6 – Management System for incentive Grants to ULBs).

The project implementation will be carried out by a Project Implementation Unit (PIU) and the head of the PIU will be the "Implementation Officer" for various executive actions required under the current planning and approval systems of the ULB. The PIU will report to the Secretary of the ULB and will be constituted by the following staff members of the ULB:

- a) SWM Engineer who will also act as the head of PIU
- b) Heads of the Health and Engineering Wings of the ULB
- c) Accounts Officer recruited for the PIU.

The role and responsibilities of the ULBs in implementing component 2 are as below:

Role of ULB-PIU in implementing component 2 of the KSWMP Project

- a) In association with TSCs, prepare SWM plans and the Annual SWM Plans and obtain administrative approval from appropriate authorities. Ensure the plan size is appropriately budgeted at the LSGD level. Coordinate with SM to obtain the annual plan size for preparation of Annual Plans.
- b) In association with TSCs, prioritize and plan, design and implement the subprojects/SWM facilities which amongst others include the following:
 - Project procurements including procurement of primary collection & transport handcarts/tricycles/vehicles and vehicles for secondary transportation of collected waste) in accordance with the guidelines stated in Chapters 7,8,and 9 of the PIM
 - Procure C&T contractors and implement C&T arrangements for primary & secondary collection and transportation of waste in accordance with the guidelines stated in Chapters 7,8,9. Plan and procure and install household level equipment for SWM treatment facilities as per detailed guidelines in Chapter 7, Chapter 8, Chapter 9 of this PIM.
 - Setting up Biodegradable Waste Treatment Plants such as centralized Composting plants/ Bio methanation Plants (with or without Energy production) with approvals as per Section 3.7: Project Approval Processof this PIM.
 - Setting up Sanitary Landfills (single cells or multiple cells) with approvals as per Section 3.7: Project Approval Process of this PIM.
 - Closure or Remediation of existing dumpsites with approvals as per Section 3.7: Project Approval Processof this PIM.

Role of ULB-PIU in implementing component 2 of the KSWMP Project

- Setting up/Upgradation of MCF, RRF. MRF with approvals as per Section 3.7: Project Approval Process of this PIM.
- Routine public space cleaning/sanitization and other waste management activities related to COVID19 like procurement of protective gears and equipment for sanitation workers.
- Extend financial support to existing women self-help groups engaged in ongoing waste collection services
- Payment to C&T contractors and O&M support for tipping fee for regional disposal facilities
- c) Coordinate with S-ESDU/D-ESDU as the case may be, in conducting the E&S screening and E&S assessments for all sub-projects & in getting requisite regulatory sanctions / permits.
- d) In association with Health officer and support organizations, supervise the contractors /Design Build Operate and Transfer (DBOT) operator and guide the implementation of ESMPs with TSC support. The PIUs will support and co-ordinate for government approvals and statutory clearances. The PIU will submit the compliance reports on clearances, permits, and environmental and social safeguards to D-ESDU.
- e) Continuously update the Safeguards Information Management System (SGIMS) for monitoring ESMF compliance.
- f) In consultation with SPMU/DPMUs and in association with TSCs, supervise & ensure that contractors/ ULB staffs, as the case maybe, are implementing safeguards and support annual environment and social audit/ support measures.
- g) In association with SPMU/DPMU and in association with TSCs, plan for O&M procedures and protocols for the assets/facilities created under the project.
- h) Maintain separate project accounts for grants received and spent (under component 2); prepare and submit monthly Grant Utilisation Reports (as detailed in Section 11.3 of this PIM) to DPMU for verification and submission to SPMU.
- i) Ensure the accounts are audited timely by the Local Fund Examiner to comply with AT conditions for Grants.
- j) Prepare and submit Annual AT compliance reports to DPMU for verification and submission to SPMU.
- k) In association with TSC teams conduct waste generation surveys, track waste flows, collect and update state MIS on SWM data and project monitoring data. Submit periodical reports to the health/ waste standing committee of the ULB for their review, supervision and necessary action.
- Ensure data is collected in various MIS tools on real time basis which would help in monitoring the progress of the project and prepare M&E reports and submit to DPMU for verification and submission to SPMU.

The organization structure of ULB-PIUs and the key tasks assigned to the PIU staff are as below:



Figure 3-4: Organization Structure of ULB-PIU

While the TSC teams will carry out day-to-day activities and will facilitate periodic formal training sessions to ULB staff ensure a gradual and steady increase of capacity in the capacity of the ULBs, the executive responsibilities on the project activities will rest with ULB PIUs. The key tasks assigned to ULB PIU staff is as below:

Key Tasks Assigned to ULB-PIU Staff

SWM Engineer

Assisted by TSC staff, the SWM Engineer/Expert will be responsible for the following activities: :

- a) Prepare 5 year and Annual SWM Plans, obtain approval from the Secretary and the Municipal Council; ensure the SWM plan is integrated into ULB annual plan and submitted to DPC for approvals; in case of 5-year plans, coordinate with DPMU and SPMU in obtaining the SPMU/SM approvals.
- b) Conduct the citizen engagement and stakeholder consultations including Ward Sabha meetings, for 5 year and Annual plan exercises and obtain their respective consents.
- c) Prioritize the projects identified in the 5 year and Annual plans; plan, design and implement the sub projects in association with external works contractors/consultants; review the DPRs, FRs, ESIA assessments prepared by TSC teams and other external consultants prior to submission to DPMU and SPMU. Ensure for each project the following are conducted:
 - Feasibility assessment of the various alternative technical solutions including climate and disaster resilience, environment and social risk screening and financial sustainability assessment,
 - Firm up the preliminary engineering designs and implementation modality (DBOT, Engineering-Procurement and Construction (EPC) etc.), and
 - Environment and social impact assessment and management plan preparation.
 - Obtaining Municipal Council Approval and Technical Sanction from SM. In case of projects that require no-objection from World Bank, ensure the no-objections have been obtained prior to commencement of bid process.
 - Prepare bid documents and undertake the procurement process to engage a

Key Tasks Assigned to ULB-PIU Staff

qualified contractor/vendor, and then supervise the implementation of the subprojects.

- Handover of the completed sub-projects for O&M.
- d) In association with TSC, plan the procurements of equipment, vehicles and works contractors and consultants by following the procedures for procurement as laid down in Volume 2 of this PIM (Procurement Manual), and the procurement procedures of ULB/ GoK. Where necessary, ensure appropriate approvals are obtained from SPMU/SM as per Project Approval Process detailed in Section 3.7 of this PIM.
- e) In conjunction with TSC, , inspect the project and operational sites for monitoring of project progress and operation of sites and provide necessary technical advice as needed and report to DPMU and SPMU counterparts.
- f) Advise, as needed, the project contractors to prepare site specific health and safety protocols required for collection, transportation, and treatment of all types of waste as may be needed.
- g) In association with TSCs and other technical consultants, ensure the E & S arrangements as approved by SM/World Bank are implemented.
- h) Coordinate with district level PMC teams and SPMU/SPMC for execution of necessary tasks/activities in case of regional projects (component 3), where the ULB may be participating in any manner.

Accounts Officer

The Accounts Officer will be responsible for the following activities:

- a) Establish financial systems for planning, budgeting, implementation, management, and monitoring of all activities for which the ULB is funded under component 2 of the Project; ensure that the project's financial management system operates within the state's PFM system and complies with the requirements laid down in the Project's legal agreements and this PIM.
- b) In conjunction with the Accounts wing of the ULB and the SWM wing, prepare annual plans including the budget covering the activities for which the ULB is funded under component 2 of the Project; prepare monthly budget versus actual expenditure reports and circulate the same for necessary action.
- c) Maintain project accounts for grants received and expenditure incurred.
- d) Prepare monthly Grant Utilization Reports (as detailed in Section 11.3 of this PIM) and submit the same to DPMU for verification and transmission to SPMU.
- e) Coordinate with ULB-Accounts wing to ensure the ULB accounts are audited timely for AT compliance.
- f) Prepare AT compliance reports and submit to DPMU for verification and submission to SPMU.
- g) Coordinate with SPMU/SM for grant releases and in fixing the annual plan size.

Technical Support Staff

- a) , Assist the SWM Engineer/Experts in vetting the project proposals, engineering drawings, DPRs/FRs etc.
- b) Provide necessary assistance to SWM Engineers/Experts in inter wing coordination for obtaining approvals from other wings (for example Engineering Wing), the district level

Key Tasks Assigned to ULB-PIU Staff

monitoring committees for projects involving electrical and mechanical works.

c) Assist the SWM Engineer/Experts in project procurements, conducting public consultation including Ward Sabha meetings, presentations to DPC etc.

The staff of PIU may be either recruited independently from the market or may be brought in on secondment/deputation from other government departments under a MoU with that department or in accordance with the deputation rules of the GoK. Those recruited for PIU will be in addition to the staff assigned by the TSC for the ULBs. Till such time the staff(s) for PIU, as above, is/ are recruited, the staff within engineering/ health/ accounts etc. wings in the ULB will perform the above tasks.

3.4.2. District Level PMCs

District level PMC teams will support the DPMUs being set up under the Project. The district level PMC teams comprising of about 7 staff positions in each district team will support and assist the DPMU in its operational, monitoring and oversight functions in respect of all Project activities. The model ToR at Annexure A.3.3 in Volume 3 details the functional responsibilities of D-PMCs.

3.4.3. District Level Technical Support Consultants

The district level TSC hired by SPMU in consultation with DPMUs will provide end to end endto-end technical support to the participating ULBs in their respective districts in carrying out all the annual fiscal planning, budgeting and reporting activities; sub-project specific planning, design and implementation activities including preparation of all technical documents duly incorporating climate and disaster resilience, environment and social impact assessment as per ESMF, procurement, contract management and implementation supervision. The model ToR annexed at Annexure A.3.4 in Volume 3 details the functional responsibilities of the TSCs. The TSCs will provide technical assistance and technical support to their affiliated ULBs as provided below:

Project Planning and screening

Preparing 5-year SWMP:

- a) Developing the annual SWM plan
- b) Identification of investments
- c) Assessment of technical readiness and prioritization of projects and activities

Implementation of sub-projects:

- d) Preparing of feasibility reports and DPRs
- e) Assisting on procurement related aspects which includes the whole transaction advisory services and bid process management
- f) On-boarding of the works contractor

FM and Procurement compliance

- a) Overall planning and budgeting
- b) Fund flow management
- c) Accounting and reporting activities
- d) Internal and external audit
- e) Internal controls

- f) Preparation of Utilization certificates
- g) Preparation of Works Requirements, BoQs, review of bid document
- h) Assisting on implementation of risk mitigation measures
- i) Providing inputs for Bank's prior and post reviews

Environment and Social safeguards

- a) Technical support for preparation and implementation of safeguards instruments at the ULB level
- b) Undertaking Environment and Social Impact Assessment. For E2 and substantial social safeguards projects TSC will prepare the ESIAs as part of DPR preparation. For E3 projects, TSC will compile the filled-in screening Formats and applicable Generic ESMP and will submit to District Environmental And Social Development unit (DESDU) for approval and records.
- c) To support screening and categorization of the subprojects, including regional projects, using the screening tools presented in the ESMF
- d) Integrate findings of the screening exercise, as per point (d), in the Project design
- e) In association with specialist consultants (for ESMF), prepare, implement, supervise and monitor RAP and TDP-SMP.
- f) On-site review for compliance with the ESMF, ESMP/TDP-SMP/RAP etc.
- g) Providing safeguard inputs/onsite compliance of safeguards into the MIS
- h) Co-ordinating with contractors to Provide required update/data/information/ monthly reports to the PMU on ESMF implementation and compliance of labour laws and labour Management Plan.
- i) Training / handholding ULB on safeguards mgmt. during implementation & work close out
- j) Support PIUs in supervising the contractor / DBOT operator and guide the implementation of ESMPs

M&E and reporting

- a) Waste generation surveys
- b) Waste flow tracking
- c) Updating State MIS with ULB data; incl environmental and social parameters
- d) GRM
- e) Citizen feedback
- f) Labour laws and labour influx management plan

The TSC will also be responsible for social safeguards related matters which includes completion of screening checklist, implementation of TDP-SMP and RAP, preparation of livelihood restoration plan for the affected including ragpickers and carry out consultation with the Host community. The social safeguard management will be implemented by a multi-disciplinary team which would include, TSC, ULB/PIU and external consultants that may be hired by TSC in accordance with their ToR..

The district level TSC teams will assist ULBs in their day to day responsibilities relating to planning, design and implementation of Component 2 activities and also in providing appropriate technical assistance under Component 1 (as further captured in Chapter 4) activities. The TSC teams will carry out day-to-day activities and will facilitate periodic formal training sessions to ULB staff ensure a gradual and steady increase of capacity in the capacity of the ULBs.

3.5. Planning & Project Process Flow for Component 2 Projects

a) <u>SWM Plans</u>

The development of a SWM Plan (as required for the Project), will follow the generally established planning processes of the State with specific requirements of the Project embedded into those processes, as depicted in the planning process flow chart at Annexure A.3.5 in Volume 3. The TSC will support ULBs to prepare the SWM Plan (including ESIA of the plan) which will be approved by Municipal Council prior to seeking approvals from SPMU/SM. The key process and approval activities are:

- a) Prepare and finalise SWM Plan Guidelines (refer Chapter 7 of this PIM)
- b) Identification of project opportunities
- c) Preparation of sub-project concept notes and resource estimates
- d) Conduct ESIA screenings and preliminary ranking of projects on risk categories (as detailed in Chapter 7 and 8 and in accordance with the Bank guidance on ESMF)
- e) Hold Public consultation
- f) Prepare a detailed SWM Plan & submit to Municipal Council for approval
- g) Approval by Municipal Council
- h) Forward thePlan with Council Approval to DPMU for review and verification
- i) DPMU to conduct a detailed review including QA/ QC checks and review ESIA screening and forward it to SPMU for approval
- j) Technical assessment and eligibility checks by SPMU
- k) Referral of Plan to Technical Approval Committee for recommendations
- l) Approval by Project Director

The SWM plan will largely feed into the Annual SWM plans of the ULBs except, in the first year of the ULB agreement with SPMU for which year project proposals need to be identified by TSC/ULB from other sources.

b) Annual Plans of ULBs

The annual planning process for the sub-projects will follow the existing processes established by the State Planning Board with no exceptions, as depicted in the process flow chart annexed at Annexure A.3.6 in Volume 3. The SWM project proposals as identified by TSC/ULB from 5-year plans/other sources will be integrated into the general Annual Plan of the ULB and will have to be approved by the Municipal Council and DPC prior to undertaking project procurement. In addition to the DPC approvals, ULBs will have to obtain approval of the SPMU for the SWM projects to be included in their respective Annual Plans. The key process and approval activities are:

- a. Identification of SWM sub-projects from 5-year plans/other sources and preparing SWM annual plans by TSC/ULB
- b. Integration of SWM projects with overall annual plan of ULB.
- c. Obtain the indicative plan size from SPMU/Project Director.
- d. Conduct ward (special or regular) sabha meetings/citizen engagement as needed
- e. Finalising the draft plan and presentation at Development Seminar
- f. Approval by Financing Standing Committee for budget (Internal standing committee)

- g. Submission of the finalized plan with budget estimate to Municipal Council for approval
- h. Submission of Plan to DPC for discussion and approval
- i. DPC to approve and (i) communicate the approval to ULB and (ii) parallelly consolidate the plans into a district plan and transmit to LSGD for state level discussion and inclusion in the State Budget

A copy of the Annual Plan as approved by the DPC will be sent to DPMU and SPMU for record and information. ULBs will do the project detailing in terms of planning, design, DPR/FRs etc. only for those projects which are approved in the Annual Plans.

c) Sub-project process flow for Component 2 projects

KSWMP project will generally follow the GoK/ULB's current systems and workflows for the project approval and implementation activities but suitably incorporate the Bank's specific requirements into the existing processes of ULBs and SM for better technical /operational aspects, environmental sustainability, and social acceptance by ensuring compliance with the KSWMP's legal covenants and operating requirements as per this PIM. The sub-project process flow charts showing activities flow and approvals is attached at Annexure A.3.7 in Volume 3 of the PIM for information. The overall project process flow as shown in these flow charts should be cross referred and linked to sub-project type flow charts given in chapters 8 & 9 which detail out individual project flow activities. The key process and approval activities are:

- a. Prepare detailed engineering drawings/DPRs/FRs as may be needed for the identified SWM projects from Annual Plans.
- b. Conduct ESIA as required under the PAD/ ESMF arrangements agreed with the Bank and categorize the projects by their risk categories –for sub-projects ranked E1 from environmental risk assessment and representing high and substantial social risk category, safeguard instruments will be prepared by an independent consultant other than the TSC who is in charge of DPR preparation. For E2 and moderate social risk projects TSC will prepare the ESIAs as part of DPR preparation. For E3 and low social risk projects, TSC will compile the filled-in screening Formats and applicable Generic ESMP and will submit to DESDU for approval and records.
- c. Hold Ward Sabha meetings/public consultation
- d. Finalise sub-projects' technical documentation and obtain Municipal Council approval for the project; if the project is within the delegated powers of ULB, the procurement process can be initiated after the Council approval; else the sub-project will be referred to DPMU for quality control checks and onward submission to SPMU for due diligence and Technical Sanction by Project Director.(refer Project Approval Matrix as in Section 3.7 of this PIM)
- e. DPMU to review the technical documentation including ESIA (for E1 and high and substantial social riskand E2 and moderate social risk subprojects) and carry out QA-QC checks, document the findings and forward the project's technical documentation to SPMU.
- f. SPMU to conduct technical and financial due diligence and forward the proposals to Technical Approval Committee for review and recommendations; in recommending projects for technical sanction, the ESIA for sub-projects ranked E2 (Enviro) and

moderate social risk projects (Social) will have to be cleared by S-ESDU; while those of E1 and high and substantial social risk category projects or any special projects/under any special circumstances will be sent to the World Bank for review and clearance

- g. The Technical Approval Committee to review and provide recommendation to Project Director for Technical Sanction.
- h. Project Director to review and provide technical sanction to ULBs for all projects; however, in case of projects requiring World Bank clearance, the technical sanction will be provided after such clearance by World Bank.

3.6. Planning &Project Process Flow for Component3 Projects

a) <u>Planning for Component 3 sub-projects</u>

The Annual Plan for Component 3 sub-projects will need to be incorporated into the SM's overall annual plan and budget that gets submitted to LSGD for budgeting purposes. Accordingly, the Component 3 sub-projects (like Regional Sanitary Landfill, Dumpsite closure/remediation, creation of C&D and Biomedical Waste treatment facilities, etc.) will be identified andpreliminary concept notes developed for each of them with expected projected cost estimates. These will be incorporated in the SM's Annual Plan for the year following the year in which such regional projects are planned, and their cost estimated. This will facilitate the inclusion of the sub project's fund requirements in the SM budgets and necessary fund release by GoK.The PMC will be primarily responsible to carry out such planning activities in association with SPMU's engineering wing and submit it to SM for its further action. Similarly, SPMU will develop an Annual Plan for Component 1 activities with cost estimation which will be incorporated in the SM's Annual Plan and Budget that will facilitate fund releases by GoK.

b) Sub-project process flow for Component 3 projects

The SPMU (& the PMC) will generally follow the GoK/SM's current systems and workflows for the project approval and implementation activities but suitably incorporate the Bank's specific requirements into the existing processes of SM/GoK, for better technical /operational aspects, environmental sustainability, and social acceptance by ensuring compliance with the KSWMP's legal covenants and operating requirements as per this PIM.

The sub-project process flow charts showing activities flow and approvals is attached at Annexure A.3.8 in Volume 3 for information. The overall project process flow as shown in these flow charts should be cross referred and linked to sub project flow charts given in chapters 8 & 9 that detail out individual project flow activities. The key process and approval activities for these sub-projects are:

- a) Identification and inventorisation of dumpsites and land parcels for various processing and disposal facilities
- b) Preliminary technical assessment and E&S screening of identified sites including preliminary resource cost estimates.
- c) Consultation with district authorities

- d) Prepare a tentative list of sites, carry out detailed technical assessment and submit technical assessment report to LSGD for administrative sanction.
- e) Obtain Administrative Sanction for the sub-project/s.
- f) Procurement of technical consultants for DPR/FR and ESIA.
- g) Preparation of detailed engineering drawings, DPRs, FRs, etc. by Technical Consultants hired by SPMU for the task.
- h) Carryout sub-project specific ESIA by Technical Consultants hired by SPMU for the task; the ESIA for all sub-projects should be cleared by S-ESDU and referred to World Bank for its review and clearance prior to Project Director providing Technical Sanction as noted below.
- i) Carryout technical and financial due diligence of the sub-projects (by PMC in association with SPMU) and submit all technical documents (such as DPR/FRs, Detailed Engineering Drawings, PMC's due diligence report, ESIA reports, etc.) to Technical Approval Committee for its review and recommendations.
- j) The Technical Approval Committee to review and provide recommendation to Project Director for Technical Sanction.
- k) Project Director to review and provide Technical Sanction for all sub-projects (refer 3.7 below).

3.7. Sub-project Approval Matrix⁹

All sub-projects will be approved in accordance with the following matrix:

Category of project	Type of project	Approvals required
	Type 1 - Low category - these sub level as per the approved gui SPMU/DPMU. These sub-projects ca	project investments can be approved at LSGI idelines with adequate supervision from n be:
Type 1 - Low risk category	A. Facilities for segregation & Storage of waste at Source in ULBs	 Approval at LSGI level. Technical Sanction by Project Director is not required for each sub-project. However, all such sub-projects should be included in the SWM Plan (refer 3.5 a)which should be approved by Project Director. Monitoring by SPMU/DPMU
	B. Collection & Transportation vehicles/ equipment, etc. for Municipalities	 Approval at LSGI level. Technical Sanction by Project Director is not required for each sub-project. However, all such sub-projects should be included in the SWM Plan (refer 3.5 a) which should be approved by Project Director

Table 3-1: Project Approval Matrix

⁹When an investment is referred to the Bank under this approval process, for its review and no-objection, the Bank will conduct technical and associated safeguards and procurement related reviews. Safeguards review will be driven by ESMF and procurement approvals by the procurement thresholds and associated procedures
Category of project	Type of project	Approvals required
		Monitoring by SPMU/DPMU
	C. Biodegradable waste treatment facilities at source with approved unit costs	Technical Sanction as per relevant G.O for SWM projects under plan schemes issued by LSGD (Refer Annexure A.3.10 in Volume 3 of the PIM).
	 D. Community level biodegradable waste management (Composting/Biomethanation) facilities for ULBs 	Technical sanction as per relevant G.O for SWM projects under plan schemes issued by LSGD (Refer Annexure A.3.10 under Volume 3 of the PIM).
	E. Mini MCFs, MCFs, MRF/RRFs (with or without mechanization) up to 5 Tons of waste Per Day (TPD) planned capacity	Technical Sanction as per relevant G.O for SWM projects under plan schemes issued by LSGD (Refer Annexure A.3.10 in Volume 3 of the PIM
Type 2 -M SPMU and addition, t basis for co	Ioderate category – these sub proje Technical Sanction provided by the Bank may conduct during its sup compliance with its guidelines. These s	ect investments will need to be appraised by ne Project Director as shown hereunder. In pervisory missions, a QA review on a sample sub-projects can be:
te risk category	a. Collection & Transportation vehicles/ equipment etc. for Municipal Corporations	 Approval at Corporation level with prior technical approval from SPMU. Technical Sanction by Project Director is not required for each sub-project. However, all such sub-projects should be included in the SWM Plan (refer 3.5 a) which should be approved by Project Director Monitoring by SPMU/DPMU
lera	b. Centralized treatment facilities	
Type 2 -Mod	i. Centralized biodegradable waste treatment facilities up to 30 TPD planned capacity	Technical Sanction by Project Director,
	i. MRF/RRF above 5 TPD up to 20 TPD planned capacity	Technical Sanction by Project Director,
Type 3 - H on a 100% These sub-	igh category - these sub project invention of a sample basis prior to commencem projects can be	estments will need to be reviewed by the Bank eent of procurement/project implementation.
Type 3 - High risk category	 a. Centralized treatment facilities above a certain threshold capacity such as: i. Centralized biodegradable waste treatment facilities above 30 TPD planned capacity i. MRF/RRF above 20 TPD 	Technical Sanction by Project Director subject to World Bank review and clearance.

Category of project	Type of project	Approvals required
	planned capacity b. All projects involving Dumpsite rehabilitation/ bio- mining/ closure of all types/ sizes	
	c. Sanitary Landfills of all sizesd. All regional interventions	

3.8. Scheme Cycle – Social Management Activities in SWM Plan, sub-projects and regional land-fills

A ULB level scheme Cycle for Preparation of SWMP; sub-project preparation, implementation and exit program for Social Management Actions is attached at annexure A 3.9 for reference and implementation. This matrix identifies the activities along with timelines and institutional responsibilities for implementing these actions.

Similarly, a separate matrix showing scheme cycle for social management actions for regional landfill projects is also included in annexure A 3.9 for reference and implementation. This matrix identifies the activities along with timelines and institutional responsibilities for implementing these actions.

3.9. Grievance Redressal Mechanism

All grievances relating to the Project and SWM services will be resolved within the legal framework of the State. The grievance redressal measures will be provided at (i) SM level which will be the Project level GRM (KSWMP-GRM) and (ii) state level which will use the existing Chief Minister's Grievance Redressal mechanism and its website.

3.9.1. Institutional Structure for Project Level GRM

For the Project level GRM, a Grievance Redressal Cell will be established within SM under the Chairmanship of the Principal Secretary – LSGD with the Project Director – SM being the convener. The Members of the Cell will comprise of the following:

- a) One representative each from Revenue Department, Town & Country Planning Department and Environment Department.
- b) A representative from LSGD
- c) A representative from State Planning Board and State Pollution Control Board
- d) A representative from Tribal Women and Child Welfare Department
- e) A representative from labour department
- f) Representative from ULBs
- g) Prominent SWM experts.
- h) A women representative from institutions such as HKS/HSS/Kudumbashree

The Grievance Redressal Cell will meet quarterly and will review the MIS relating to the complaints received, resolved and pending. No complaint can be kept pending for more than

30 calendar days from the date of its receipt. All complaints will be resolved by the officials of respective departments/ULBs to whom the complaint was forwarded. All pending complaints for more than 30 days will be taken by the Cell in its quarterly meeting and a resolution will be provided/ orders sent to respective departments/ULBs for resolution. If the aggrieved party is not satisfied with such resolutions, it can approach the courts in accordance with the judicial system of the Country.

GRM will capture (i) SWM Services (ii) Governance, Transparency and Accountability of ULBs (iii) GBV Response and (iv) Labour Compliances.

3.9.2. Process to lodge and resolve complaints

The project level GRM system will have dedicated online and offline options to file complaints, user centric categorization, alert generation, response, and escalation flow. Each complaint must have an option to use a toll free, online (including email and other social media platforms. For this purpose, specific pages and / or handles shall be created on social media platforms to facilitate ease of filing complaints and tagging of designated personnel. The necessary delegation to attend to specific complaints shall also be reflected in the social media pages (through appropriate tagging) so as to give comfort to the complainant. Complaints lodged through such online medium shall be treated on par with any other mode. Resolution of such complaints shall also be recorded on social media platforms), and written complaints to designated personnel. All complaints (received through any means) to be digitally recorded so that monthly record can be generated for analysis and review. The complaint process flow is illustrated below:



Figure 3-5: Complaint Process Flow

The Component 1 will support design and development of a GRM system at SM which will have the following features:

a. Easy and systematic method to register complaints and track their redressal; Contact information of Complainant important for sending alerts and tracking feedback (email mandatory for web-based complaint and a dedicated toll-free number to track complaintswhich will also ensure access to women and vulnerable)

- b. In addition, Interfaces to Web, Phone, IVR Interactive Voice Recognition systems,, and Walk-In with Paper-Form.
- c. Structured complaint forms to enable better problem analysis and assignment.
- d. For better transparency, status tracking, reporting and evaluation, assignment of a computer-generated ID which can be tracked until it is resolved.
- e. Prioritization of complaints and system enabled assignment/routing of complains to the concerned ULB, Department/ Agency and/ or concerned engineer/ health/ sanitary/ SWM staff.
- f. Date for response or assigning of complain to be inbuilt and not discretionary
- g. The system must have an inbuilt annually updated Calendar where only working days are counted
- h. A complaint should only be closed after confirmation from the Complainant.
- i. Complain categories to be practical, understandable and complainant/user centric
- j. GRM system to be widely advertised so people are aware of it.
- k. Dynamic MIS reports by: mode used to file the complaint, profile of the complainant, category, date, street, ward, department, city/ULB; up-to-date statistics on complaints accessible to all stakeholders including the public.
- l. Escalation of complaints not resolved to higher officials according to a predetermined hierarchy of officials.
- m. Updating the system with the resolved complains and time taken to resolve.
- n. Train the SPMU/DPMU/ULB staff in GRM handling.
- o. Put up "Public Information Boards" at key sub-project locations displaying the details of contact persons/agencies for lodging the grievance/complaint.
- p. Monthly Reporting by PMU on total complaints, resolved, pending. In addition, mode used to file the complaint (handwritten, toll free, online), profile of complainant (location and gender), number of days taken for resolution, complaint category wise break up of number of complaints received.
- q. In the first year of implementation, PMU will review the GRM system in terms of outreach, volume, response and resolution rate, complaint satisfaction rating etc. and take appropriate action based on such review to improve/enhance the system as needed.

3.9.3. Monitoring of GRM

The project level GRM will be monitored by the SPMU during the life of the project and thereafter by a designated official in SM. The PMU will monitor the monthly status of complaints received by ULB/Department/Ward/Category, complaints resolved and pending as at the end of the month. The reasons for pendency beyond a specified downtime will be enquired and monitored. For this purpose, each category of complaint will be given a predetermined downtime for resolution and the system will automatically send alerts to the concerned agency/official at the end of such period for resolution. The SPMU will generate a monthly report on outstanding complaints with their nature and reasons for pendency and submit the same to the Project Director – SM for information and action.

The MIS from the GRM with a detailed analysis thereof will be presented and discussed at the Grievance Redressal Cell at it quarterly meetings. The GR cell may provide such directions as it may deem necessary to concerned officials on pending complaints as well as other issues

relating to repetitive nature of complaints, the response times, the resolution mechanisms etc. which shall be implemented by the SPMU for proper redressal.

3.9.4. Complaint redressal downtimes

Generally, the maximum time allowed to resolve a complaint shall not exceed 30 days. The following table illustrates the timelines that will be implemented into the GRM system to monitor the resolution of complaints.

#	Category of	Type of Complaint	Time period for
	Complaint		redressal
1	Issues relating to	No door to door collection/ Delayed	Less than 24 hours
	SWM services	Garbage collection from homes/	
		establishments	
		Bad odour from home composting	Less than 24 hours
		units	
		Home composting units not working	1-2 days
		Roads not swept	1-2 days
		Bins Overflow/Bad smell from bins	1-2 days
		Public littering	1-2 days
		Non-cleaning of litter bins	1-2 days
		Garbage spillage from ULB vehicles	1-2 days
		Transport vehicles not in condition	2-4 days
		Dumping of garbage	1–2 days
		Complaints against HSS/ HKS/	2-4 days
		Kudumbashree collection workers	
2	Issues relating to	Selection of Dumpsites	Maximum 4 weeks
	Project	Selection of Land Parcels	Maximum 4 weeks
	Implementation	Issues on project implementation	Maximum 4 weeks
		works such as MCF/RRF/MRF etc.	
		Issues related to Land Acquisition	SM to discuss with PMC
		Issues related to Loss of Livelihood	and finalise the timelines
		Issues related to R&R entitlements	and processes.
		Issues related to disbursals/	
		payments	
		Issues related to environmental	
		pollution including leachate flowing,	
		air pollution due to construction	
		vehicles, and during operations,	
		water bodies getting polluted etc.	
		Issues arising during Construction	
		phase	
3	Issues relating to	Bids/Tenders not advertised in	Within 1 week from the
	Project	accordance with the Procurement	time the complaint is
	Procurement	Management System as outlined in	logged and prior to closure

Table 3-2: Grievance Redressal Timelines

#	Category of	Type of Complaint	Time period for
	Complaint		redressal
		Vol 2 of the PIM and/or in	of bids.
		accordance with GoK guidelines	
		Exclusion of potential vendors from	Within 1 week from the
		procurement process	time the complaint is
			logged and prior to closure
			of bids.
		Choice of procurement methods to	Within 1 week from the
		prefer certain brands/vendors/	time the complaint is
		contractors	logged in.
		Issues relating to bid documents	Within 1 week from the
		and submission of tenders and	time the complaint is
		exclusion of certain vendors	logged and prior to closure
			of bids
		Issues relating to bid evaluation and	Within 1 week from the
		award	time the complaint is
			logged and prior to signing
			of contract with successful
			contractors.
		Issues relating to	Maximum 4 weeks from
		corrupt/fraudulent/ collusive	the complaint logged in
		practices in procurement	
		Issues alleging fraud	Maximum 4 weeks from
	.		the complaint logged in
4	Issues relating to	Workhours exceeding the statutory	Within a week from the
	Labour		time compliant is logged in
		OI for additional worknours not	within a week from the
		paid	Within a weak from the
		Lack of recognition and growth	time compliant is logged in
		No equal wages for male and female	Within a wool from the
		workers for work of equal nature	time compliant is logged in
		navment inadequacies	time compliant is logged in
		Issues related to contractors	Within a week from the
		contract workers or other workers	time compliant is logged in
		Workers Accommodation including	Maximum of 3 weeks from
		ensuring appropriate sanitation.	the time the compliant is
		adequate lighting, ensuring privacy	logged in
		etc. not in accordance with the set	
		practices/guidelines of the GoK	
		Access to safe drinking water;	Maximum of 3 weeks from
		qualify of food provided in canteens	the time the compliant is
		etc.	logged in
		Non-availability of first aid	Maximum of 3 weeks from
		kits/treatment facility at	the time the compliant is

#	Category of	Type of Complaint	Time period for
	Complaint		redressal
		construction sites	logged in
		Caste and gender stereotype	Maximum of 3 weeks from
			the time the compliant is
			logged in
		Occupational health and safety	Maximum of 3 weeks from
			the time the compliant is
			logged in
		Discrimination and sexual	Maximum of 3 weeks from
		harassment	the time the compliant is
			logged in
		Child Labour	Maximum of 3 weeks from
			the time the compliant is
			logged in
		Complaints on GBV	Maximum of 3 weeks from
			the time the compliant is
			logged in

3.9.5. GRM at State Level

The project will use the existing Chief Minister's Public Grievance Redressal portal which is a 24 x 7 online platform where any citizen may submit a Grievance/Application by logging into the site for any SWM or project related grievances in any ULB/district area and/or the KSWMP. The complaints get registered and automatically routed to the concerned officials for redressal. The system maintains statistics and has a robust MIS including a high-level dashboard.

The SPMU will monitor the complaints lodged on this portal for project and SWM service delivery issues and will periodically report to the Project Director-SM for necessary information and action.

Chapter 4. Technical Assistance and Capacity Building

TA and Capacity Building activities under component 1 of the Project seek to build the capacities of the project implementing agencies at state, district and city level, augment their resources to institutionalize capacities for their competency development for sustainable delivery of SWM services, enhance the quality of the project planning, design and implementation for SWM projects and maximize the impact of the investments by SPMU and ULBs in regional and other various subprojects. The Project envisages hiring of a Project Management Consultant (PMC) to support project management functions at the SPMU and DPMU levels. In addition, 4 to 5 district TSC will be hired to support ULBs in implementation of component 1 and 2 of the Project activities. An Institutional Responsibility Matrix attached atA.3.2 in Volume 3, details the institutional responsibilities for TA & Capacity Building under component 1 of the Project. These are summarized below:

Recipient of	Activity	TA provider	Mode of TA
TA			provision
LSGD	Updating the state's policy and	PMC – State Level	Resource
	SWM operating guidelines		Development
LSGD	Drafting revisions to the KMA	PMC – State Level	Resource
	and Rules		Development
LSGD	Drafting Government Orders	PMC – State Level	Resource
	for model SWM organizational		Development
LSGD	Updating annual planning	PMC – State Level	Resource
	guidelines periodically to		Development
	facilitate multiyear		
	investments for SWM		
LSGD	Developing guidelines for	PMC – State Level	Resource
	public space cleaning and		Development
	sanitization in the context of		
	for compliance with safety		
	standards for labor-force		
	involved in waste management		
	activities in the aftermath of		
LCOD	COVID-19 crisis		D
LSGD	Developing guidelines and	PMC – State Level	Resource
	operating procedures for		Development
	women sanitation workers		
	including access to safety		
	equipment, information on		
	SWM practices and		
	technologies, and access to		

Table 4-1: Summary of TA Activities

Recipient of	Activity	TA provider	Mode of TA
ТА			provision
	finance		
SM/ SPMU	Institutional Development and	PMC – State Level	Resource
	Policy Implementation		Development
SM/ SPMU	General Project Management	PMC – State and	Consultations and
	and Procurement related	District Level	handholding on the
	activities		job
SM/ SPMU	Sub-project planning, design	PMC – State Level	Resource
	and implementation		Development
SM/ SPMU	Managing Grants and sub-	PMC – State and	Consultations and
	projects under Component 2	District Level	handholding on the
			JOD
SM/ SPMU	Budgeting, Financial	PMC – State Level	Consultations and
	Management and Reporting		nandholding on the
SM / SDMU	Project M&E including sub	DMC State and	JOD Concultations and
SWI/ SPWIU	project M&E	PMC - State allu	bandholding on the
	project M&L	District Level	ioh
ULB/ PIU	Project Planning and Screening	TSC	Consultations and
022/110			handholding on the
			job
ULB/ PIU	Implementation of sub-projects	TSC	Consultations and
-			handholding on the
			job
ULB/ PIU	Financial Management and	TSC	Consultations and
	Procurement, Annual Trigger		handholding on the
	Compliances		job
ULB/ PIU	Environmental and Social	TSC	Consultations and
	Safeguards		handholding on the
			job
ULB/ PIU	Project M&E and reporting	TSC	Consultations and
			handholding on the
			JOD

Table 4-2: Summary of training activities

		PMC	TSC	KILA	Sector Experts	Platform/	Mode of
					(Individuals/	Software	Training ¹⁰
					Institutions)	Developers	
Α	Preparatory Activities						
	Conducting						-
1	Training Needs	\checkmark		\checkmark			
	Assessment						

¹⁰The actual mix of class-room to online mode will be decided by the Providers in consultation with the Project Director.

		PMC	TSC	KILA	Sector Experts	Platform/	Mode of
					(Individuals/	Software	Training ¹⁰
					Institutions)	Developers	
2	Preparation of Training plan	✓					-
	Design and						-
3	Development of					✓	
0	digital learning						
	platform						
	Development of						-
4	Course Content	\checkmark		1	1		
т	(online/	•			•		
	classroom)						
D	Conducting						
D	training:						
	Project						Online/
	management,						Classroom
	and						
5	related	\checkmark	✓		\checkmark	\checkmark	
	trainings to						
	PMU/State						
	Level						
	Institutions						Online /
	management						Classroom
	and						Clussicolli
	implementation						
6	related		✓		✓	✓	
	trainings to						
	ULB and City						
	Institutions						
	SWM Sector						Online/
7	specific	\checkmark	✓		✓	✓	Classroom
	training to						
	PMU/ULBS						Onling/
	and social						Classroom
8	safeguards and	\checkmark			\checkmark	\checkmark	Glassicolli
	labour related						
	trainings						
	General					,	Online/
9	functional			✓		✓	Classroom
	trainings						
10	M&E training	\checkmark			✓	✓	Online/
	0						Classroom

4.1. Objectives of the TA and Capacity Building

Technical Assistance under the project seeks to achieve the following objectives.

- a) Strengthen and build technical and administrative capacity for solid waste management in the state.
- b) Enable the existing governance system to carry out policy, regulatory and institutional reviews and reforms to strengthen the systems and comply with the national and state SWM rules and regulations.
- c) Enhance SWM planning, and sub-projects planning, design and implementation capacities at SPMU, DPMU and ULBs.

4.2. Approach for delivering Technical Assistance

The objectives of technical assistance will be achieved through a two-fold approach, namely short-term interventions for policy, regulatory and project planning and long-term interventions for institutional development and building state-wide capacity for SWM services. The approach and methods for provisioning TA will broadly take the following approach:

Resource Development	Conducting Consultations and Handholding	Developing Training	Providing Training
 Developing Policies, Manuals, SOPs and Guidelines Developing long term strategic plans and short term annual operating plans Developing Standard Templates/Forma ts/Tools 	 Project Planning, Design, DPRs and Appraisals Contract Management and Implementation Procurement Management Project Financial Management M&E Impact Assessments 	 Design and develop eLearning platform Prepare course content/ curriculam Prepare trainign calendars and schedules Provide administrative support for training 	 Launch the digital learning and ensure all targeted participants take the training by appropriate monitoring and compliance mechanism Hold classroom sessions/ seminars/ workshops as planned Assess and Monitor the training effectivenss and take corrective actions

Figure 4-1: Focus areas for Technical Assistance at the state level

4.3. Technical assistance and project management support at state level

At the state level, TA will be provided for undertaking necessary policy, regulatory and institutional reforms for strengthening the overall sector governance; developing guidelines and systems for COVID-19 related waste management, sanitization and public hygiene related practices to be rolled out in ULBs and project planning, design and implementation, and M&E

of SWM projects. Technical Assistance at state level will be provided to LSGD and SM. For each of the institutions, the TA will focus on the following aspects. The support provided to the institutions will be on respective lines.

State Level	Areas of Technical Assistance					
Institution/ Agency						
LSGD	Policy, regulatory and institutional reforms comprising of the					
	following:					
	a) Updating the state's policy and SWM operating guidelines					
	b) Drafting revisions to the KMA and Rules,					
	c) Drafting Government Orders for model SWM organizational					
	structures at ULB level;					
	d) Updating annual planning guidelines periodically to					
	facilitate multiyear investments for SWM;					
	e) Developing guidelines for public space cleaning and					
	sanitization in the context of COVID-19, as well as guidelines					
	for compliance with safety standards for labor-force					
	involved in waste management activities in the aftermath of					
	COVID-19 crisis; and					
	f) developing guidelines and operating procedures for women					
	sanitation workers including access to safety equipment,					
	information on SWM practices and technologies, and access					
	to finance					
Suchitwa Mission	a) Organisational strengthening & Competency Development					
	b) Institutional Systems and Policy Implementation					
	c) Sub-project planning, design and implementation					
	d) Financial Management and Reporting					
	e) Project M&E including sub-project M&E					

4.3.1. Technical Assistance to LSGD

The PMC will provide technical assistance to LSGD in the following activities leading to updated policies and rules and regulations and operating guidelines in line with the state government's SWM strategy-2020. The PMC teams, working with SPMU/SM, will carry out the following tasks, amongst others:

A. Policy and regulatory reforms in response to sector needs and National Rules

- i. Review the existing sectoral policies/regulations in the state vis-à-vis the SWM rules 2016 and the operational requirements envisioned in the Municipal Solid Waste Management Manual issued by the Central Public Health and Environmental Engineering Organisation(CPHEEO) document the gaps in policy/regulations and assess the need for update/revision of the existing policies and regulations.
- ii. Hold inter departmental and inter ULB consultations for operational level inputs, suggestions and recommendations for revision; hold initial discussions with LSGD for necessary inputs.

- iii. Draft the revised policies, rules and regulations and circulate to relevant stakeholders for views and suggestions.
- iv. Revise the policies, rules and regulations based on the comments received and submit to SM and LSGD for their review.
- v. Conduct consultations with SM and LSGD to finalise the revised policies and regulations
- vi. Assist the LSGD in issuance of revised policies and regulations

B. <u>Developing/revising operating guidelines in line with revised SWM policies and</u> regulations

- i. Review of existing guidelines issued to understand the extent of revisions required in the existing guidelines as well to assess the need for additional guidelines
- ii. Assess requirement update/development of new guidelines (for e.g. COVID-19 related guidelines) in line with the state policies and procedures
- iii. Interact with the stakeholders such as ULBs and various government departments to identify their expectations of various guidelines.
- iv. Draft and circulate new/update the existing guidelines in line with new SWM strategy and policies of the state.
- v. Hold consultative workshops/FGDs for discussion and finalization of the guidelines; revise the drafts and circulate to SM and LSGD for their review and comment.
- vi. Consult with SM and LSGD and finalise the guidelines.
- vii. Assist LSGD and SM in issuance of the operating guidelines.

In updating/revising the operating guidelines, the PMC along with SPMU, will ensure that the required emphasis is laid on the following:

- i. Strengthening the inter-institutional coordination mechanisms between LSGD, KSPCB and Environment Department and the functioning of the state level monitoring committee on SWM (constituted by the National Green Tribunal)
- ii. Strengthening the district level monitoring systems including the functioning of district level monitoring committee
- iii. Developing and operationalizing comprehensive SWM data collection and information management systems to strengthen reliable data collection and analysis for service performance and compliance monitoring,

C. <u>Drafting revisions to KMA and Rules and drafting Government Orders for model</u> <u>SWM organizational structures at ULB level</u>

The KMA 1994 (hereinafter referred to as KMA) was enacted in response to the 74th Constitutional Amendment Act that vested several local governance functions on Municipalities/Municipal Corporations and in particular the functions detailed in 12th Schedule under Article 243-W of the Constitution of India. Since then, a few amendments

were made to the Act to incorporate necessary changes in local governance as contemplated by the GoI and GoK. This Act along with its rules and guidelines need to be reviewed and amended in order to bring in the consistency with the SWM rules 2016 of GoI and the new SWM strategy of the GoK to ensure necessary legal and regulatory mandates are provided to various institutions both at the state level and the ULBs, the primary drivers of the SWM strategy at local level.

In addition, the technical assessment done during the Project appraisal stage, at the ULB level revealed significant organizational weaknesses and gaps, particularly in SWM related functions and general project management functions which need to be corrected for a smooth implementation of the KSWMP.

The PMC with assistance from external consultants (as may be needed and approved by SM) will carry out the following tasks to support in amending the KMA to bring it in line with the new SWM strategy and regulations:

- i. Review the KMA and its rules and regulations and the legal mandates provided to each institution with respect to SWM related functions, identify gaps for amendments to bring it line with the new SWM strategy, policy and rules of GoK and the SWM rules 2016 of the GoI.
- ii. Hold consultations with SM, LSGD and ULBs to establish the need to address the gaps through formal amendments to the KMA and its rules and regulations.
- iii. Draft and circulate the amendments required with detailed explanations to LSGD, SM and ULBs and seek their views and recommendations.
- iv. Hold consultative workshops/FGDs for discussion and finalization of the amendments to KMA and its rules.
- v. Finalise the amendments to the KMA and its rules and submit to LSGD and Law Department to carry out necessary legislative process to amend the KMA.
- vi. Assist LSGD in its coordination with Law Department to amend the KMA and gazetting the amended KMA.
- vii. Prepare necessary guidelines to implementing agencies such as ULBs and others to ensure their respective operating guidelines are suitably amended to be in line with the amended KMA and its rules.

The PMC will also carry out the following tasks and provide technical support to the SPMU and ULBs in the following:

- i. Assess the as is ULB organizational structures to check if they are in consonance with the expectations from the amended KMA and its rules and regulations to make ULBs fully responsible and accountable for SWM related activities.
- ii. Identify gaps in organizational structures, particularly with respect to the skill sets, expertise institutional competence and delegation of powers to provide SWM service delivery at city level.
- iii. Confer with ULBs and other stakeholders in preparing a model SWM organizational structure for ULBs including amending the existing norms on

staffing to permit additional recruitment of SWM staff in ULBs and hold discussions with SM and LSGD for its approval.

 iv. Draft the final model SWM organizational structure with recommended staffing, roles and responsibilities and assist LSGD in issuing it to ULBs for implementation. Update annual planning guidelines periodically to facilitate multiyear investments for SWM.

D. <u>Update annual planning guidelines periodically to facilitate multiyear investments</u> for SWM

The annual planning of ULBs for developmental projects and other activities follows a planning cycle that typically begins in December and ends with March, to enable ULBs implementation of the planned projects and activities in the following year. The process begins with LSGD issuing the Planning Guidelines with details on "dos and don'ts" and the approval process of the plans. However, in the current scheme of planning, the projects/activities are restricted to single year plans and expect in cases supported by specific schemes of the GoI and/or GoK, multi-year projects are not generally included in the ULB plans (though the same is not prohibited, the general lack of adoption of multiyear projects is due to the same not being prescriptive under the current planning framework).

The KSWMP requires preparation of SWM Plans by all participating ULBs which could contain multi-year as well as single year project proposals and these plans provide the necessary inputs to SWM annual plans of the ULBs. The PMC will provide necessary technical support to LSGD in revising the annual planning guidelines for inclusion of multi-year SWM plans and their approvals. The PMC will perform the following tasks:

- i. Review the current planning guidelines and the planning processes of the state and ULBs and in particular the SWM related plans and their implementation including devolution of powers for approval of plans and projects.
- ii. Consult with LSGD and Kerala State Planning Board to revise periodically the guidelines to prescribe and explicitly advocate inclusion of multi-year SWM projects in the annual plans of the ULBs; the guidelines to details the content as well as the timelines for finalizing the multi-year projects and their approval process.
- iii. Circulate the updated guidelines to LSGD and Kerala State Planning Board for their concurrence and issuance.

E. <u>Develop guidelines for public space cleaning and sanitization in the context of</u> <u>COVID-19, as well as guidelines for compliance with safety standards for labor-</u> <u>force involved in waste management activities in the aftermath of COVID-19 crisis</u>

Occupational health and safety of workers is a key requirement of the International Labor Standards (ILS) as propounded by the ILO and these standards become particularly relevant in outbreaks such as COVID 19. Health and safety risks of unorganized labor engaged in SWM and potential noncompliance with labour laws are key risks for the project. The implementing and executing agencies of the KSWMP project and their supporting organizations that employ labour in waste management activities have a responsibility to ensure that all practicable preventive and protective measures are taken to minimize occupational risks and COVID 19 related injuries are minimized. The guidelines issued by CPCB address, amongst others, the safety of waste handlers and sanitation workers. Similarly, the World Health Organization has been providing guidance on cleaning and disinfection of environmental surfaces in the context of COVID 19.

The PMC in consultation with SPMU will perform the following tasks in developing guidelines for surface and spatial sanitization as well as guidelines for compliance with safety standards:

- i. Review the Biomedical Waste Management Rules 2016 as amended from time to time, and the corresponding rules of the state government, the CPCB and KSPCB rules and guidelines issued for handling the COVID related waste in the context of state requirement needs and policies; review guidelines issued by international institutions such as WHO, ILO etc.; and various guidance by the WB (refer ESMF) in the context.
- ii. Implement and monitor labour laws, current arrangements between ULBs and HKS/HSS/Kudumbashree workers engaged in SWM activities throughout the value chain and their alignment with national laws and regulations (as available) for SWM activities.
- iii. Hold consultations with SPMU, SM, LSGD, Department of Labour, Department of Health and other agencies such as HKS/HSS etc. and perform a contextual analysis and a gap assessment.
- iv. Draft new/update the existing guidelines and operating procedures (if any) and submit for review by SM and LSGD and other stakeholders. Hold consultative discussions/workshops on the draft guidelines and the proposals to communicate the same to ULBs, agencies and in general the citizens.
- v. Finalize the guidelines and assist LSGD in issuing the same through appropriate Government Orders or other instruments.

F. <u>Develop guidelines and operating procedures for women sanitation workers</u> <u>including access to safety equipment, information on SWM practices and</u> <u>technologies, and access to finance</u>

Unorganised workers form a significant portion of the formal and informal labour force in primary waste collection system in the state. To strengthen the gender equality and women upliftment, the government enacted the Gender Equality and Women's Empowerment (GEWE) policy in 2015. This policy advocates for Gender Action Plans and ensuring gender outputs and indicators in all projects. Accordingly, the PMC with support from Department of Social Justice, LSGD and SM will perform the following tasks:

- i. Review the existing guidelines and operating procedures applicable for unorganized workforce for sanitation to assess if they are in in line with the SC/ST Act, GEWE policy recommendations and other national and state regulations including the regulations on labour.
- ii. Hold consultations with relevant stakeholders including Labour, Health and Social Justice departments to develop appropriate guidelines and operating procedures

for unorganized sanitation workers and integrate the same in the over SWM process flows and guidelines.

- iii. Draft guidelines and operating procedures for unorganized sanitation workers and integrate the same in the over SWM value chain process flows and guidelines.
- iv. Hold consultative workshops and finalise guidelines and operating procedures.
- v. Assist LSGD in issuing necessary Government Orders to effectuate the guidelines and operating procedures.

4.3.2. Technical Assistance to SM & SPMU

The institutional assessment carried for the project appraisal indicated considerable scope for institutional strengthening of SM and it competency development to assume the role of the Lead Agency for SWM activities. Accordingly, the technical assistance for SM is aimed at a) strengthening its organizational capacity and institutional systems to assume its role as lead agency in SWM; (b) monitoring and supervising all activities at the ULB level relating to planning and designing, implementation of sub-projects, FM and procurement compliance, environment and social safeguards, and M&E and reporting; and (c) supporting design, implementation and management of regional SWM facilities, and coordinating all the participating ULBs and peri-urban LGs in the use of these facilities.

The state PMC's teams (assisted by external consultants where required) will work with SPMU in carrying out the day to day tasks as identified in the following table and will also facilitate formal training sessions periodically on the related subjects. This will be complemented by eLearning digital platform-based tutoring/coaching which will ensure a gradual capacity build up at SM and SPMU.

Activity			Activity P	hasing
doscription	Ta	isks to deliver the TA activity	0-2	2-6
uescription			years	years
1. Organizational	a.	Conduct a rapid institutional assessment for	\checkmark	
strengthening		undertaking SWM regulation and KSWMP		
and		implementation and supervision.		
competency	b.	Develop a plan and a roadmap for setting up	✓	
development		a SPMU and DPMUs and their organizational		
	strengthening including staffing needs with			
	skill sets and expertise required to position			
		SM for its designated role		
	C.	In consultation with PD, redesign the SM	✓	
		organization structure and provide support		
		to recruit the required staff		
	d.	Provide handholding and on the job training	✓	✓
to the staff in KSWMP project management				
and implementation – this would cover (i)				
		the upstream activities – land/identification/		
		planning/ screening activities; (ii) technical		

Table 4-4: Technical Assistance to SM and SPMU

Activity		Activity Phasing		
description	Tasks to deliver the TA activity	0-2	2-6	
description		years	years	
	design and preparation activities - field			
	investigations/ surveys/ consultations to be			
	conducted, detailed technical studies/			
	feasibility assessment/ engineering design			
	preparation, environment and social impact			
	assessment/other relevant safeguards			
	instruments (ESMP, RAP etc.); and (iii)			
	implementation activities - procurement,			
	implementation supervision (including			
	safeguards management), contract			
	management and reporting.			
2. Institutional	a. Prepare model by laws to comply with and	v		
policy	h Prepare model municipal council resolutions.	✓		
implementatio	and assist SM to issue the same to III.Bs	•		
n	c. Prepare model performance-based C&T	\checkmark		
	contracts and finalize the same in			
	consultation with relevant stakeholders			
	d. Draft Public Private Partnerships (PPP)	✓		
	guidelines/model concession agreements and			
	finalize the same in consultation with			
	relevant stakeholders			
	e. Prepare model user charge frameworks and	\checkmark		
	assist SM to finalise the same in consultation			
	with LSGD, ULBs and other stakeholders.			
	f. Prepare operational guidelines for the entire	\checkmark		
	SWM value chain activities and assist SM in			
	their implementation			
3. Sub project	a. Handhold and assist SPMU in sub-project	\checkmark	\checkmark	
Planning and	planning and implementation activities for all			
Implementati	regional projects under component 3.			
on				
3-a Identification	Identification of clusters	~	✓	
	Willingness of participating ULBs			
	Identification of land	1		
3-b Planning	Surveys and Consultations	~	~	
	Capacity determination			
	Logistics feasibility/arrangements			
	Inter LB arrangements			
2	Feasibility of identified land			
3-C Design	Technical design preparation	✓	↓	
	Review of design			
	 Compliance to various standards 			

Activity		Activity Phasing		
description	Tasks to deliver the TA activity	0-2	2-6	
description		years	years	
	Preparation of DPR			
	• ESIA			
3-d Procurement	• Preparation of project procurement plan	\checkmark	√	
	• Preparation of tender documents and			
	contract agreement			
	Selection of concession models			
3-е	• Supervision of design implementation	✓	✓	
Implementation	Coordination with contractors			
	• Safeguards monitoring and Annual E&S			
	audit			
	 Monitoring of progress 			
	 Monitoring of fund utilisation 			
4. Procurement	a. Standardization of procurement processes	✓	✓	
and Contract	for the sub-projects under components 2 & 3			
Administratio	b. Approving all bid/contract documents for			
n	ULBs for sub-projects under component 2			
	c. Preparation of all procurement related			
	documentation [likeExpression of Interest			
	(EOIs). Request for Proposal (RFP). RFOs.			
	Request for Bids (RFB), and contract			
	documents]			
	d. Conducting Bid Evaluation, vendor selection,			
	contract finalization etc.			
	e. Contract administration.			
5. Budgeting and	a. Prepare operational frameworks/	✓		
Financial	operational procedures and guidelines for			
Management	budgeting and financial management systems			
	b. Prepare model Accounting and Finance	\checkmark		
	Management Manual and assist SM-SPMU in			
	its implementation			
	c. Assist SM-SPMU in preparation of IFRs and	\checkmark		
	Project Financial Statements and the audit			
	thereof			
6. Project M&E	a. Assist in development of SWM MIS systems	✓		
	including the ICT tools and deployment			
	thereof across the implementing agencies –			
	SPMU, DPMU and ULBs			
	b. SWM service delivery performance tracking	✓	✓	
	through DPMUs and ULBs using the MIS and			
	ICT tools			
	c. Assist SPMU/SM in AT compliance checks	\checkmark	✓	
	and grievance redressal relating AT			
	d. Compliances to Health Safety and	\checkmark	✓	

Activity		Activity Phasing		
description	Tasks to deliver the TA activity		2-6	
ueseription		years	years	
	Environment (HSE) practices			
	e. Monitoring and supervision of all ULB level		\checkmark	
	activities			

4.3.3. Technical Assistance to ULBs

Technical Assistance to ULB will be provided by the TSCs hired by the SPMU. The TSCs will provide end-to-end specialized technical support to the ULBs in annual fiscal planning, budgeting and reporting, and sub-project specific planning, design and implementation activities including preparation of all technical documents including climate and disaster resilience, environment and social impact assessment, procurement, contract management and implementation supervision. The TSCs team of experts will handhold the ULBs-PIU staff and carry out the day to day activities relating to component 2 of the project and in association with the PMC experts and external specialists will provide formal training sessions. This will be complemented by eLearning digital platform based online training/coaching and certification from SM which will ensure a gradual increase in the capacity of the ULBs. The TA will be provided in activities that TSC will support ULBs namely (i) Planning and Screening (ii) Implementation of sub-projects (iii) FM and procurement compliance (iv) Environment and social safeguards and (v) M&E and Reporting.

 Table 4-5: Technical Assistance to ULBs

				y	
S. Activity		Tacks to deliver the TA		Phasing	
No.	Description		0-2	2-6	
				years	
(i)	Planning and	• Preparing SWM Plan (solid waste management	✓		
	Screening	plan)			
		• Developing annual SWM plans (incl. plan level			
		safeguards documents)			
		• Identification of sub-projects and assessment			
		of Technical Readiness			
		Prioritisation of activities			
(ii)	Implementation	• Preparing of Feasibility Reports, DPRs and	✓	~	
	of sub-projects	ESIA			
		• Assisting on procurement for identified capital			
		works and contract management			
		On boarding of works contractor			
		Supervision of implementation activities			
		including safeguards			
(iii)	FM and	Overall Planning and Budgeting	~	~	
	Procurement	Fund Flow Management			
	Compliance	Accounting and Reporting Activities			
		Internal and External Audit			

				y
S.	Activity	Tasks to doliver the TA	Phasin	ıg
No. Description		Tasks to deriver the TA	0-2	2-6
			years	years
(iv)	Environmental	 Internal Controls Preparation of utilization certificates Preparation of work's requirements, BOQs, review of bid document Assisting on implementation of risk mitigation measures Providing inputs for Bank's prior and post reviews Screening of sub-projects for Environment and 	~	~
	and Social Safeguards	 Screening of sub-projects for Environment and Social Safeguard compliance Integrate the findings of the E&S screening exercise in the project design Preparing safeguard instruments based on category of investment - Undertaking Environment and social impact assessment Including approved ESMP in bid documents On site review for compliance with the ESMF, ESMP/RAP etc. & corrective actions if required Providing safeguard inputs/onsite compliance of safeguards into the MIS Providing required update/data/information/monthly reports to the PMU on ESMF implementation 		
(v)	M&E and Reporting	 Waste Generation Surveys Waste flow tracking Updating State MIS with ULB data GRM Citizen feedback 	~	~

4.4. Training and Capacity Building

The objectives of training and capacity building activities under the project are:

a) At SM and SPMU and DPMU levels, to build the SWM capacities in a structured manner for an effective project management and implementation and SWM service delivery functions through formal trainings and handholding support, with audience including core staff of SM, SPMU and DPMU, policy makers from government departments, support organizations and missions.

- b) At City Level, to build the capacities of allULBs¹¹, for implementing sub projects under component 2 and for improving SWM systems along with institutional/organizational and financial systems in all ULBs.
- c) At an Intermediary level (HKS, HSS, Kudumbashree, etc.), all key stakeholders for improved SWM practices which will include formal trainings for strengthening the local level systems and practices for managing medical waste (COVID-19 related), robust protocols for ensuring continuity of waste management services and use of protective gears/equipment by sanitation workers to minimize health risks
- d) At all levels for use of a robust MIS system and ICT tools for effective monitoring and evaluation of the project and SWM service delivery.

4.4.1. Capacity Building Needs

The following Table 4-6 presents the role and learning requirements of the key stakeholders in the KSWMP project for which a suitable strategy and a delivery model will be designed.

#	Institution/Agency/Department	Expected/Envisioned	Broad Learning
		Role	Requirements
1	State Departments such as LSGD, Dept of Health, Dept of Environment, Dept of Social Justice, Town Planning Department etc.	 Policy and Regulatory oversight. Conflict Resolution 	Implications of the sector policy; sector technologies; inter institutional problems; institutional roles of downstream agencies and devolution of powers; allotment of land for SWM purposes
2	Suchitwa Mission/SPMU	 Nodal agency for SWM in Kerala Project Implementation and Monitoring for KSWMP Conflict Resolution Planning and Project management and implementation of KSWMP (Components 1 & 3) Advocacy 	 Developing regulations and overseeing implementation. Project management and monitoring; Sector technologies; procurement, finance and asset O&M Inter ULB and Inter departmental coordination Development of SWM plan along with mainstreaming of E &S needs in plans and projects. Project management

Table 4-6: Roles and learning requirements of the key stakeholders in the KSWMP project

¹¹ As per Suchitwa Mission, all the ULBs in the state have already signed/or is in the process of signing the participatory agreement for the project.

#	Institution/Agency/Department	Expected/Envisioned	Broad Learning
		Role	Requirements
3	ULBs	• Planning and	and implementation including sector technologies; operations, procurement, finance and asset 0&M • Development of
		 Plaining and Project management and implementation and close out of KSWMP Management of the entire SWM Value Chain Activities Advocacy 	 Development of integrated SWM plan along with mainstreaming of E&S needs in plans and projects. Project management and implementation including sector technologies; operations, procurement, finance and asset O&M Employment of contractors and management of SWM facilities and activities SWM monitoring including using ICT tools Facilitation skills Technical trainings on engineering and technological solutions for SWM Cross learning of best practices adopted in other performing ULBs through exposure visits
4	HKS/HSS/Kudumbashree	 Collectors and secondary segregators of SW Implementers of the C&T Policy as per SWM rules of the state government 	 Sector technologies, Safe practices and facilitation skills User fee fixation and implementation

#	Institution/Agency/Department	Expected/Envisioned	Broad Learning
		Role	Requirements
5	KILA	Content development	KWSMP project content
		and delivery of	and general project
		training	management and
			implementation for
			content development and
			training.

4.4.2. Capacity Development Strategy

Based on the broadly identified learning requirements to plug the capacity weaknesses in the existing institutions for SWM delivery, the strategy for provision of training and skill development will be as follows:

- a) **Need Assessments to drive the training**: A Training Need Assessment (TNA) at the beginning and at the end of the 3rd year of the Project to develop training plans and calendars; the TNA will be complemented by evaluations at the end of each course/training which will facilitate midcourse corrections as may be needed.
- b) **Training for all ULBs**: training assessment and the plan to seek training for all ULBs in SWM related subjects and general functional training.
- c) **Focus on digital learning:** training to be designed and delivered using digital platforms to be developed and operationalised under the Project and this will include a combination of online learning, blended learning; personalised training/learning, and can include elements such as tutoring, instruction and assessments and certification based on standardised parameters. The entire course content/s will be digitised for libraries maintained to ensure a continuous learning for the stakeholders.
- d) **Standardisation of training modules**: the course contents divided into homogenous modules covering the KSWMP project implementation as well as generic capacity training will be standardised by the content consultants and training deliverers.
- e) **SM/SPMU with PMC to drive the training efforts:** SM/SPMU with assistance from PMC training consultants will drive the whole training efforts under the project with external consultants for digital training and course development recruited by following the procurement guidelines of the project.

4.4.3. Capacity Building Delivery – Role of Institutions

The role of various institutions in strategizing and delivering the training will be as follows:

a) **Suchitwa Mission / SPMU -** SM as the Implementing Agency, will monitor and exercise oversight for the delivery of all training activities envisioned in the Project and will report to the Bank as per the covenants of the Project Agreement between GoK and the Bank. In that role, all course content, delivery methodology, selection of digital platform and presenters/training service providers will be approved by the Project Director. SPMU as the Project Management Unit, with necessary support from PMC and specialist training agencies/provider institutions, will be specifically responsible for the following:

- Conducting training needs assessment; the TNA report to be reviewed and approved by the Project Director.
- Develop annual training plans and schedules
- In association with KILA identify the most appropriate eLearning authoring tool/s and learning management systems with multimedia links (preferably cloud based) that offer the features and functions required to deliver the courses online via computers and IoT devises and video conferencing.
- Hiring technical consultants for developing digital platform/solutions for eLearning and specialist consultants for training course/content development conduct a competitive process for the selection of digital e- course platform developer. In the process, SPMU with PMC, shall also evaluate the existing E-course platform of KILA (and other such platforms that KILA might put in place prior to the engagement of the e-course platform developer) in comparison to the options available in the market and select the most optimal option.
- In association with PMC develop specifications and SRS for digital platform development; coordinate with the external consultant for digital platform in developing an online training platform; the platform amongst others, to have the following specs:
 - i. Accessible from laptops as well as mobile phones
 - ii. Display of personalized list of mandatory and optional courses
 - iii. Video based interactive lessons and testing for certification
 - iv. Enable monitoring and evaluation of training activities at different levels (including generation of training reports). For Example, a ULB secretary to be able to review the training progress of the ULB level staff. Similarly, SM to be able to monitor the training statuses of various local bodies and state/ district level institutions
 - v. Enable training reminders in the form of mails and messages
- In association with KILA and other external consultants, identify topics/modules for training (which will include Project specific technical training and sub project implementation topics, general functional training such as procurement and FM systems, topics on ESMF and general SWM related topics), design and develop training course content specific to digital platform and to class room training.
- Roll out the training programs (eLearning and classroom where required) and ensure the trainings are conducted as per the training plans/schedules
- Monitor the training including assessing its effectiveness and making course corrections as needed.
- b) **KILA:** KILA as an autonomous institution for local governments in Kerala has been providing myriad of capacity building interventions. The role of KILA for training in this Project (at the request of SM/SPMU) will be:
 - Assisting SPMU in conducting training needs assessment and identification of skill and knowledge gaps to be filled through training.
 - Assist SM and SPMU in researching for appropriate digital platform for providing training in specialized SWM related courses and general ULB courses, under KSWMP.

- Assist SM and SPMU in planning, designing and conducting general ULB training programs as well as training programs for HKS/HSS and Kudumbashree beneficiaries in upstream activities of SWM.
- Assist SPMU in training monitoring (for trainings conducted by KILA) including evaluations at the end of each batch for evaluating the effectiveness of training (the evaluations to be shared with SM for updatein the digital e-course platform)
- Provide training to a group of trainers as identified by SM/SPMU [for training of trainers (ToT)]
- c) **Developer/s for eLearning Platform:** in association with SPMU and PMC, design and develop eLearning tools and platforms along with a learning management system; prepare curriculum/course content and host the same on the digital platform; monitor the progress and delivery of the online courses and ensure certifications issued comply with underlying standard protocols. This platform will not only be suitable for providing interactive training and certification but also for monitoring and reporting on the training activities.
- d) **Training Consultants**: specialized agencies/institutions, sectoral experts, recruited by SPMU for design and development of training materials/courses/modules for both digital platform-based training and classroom training. etc. shall develop training content and be responsible for delivery of trainings. While KILA will involve only in the development of training content and delivery of trainings related to general functional aspects, specialized agencies, experts and institutions shall be responsible for content development and training delivery in the Project and SWM related topics.

4.4.4. Planning and Delivery of Training

Figure 4-3 attached at the end of this Chapter illustrates the process of planning and delivery of training. It includes the following steps (i) conducting training needs assessment and identification of skill and knowledge gaps to be filled in (ii) developing annual training plans and schedules (iii) developing training materials/course content and (iv) actual delivery of training. The following table summarizes the proposed planning and delivery plan and the sections underneath it details the steps:

#	Area of	training	Preferred mode delivery	of	Course content developers	Approver of course content	Course completion status update
1.	Project	Management	Classroom		Specialized	SM/World	To be updated
	and	Project	training		Institutions/	Bank	on Digital
	Impleme	entation			Sectoral		Learning
					Experts		Platforms (DLP)
							by SPMU based
							on attendance

Table 4-7: Delivery plan for trainings

2.	Environmental	Online	Specialised	SM/World	Automatic
	Safeguards	trainings	Institutions/	Bank ¹²	update in DLP
	preparation and		Sectoral		
	implementation	Classroom	Experts		To be updated
	Monitoring related	trainings			on DLP by
	trainings				SPMU based on
					attendance
3.	Sector related	Online	Specialised	SM	Automatic
	subjects (SWM)	trainings	institutions/		update in DLP
			Select sector		
			experts		
		Exposure	SWM	SM	To be updated
		visits	engineer at		on DLP by SM
			the SWM		based on
			plant		attendance
4.	General functional	Online	KILA	SM	Automatic
	subjects	trainings			update in DLP
		Classroom		SM	To be updated
		trainings			on DLP by SM
					based on
					attendance.

4.4.4.1. Conducting Training needs assessment

The capacities and skills levels at ULB varies depending on its size, scale of operations, availability of skilled staff for various ULB functions etc. While it is an established fact that the SWM capacities at any ULB are not robust enough for an integrated SWM service delivery, the existing skills gaps and training requirements to plug those gaps need to be assessed through a Training need assessment (TNA). The TNA will be conducted twice during the project life cycle – one within 6 months of the project effectiveness date and the other at the end of 3rd year of the project. The TNA shall cover all ULBs and C&T providers attached to those ULBs and shall be conducted by SPMU in conjunction with PMC/KILA. Based on such TNA, SPMU will initiate further training and capacity building activities to respond to the gaps and training requirements. The objective of performing training need assessment is to:

- Identify existing capacities, skill sets, expertise available and do a gap analysis to prepare training modules.
- Determine who needs to be trained with what
- Ensure correct competencies are targeted and correct method is used

Training needs assessment involves collection and analysis of data relating to the skills and capacities of the existing staff vis a vis their desired job role in an organization to identify gaps and training requirements to enable the staff to perform better. TNA will lead to development of appropriate training programs and delivery channels. An illustrative method of conducting TNA is given below:

¹² The course content may be additionally reviewed by KSPCB/Environment Department/Forest Department appropriately.



Figure 4-2: Illustrative methodology for training needs assessment

Detailed steps under each of the aforementioned steps are described below:

1	Identification of	1.	Determine desired organizational context (policy,
	problems/gaps		goal & responsibilities)
		2.	Perform gap analysis in line with the current
			performance and ability to achieve goals and
			objectives
		3.	Review of original job descriptions
2	Determine design of	1.	Finalise target groups (after preparatory step)
	needs analysis	2.	Finalise the TNA task force
		3.	Finalise survey questionnaires
		4.	Introduction of required online systems for fast and
			efficient survey
		5.	Preparation of survey plan ¹³
		6.	Provide survey training to task force
3	Collect Data	1.	Review of secondary data/information
		2.	Conduct Survey/interviews/observations
		3.	Get data on current training curriculum/course
			material
4	Analyse Data	1.	Tabulate and analyse survey data
		2.	Perform SWOT analysis for selected ULBs
		3.	Functional Competency analysis
		4.	Determine competency gap
5	Firm up training areas	1.	Determine core training needs for various categories
			of staff
		2.	Prioritise the training needs based on the urgency of
			training and importance of topics

¹³ Survey plan includes background, objectives, schedule, survey team and methodology

6	Training Scheduling	1.	Phasing of training – identification of training
			required in first year and trainings that can wait
		2.	Detailed training outline for state level and ULB level
7	Trainer Allocation	1.	Empanelment of training experts/specialized
			institutions etc. to impart training under relevant
			subjects
		2.	Form tie up with specialized institutions
		3.	Allocate trainers to training plan
		4.	Launch digital platforms for training

The outputs from TNA will be:

- Gap Assessment Report
- Training plan and Course Content Design
- Delivery as per the methods identified.

4.4.4.2. Preparing Training Plan Outline

In line with the training needs assessment carried out by the SPMU, detailed training plan will be prepared for imparting training to both the state level agencies, project proponents such as DPMU, PIU etc. and ULBs.

The workflow towards preparation of training plan outline will be as indicated below:

- 1. As per the training needs assessments, define the learning objectives determined so as to bring about institutional empowerment under the project
- 2. Categorise learning areas and organize subtopic under each category in tune with the training needs assessment
- 3. Prioritise trainings as immediate trainings and other trainings
- 4. Determine the frequency, targeted participants, trainers and mode of training (online, classroom etc.)
- 5. Organise course material for training booklets, presentations, etc.

a) State level training plan outline

While the TNA will provide insights into actual training requirements for program/course design and preparation of a long term and annual training plans, the tables below provide indicative training programs. These may change based on the actual needs as identified by TNA.

The trainings are broadly classified as:

- i. Capacity Building on KSWMP
 - a. Project Management and Project Implementation related trainings
 - b. Environmental and social safeguards related trainings
- ii. SWM Sector related training
- iii. General functional training

i. Capacity Building on KSWMP

a. Project management and project implementation related trainings

Table 4-8: Project management and project implementation related trainings

Sl.	Training Programs	Contents	Preferred	Phasing of training	Targeted
No.	or Modules		Mode of		Participants
			training		
1	State level	• About SWM in Kerala; existing and proposed	Workshops/	Year 0-1	LSGD, SM, SPMU,
	orientation	system; and involvement of the State, ULBs,	online		DPMU and ULB staff
	programme on	and The World Bank (including Financing			and other supporting
	KSWMP	Instrument)			agencies
		Technical and Financial Aspects			
		Project Implementation and Set up			
2	Project Management	Project Life Cycle	Blended	Year 0-1	SM, SPMU, DPMU and
		• Building the team – procurement of external	training		ULB staff
		consultants, service providers			
		Project planning – Work Breakdown			
		Structure (WBS), project scheduling,			
		resource allocation			
		• Procurement of works, services and goods			
		Project Approval Processes and responsible			
		institutions			
		Stakeholder engagement and consultation			
		Risk Management			
3.	Project	Managing execution	Online training	Year 2-6	SM, SPMU, DPMU and
	Implementation and	Managing Contracts			ULB staff
	Monitoring	Project Monitoring			

Sl. No.	Training Programs or Modules	Contents	Preferred Mode of training	Phasing of training	Targeted Participants
		Project Controls			

b. Environmental and Social Safeguards related trainings¹⁴

Table 4-9: Environmental and Social Safeguards related trainings¹⁵

Sl.	Training Programs	Contents	Presenters	Frequency	Targeted
No.	and Modules				Participants
1.	KSWMP Safeguards On-boarding	World Banks Safeguards Policies and ESMF, TDF- SMF, RPF Project Cycle - Applicable regulations and Sensitivities: National, State, Local/others	The World Bank	One-day interactive (Year 1: Before Project initiation; Year 2: Before Start of activities; Year 3: Mid Term Corrective)	SPMU Project Director / other Staff, Safeguards (E&S) Experts, DPMU Safeguards Experts (E&S), PMCs
2.	State Level Orientation Program				
	Module 1 – About KSWMP Project	- About SWM in Kerala; existing and proposed system; and involvement of the State, ULBs, and The World Bank (including	SPMU Project Director / Assistant Project Director	Two days interactive (First Three modules – together in a day; fourth module on the second day)	SPMU/DPMU and PIU / Local Body staff, PMCs (if onboarded) technical review

¹⁴As per Bank's ESMF documents
 ¹⁵ Refer Annexure A4.2 on social training

Sl.	Training Programs	Contents	Presenters	Frequency	Targeted
No.	and Modules				Participants
		Financing Instrument) - Technical and Financial Aspects - Project Implementation Set up			committee members
	Module 2: ESMF and the Project Cycle and Regulatory Aspects	 ESMF Applicable regulations: National, State, Local/others Project Cycle of KSWMP ESMF incorporation in Project Cycle during Identification (Screening, Categorization), Preparation, Appraisal, Implementation (Monitoring, Audit) 	Environmental and Biodiversity Specialists of SPMU, The World Bank	(Year 1: After Project Kick-off; before initiating implementation), Year 2: At the start of Subproject work initiation; Year 3: Year – After Implementation initiation)	
	Module 3: Overview of Locations and Project Activities; Impacts	 Overall Project Locations Expected impacts: activity-wise Need for mitigation/management 	Environmental and Biodiversity Specialists of SPMU, Forests, Department of Environment, Pollution Control Board		

Sl.	Training Programs	Contents	Presenters	Frequency	Targeted
No.	and Modules				Participants
	Module 4: Sub- project level Environmental Assessments, Generic Mitigation / Management measures, Institutional Aspects, budget (Case studies)	 EIA: EA process, Identification of Environmental Impacts, Impact Identification Methods, Identification of Mitigation Measures, Formulation of Environmental Management Plan, Climate Change adaptation and mitigation Plans, Implementation, and Monitoring, Institutional Mechanism SIA: R&R policies and procedures, National & World Bank Requirements, LA process, Identification of PAPs, Social Entitlement Frameworks, Social Impact Assessment, RAP Techniques Beneficiary Assessments, IPPF 	Environmental and Biodiversity Specialists of SPMU, DPMUs, The World Bank		Module 4 (Day 2): Environmental Specialists (preferably attends both modules)
3.	Implementation Experience Sharing Program				
	Module 1: Module 1: Experience Sharing	- Experiences on implementation of EMF in implemented projects	Environmental and Biodiversity Specialists	One day; interactive Year 2 - end, Year 4 - start and at the	SPMU, DPMUs, and PIU / Local Body staff,

Sl.	Training Programs	Contents	Presenters	Frequency	Targeted
No.	and Modules				Participants
	on EMP Implementation	- Best Practices-Site visits to project towns/sites	of SPMU; DPMUs with support of PMCs	close of the Project (Year 5) – near implementation completion stage	PMCs,technicalreviewcommitteemembers,Communitybasedorganisations(CBOs),Contractors,et al as applicable
	Module 2: Review of Audit Results	- Discussion on the results of the annual audit on EMF	Environmental and Biodiversity Specialists of SPMU with support of PMCs		
	Module 3: Stakeholder Participation and Community Engagement	 Stakeholder Analysis Participation models in various projects by CBOs, Communities, Individuals, Private parties, PIUs 	Environmental and Biodiversity Specialists of SPMU with support of PMCs		
	Module 4: Best Practices Showcase	- Site visit to select projects to display best practices in any field/aspect	Environmental and Biodiversity Specialists of SPMU; DPMUs with support of PMCs		

Table 4-10: Indicative training plan as per TDF- SMF document

	Topics	Duration/ Modality	Timeline	Target Group
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Topics	Duration/ Modality	Timeline	Target Group
Role in Social Management	Half day orientation workshop	Y1, Q1	Project Steering Committee (Committee
Safeguards Compliance TDF-SMF			members), Suchitwa Mission and State
and RPF Result indicators – Social			Project Management Unit (Senior Staff)
			District Coordination Committee
			(Committee Members)
			District Project Management Unit (Senior
			Staff)
Role clarity Safeguards Compliance	Full day Orientation Workshop	Y1, Q1	State Level Environmental and Social
TDF-SMF and RPF Result			Development Unit (Social Development
indicators - Social Management			Specialist, Gender Specialist, Communication
Baseline Data Compilation Scheme			Specialist, Capacity Development Manager)
Cycle			District Level Environmental and Social
			Development Unit (Social and
			Communication
			Expert), Support Organization (Coordinator)
			ULB level Project Implementation Unit
			(identified Social Focal Point), TSC staff
			(Social
			and Communication experts), Support
			Organization (Deputed staff)
Understanding Social	Two-day	Y1, Q2	District Level Environmental and Social
Assessment and	Workshop		Development Unit (Social and
Screening, SIA, DPR			Communication
(TDP, RFP)			Expert), Support Organization (Coordinator)
			ULB level Project Implementation Unit
			(identified Social Focal Pont), TSC staff
			(Social
			and Communication experts), Support

Topics	Duration/ Modality	Timeline	Target Group
			Organization (Deputed staff)
Importance of Social	Full day	Y1, Q2	State Level Environmental and Social
Baseline database and	Workshop		Development Unit (Social Development
Social Indicators			Specialist, Gender Specialist, Communication
Use of data for			Specialist, MIS team)
developing inclusive			District Level Environmental and Social
plans			Development Unit (Social and
			Communication
			Expert)
Data template	Full day	Y1, Q2	ULB level Project Implementation Unit
Orientation	Workshop		(identified Social Focal Point), TSC staff
			(Social
			and Communication experts), Support
			Organization (Deputed staff)
Participatory	Four-day	Y1, Q3	State Level Environmental and Social
Approaches and Social	ТоТ		Development Unit (Social Development
management Principles			Specialist, Gender Specialist, Communication
			Specialist, Capacity Development Manager)
			District Level Environmental and Social
			Development Unit (Social and
			Communication
			Expert), Support Organization (Coordinator)
Social Mobilization,	Two-day	Y1, Q3	ULB level Project Implementation Unit
Facilitating	Training		(identified Social Focal Point), TSC staff
Participatory Planning,	Workshop		(Social
inclusion of marginal			and Communication experts), Support
and women's voices in			Organization (Deputed staff)
the plan			Select Ward Members
Topics	Duration/ Modality	Timeline	Target Group
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Module development,	Two-day	Y1, Q4	State Level Environmental and Social
Toolkit development	Write shop		Development Unit (Social Development
(Participatory planning,			Specialist, Gender Specialist, Communication
social Inclusion,			Specialist, Capacity Development Manager)
Gender, Social Audit			
etc.)			
Facilitating Citizen	Two day	Y2	District Level Environmental and Social
Feedback, Social Audit	Training		Development Unit (Social and
	Workshop		Communication
			Expert), Support Organization (Coordinator)
Understanding	Two day	Y2	State Level Environmental and Social
Outcome Monitoring	Training		Development Unit (Social Development
and Reporting (Review	Workshop		Specialist, Gender Specialist, Communication
of Social Management			Specialist, Capacity Development Manager)
database,			District Level Environmental and Social
Activity Reports)			Development Unit (Social and
Documentation			Communication
			Expert), Support Organization (Coordinator)
			ULB level Project Implementation Unit
			(identified Social Focal Point), TSC staff
			(Social
			and Communication experts), Support
			Organization (Deputed staff)
Leadership	Two day	Y1 and 2	ULB level Project Implementation Unit
development, decision	Training		(identified Social Focal Point), TSC staff
making, conflict	Workshop		(Social
resolution			and Communication experts), Support
			Organization (Deputed staff),

Topics	Duration/ Modality	Timeline	Target Group
			Select Ward Members, Select SWM workers
Gender Mainstreaming	Two-day	Y1 and 2	State Level Environmental and Social
and Orientation on	Workshop		Development Unit (Social Development
GBV (Project Gender			Specialist, Gender Specialist, Communication
Action Plan and GBV			Specialist, Capacity Development Manager)
Action Plan)			District Level Environmental and Social
			Development Unit (Social and
			Communication
			Expert), Support Organization (Coordinator)
			ULB level Project Implementation Unit
			(identified Social Focal Point), TSC staff
			(Social
			and Communication experts), Support
			Organization (Deputed staff), Select Ward
			Members, Select SWM workers
			All Contracted Agencies and staff (State level
			PMC, District level TSA, ULB level Contracted
			Agencies for SWM services, Construction
			and
			0&M)
Entrepreneurship	TBD	As members	SWM Workers
Development and		start	
other skill building		demanding	
workshops			
Social objectives of the	Two-day	As	All Contracted Agencies and staff (State level
Program, Labour	Workshop	contractors	PMC, District level TSA, ULB level Contracted
Compliances		come onboard	Agencies for SWM services, Construction
			and

Topics	Duration/ Modality	Timeline	Target Group
			0&M)
Competing the	TBD	Y2	State Level Environmental and Social
Feedback loop (Review			Development Unit (Social Development
Grievances Redressal			Specialist, Gender Specialist, Communication
Mechanisms- including			Specialist, Capacity Development Manager)
GBV and labour)			District Level Environmental and Social
			Development Unit (Social and
			Communication
			Expert), Support Organization (Coordinator)

ii. SWM Sector Specific Training

Table 4-11: SWM Sector Specific Training

Sl.	Training Programs or	Contents	Preferred	Phasing of training	Targeted
No.	Modules		Mode of		Participants
			training		
1.	SWM Legislation/Rules	• Framing of policies,	Online course	Year 0-1/Continuous	LSGD, SM, SPMU and
	and Regulations	Preparation of guidelines			ULB
		Preparation of SOPs			
2.	Planning	Climate Resilience and Disaster	Online course	Year 0-2/Continuous	Kerala State Disaster
		Management in SWM			Management
		Fire Safety on waste sites			Authority(KSDMA),
		• Site Selection (Regional Projects)			SM, DOECC, SPMU,
		Project Costing			ULB staff
		Fund Utilization			
		Project Design Requirements			
3.	Monitoring and	User Charge Regulations	Online course	Year 0-2/Continuous	SM, SPMU and ULB

Sl.	Training Programs or	Contents	Preferred	Phasing of training	Targeted
No.	Modules		Mode of		Participants
			training		
	Evaluation	Waste Audit			staff
		Project Progress and Fund Monitoring			
		Compliances monitoring			
4.	Subject know- how	Landfill Management	Blended	Continuous	SM, SPMU and ULB
		Bioremediation and bio mining practices	learning		staff and other
		Waste Reduction			supporting agencies
		Hazardous waste Management			
		Bio Medical Waste Management			
		Sustainable waste management practices			
		Latest Technologies in SWM			

iii. General functional training

Table 4-12: General functional training

Sl.	Training	Contents	Mode of delivery	Phasing of training	Targeted
No.	Programmes or				Participants
	Modules				
1.	Financial Management	Project Costing	Online	Year 0-1	SPMU and ULB
		Fund Utilisation Planning	course/Classroom		
		Cost accounting	training		
		• Project financial and economic viability			
		assessment			
2.	Procurement	Preparation of tender documents	Online course	Year 2-6 /Continuous	SM, SPMU and ULB
		Tendering and Bid Process Management			
		About MoUs and inter agency working			

Sl.	Training	aining Contents		Phasing of training	Targeted
No.	Programmes or				Participants
	Modules				
		arrangements			
		• PPP models, Cost benefit, Value for Money			
		analysis			
		Contract Administration			
3.	Institutional Aspects	Inter institutional coordination	Online course	Year 0-1 /Continuous	SM, SPMU, LSGD
		• Institutional roles of downstream agencies			
		and devolution of powers			
4.	HR	Feedback and reporting innovations	Online course	Year 2-6 /Continuous	SM, SPMU and ULB
		Capacity building of field staff			
		Welfare of field staff			
5.	Data Documentation	Management of MIS system/ MIS tool	Online course	Year 2-6 /Continuous	LSGD, SM, SPMU and
		Waste Audit Documentation			ULBs

b) <u>ULB level training plan outline (in addition to the plan outlined above)</u>

While detailed training plan for ULB will be finalized only after training needs assessment as part of the project, an indicative training plan outline is provided below.

Table 4-13: ULB level training outline

Sl.	Training Programmes	Contents	Mode of	Phasing of training	Targeted
No.	or Modules		training		Participants
1.	Solid Waste	Preparation of bye-laws	Online course	Year 0-1	ULB PIU and Health
	Management	Preparation of SOPs			Department, Elected
	Legislation	Regulatory Framework			Representatives
2.	Financial Management	Project Costing	Classroom	Year 2-6 /Continuous	ULB PIU

Sl.	Training Programmes	Contents	Mode of	Phasing of training	Targeted
No.	or Modules		training		Participants
		Fund Utilisation Planning	training/		
		Cost accounting	Online course		
		Project financial and economic viability			
		assessment			
3.	Project Planning	Project planning and scheduling	Online course	Year 2-6/Continuous	ULB PIU
		Resource Planning			
4.	Procurement	Preparation of tender documents	Online course	Year 2-6 /Continuous	ULB PIU, Municipal
		Tendering and Bid Process Management			Secretary
		About MoUs and inter agency working			
		arrangements			
		• PPP models, Cost benefit, Value for Money			
		analysis			
		Contract Administration			
5.	Project Implementation	Field Level Implementation	Online course	Year 2-6 /Continuous	ULB PIU, Municipal
		Monitoring field activities			Secretary
		On site supervision			
6.	SWM Practices/	Sanitation and Comprehensive Waste	Online course	Year 2-6 /Continuous	SWM Engineer
	Technologies	management	+ exposure		
		Project Planning, SWM plan preparation	visits		
		Project Design			
		Siting Criteria			
7.	Work Management	Management of field staff	Online course	Year 2-6 /Continuous	PIU technical support
		Audit of SWM practices			staff
		Monitoring and Supervision including			
		Service Level Benchmarks (SLB)			
		Use of MIS tools for M&E			

Sl.	Training Programmes	ammes Contents Mode of P		Phasing of training	Targeted
No.	or Modules		training		Participants
		Health Safety and Environment			
		Project related IT systems			
8.	Trainings for collection	• Types of waste specifically NBDW such as	Classroom	Year 2-6 /Continuous	Collection staff
	staff	plastic	training		
		D2D collection			
		Waste segregation			
		Time management			
		• Use of personal protection equipment(PPE)			
		Coordination with ULBs			
		Documentation			
		User fee collection			
		Monthly audit of SWM practices			
		Quantification of waste			
		Process design			
		Operations & Maintenance			
		• Fire hazards & other disaster prevention			
		• HSE/safe facility maintenance and response			
		• Use of PPE			
		Management of C&T workers			
		Motivation skills			
		Rules and regulations			
9.	Trainings for staff at	Quantification of waste received	Classroom	Year 2-6 /Continuous	Staff at SWM
	processing	Analysis of waste received	training,		plants/RRFS/MCFs
	plant/RRFs/MCFs etc.	Process design	exposure visits		etc.
		O&M of plant machinery			
		Disposal of waste			

Sl.	Training Programmes	Contents	Mode of	Phasing of training	Targeted
No.	or Modules		training		Participants
		• Fire, health, safety and environment			
10.	Trainings for	Safe transportation	Classroom	Year 2-6 /Continuous	Transportation staff
	transportation staff	• Synchronisation between collection and	training		
		transportation			
		Maintenance of vehicles			
		Safe practices			
		Vehicle routing, geographic information			
		system (GIS)/GPS			
		Transportation of segregated waste			

4.4.5. Training Delivery

4.4.5.1. Modes of training delivery

The training programs will be implemented through the following channels.

- 1. **Digital learning:** Training facilitated through numerous short online course modules of around 10 15 minutes which the recipients can access at their own convenience and pace. Successful completion of each module will require the candidate to pass the assessment process after each module after which an online certificate will be issued.
- 2. **Classroom trainings**: Trainings facilitated through physical presence of trainer and a group of candidates at a common venue or video conferences wherein the trainer can provide training remotely.
- 3. **Exposure visits:** This includes visits to other cities with good practices/ well managed SWM system plants, specialized plants for managing waste etc. This shall facilitate cross learning between the front runner ULBs.

DLP:

The channel will enable remote access to learning and development through specially designed short course modules comprising of presentations, voice over videos, transcripts, reading materials etc. The digital training is envisaged for the capacity building on project specific program implementation aspects and sector specific technical knowledge build up.

Requirements for course modules:

- Each course module shall not be more than 10 minutes long. A typical course may contain around 3-4 modules.
- The course module shall be either of or a combination of (i) audio visual presentation (ii) visual plus transcript presentation (iii) reading material.
- On completion of each module, the trainee will have to pass an assessment test to successfully complete the module. A course shall be deemed complete only on successful completion of all the modules and the employee shall be awarded a certificate for course completion.
- The assessment test shall comprise of non-repetitive questions in each attempt and shall be so designed as to reduce tricking in tests (such as possibility of sharing answers, fast forwarding the course, alternate person attending the course) by trainees.
- On completion of each course, the platform shall ask the trainee for a feedback on the training through a very short set of objective questions.
- While some of the modules may be interactive live sessions (which may not offer time flexibility but enables remote access especially in the context of COVID), many other may be predesigned presentation modules. The first case (in case of optional trainings) is seen appropriate for a particular training having a small number of registered trainees accepting to attend the training at a particular date and time.

Under the latter case, where individual trainees may take up the trainings on different dates and time, interaction or clarification of doubts will be enabled through posting of queries for an allocated time frame after the completion of modules for which the clarifications are to be provided within a specified time limit. All the trainees who take the training will be able to view all the previous queries and clarifications.

Requirements of the digital platform:

- The software should have an easy user interface that enables the user to navigate through the application and access the desired trainings in minimal time.
- On login, the application shall display a learning record for each employee which displays the completed courses and pending mandatory courses that the employee has to take within a specified time.
- The application should send reminders to employee (via email and phone messages) for completion of mandatory courses within the specified timeline. In case of any technical issues or official commitments that hinders on-time completion, the application shall enable employee to raise timeline extension request which will trigger an approval from the manager of the employee. On approval from the manager, applicable extension of time for completion of courses shall be permitted.
- Apart from the mandatory trainings, the application shall display a list of optional trainings customized to the designation and area of interests (as provided by the employee in his/her account) of the employee.
- Each optional course shall have a specific number of points associated to it. Successful completion of optional courses shall credit the employee with the associated points. The points so secured may be used as a one of the criteria for determining individual incentives (if any) or the overall points secured by the various employees in an ULB may be linked to selection of ULBs for grants under component 2 (based on the discretion of the executive director of SM).
- The digital learning platform shall provide various levels of admin access to certain select entities.

Classroom Trainings:

Certain trainings may require live real time interactions and single long duration delivery for successful knowledge impart. Such single stretch long duration sessions may not be feasible over online platforms. Classroom trainings will be conducted for such specific courses (if any). Classroom trainings shall be conducted through prior registration for the trainings which shall permit only a desired number of trainees in a session. Classroom trainings shall be provided through the following channels:

- i. At KILA's main centre or regional centres
- ii. At specialized institutes
- iii. Visiting faculty (experts) who deliver 'In- company' trainings

Exposure Visits:

In addition to online and classroom training, certain site visits to various SWM plants will benefit certain key staff in ULB/PIU in understanding the operations of new technologies in SWM and the practical challenges during operations. However, such exposure visits to SWM specific sites within the country shall be restricted to certain select designations relevant to the sector specific departments at state/district/ULB level to be decided based on the TNA recommendations.



Figure 4-3: Process flow for implementation of training and capacity building program

4.4.6. Monitoring of training program

As described in the previous table, completion of online courses by an employee will be automatically updated in digital database and completion of offline courses by employees will be updated appropriately by SPMU on the digital portal. The various admin logins (for SPMU, individual ULBs, head of institutions etc.) will be able to monitor the status of course completions and course feedback relevant to them. The admins can generate required training implementation report from the e-course digital platform. The entire M&E shall be managed by a Training and Capacity Building MIS tool as discussed in Chapter 10, section 10.3.1.The following table provides a snapshot into the monitoring access at various levels.

Table 4-14: Sna	nshot of M	onitorina	access to e-cours	e diaital	nlatform
Tuble I II. Shu	psnot oj m	onneoring		, uigitui	plugorm

Sl. No	Adin login Levels	Information available	Action prompted
1.	SM	 Training status all employees in state/district level institutions and ULBs 	Non- compliance to mandatory trainings to be identified and disciplinary actions to be communicated to the respective employee and parent institution (through notification in the platform and email).
		2. ULB training credits	May be considered as a low weightage criterion for incentive grants (decision to be taken by the ED, SM)
		3. Feedbacks	Trainings with poor feedback needs to be updated or revised. Necessary communication shall be made to the content developer
2.	ULB Municipal Secretary	 Training record of the specific ULB staff The ULB's training credits Non- compliance notification of the ULB staff 	 Communicate during ULB level staff meeting the importance of trainings and highlight non- compliances Communicate to SM additional training needs for the specific ULB (if any)
3.	State/ District Level Institutions Heads	 Training record of the institution staff Non - compliance notification of staff 	 Take necessary action to reduce non – compliance of trainings by the staff Communicate to SM additional training needs for the institutional functioning

4.5. Procurement of Consultancy Services for TA & Capacity Building

As narrated in section 3.5 of Chapter 3, SM will hire a PMC (in accordance with the Procurement Guidelines laid down in Volume 2 of the PIM) which will undertake several of the TA & Capacity Building activities as described herein. Similarly, the specialist consultants/agencies for developing digital platform/s for training, training courses and delivery of training will be hired by SPMU/SM by following the Procurement Guidelines laid down in Volume 2 of the PIM. The ToRs for these training consultants/agencies will be developed by SPMU/SM in consultation with the Bank.

Chapter 5. IEC and Awareness Generation

5.1. Introduction

Information, Education and Communication (IEC) strategy is one of the core activities of program. IEC relatedactivity will generate awareness among the State population about the objectives, mission, vision, benefits due to the improvement of SWM service delivery. The IEC strategy comprises of (i) overall state-wide awareness generation about need and importance of good SWM services; and (ii) subproject specific communication and consultation with the local residents and communities to enhance social consensus, acceptance and ownership of the proposed interventions.

The PIM covers the strategy and approach for the overall state-wide awareness generation on the need and importance of the robust and efficient SWM service delivery. The guidance for the subproject specific communication and consultation is detailed in the ESMF of KSWMP.

The stakeholders' outreach for the IEC will include elected local representatives, ward members, community representatives, households, service providers and the strategy will adopt a communications approach consisting of a multitude of instruments such as broadcasting, interactive communication, and influencer driven techniques.

5.2. IEC strategy for KSWMP

With the adoption of People's Plan Campaign in 1996, the state demonstrated a favorable sociopolitical environment for decentralized planning with peoples' participation, ensuring social inclusion and improved governance. It was an administrative effort of mass mobilization to bring a new democratic civic culture in the functioning of the decentralized institutions i.e. the local government. KSWMP builds on the decentralized governance and community engagement which requires a judicious combination of communication that combines information dissemination and focuses on behavior change and practices for the success of SWM. Waste management is about habits, perceptions, fears, expectations, and coordination but it is also about service delivery supported with infrastructure for which land is required and engagement with multiple stakeholders connected to waste generation and its management. It is well recognized that the necessary change is a complex process of shifting the public perception and ensure social acceptance for SWM treatment and disposal systems. To address it, the project will require strategic communication interventions. Thus, the project will adopt a Social and Behavior Change Communication (SBCC) Strategy for planning, implementation and monitoring of the program. The Communication strategy provides the rationale, approach, principles, and guidance for the activities, roles and responsibilities, capacities and maps the mediums to change perceptions and sustainable practices for social and behavior change.

5.2.1. Situational Analysis

KSWMP aims to strengthen the institutional and service delivery systems for solid waste management services in select municipalities by improving primary collection and transportation systems; waste segregation and at source treatment for biodegradable waste; rehabilitation of the existing Material Collection Facilities (MCFs) and development of new integrated MRF; development of biodegradable waste management facilities; and closure/remediation of small scale existing dumpsite. It proposes a hybrid strategy for SWM where apart from the HH level segregation and management, there will be centralized treatment facilities at regional level.

Literature and experiences from ongoing interventions point towards resistance against projects which involve infrastructural investments and greater centralization of solid waste management. The waste treatment plants, or landfill sites are usually located at the periphery of urban centres, and these locations were sites of local resistance. The landfill sites over the years, became dumping grounds for the municipal waste, and this was resisted, so that the state had to find alternatives for waste management. Kerala started moving towards decentralised solid waste management- treatment of waste at the source by households, institutions, etc. Opposition often led to the local government's diversion of waste from landfills by increasing the number of recycling units, replacing the technologies or sometimes closure of projects all together. However, neither the centralised nor the decentralised systems have addressed garbage disposal and waste management as there was an assumption that by providing information to the community, they will accept the facilities in their neighbourhood.

There is enough experience that shows that information dissemination alone has not created the enduring frameworks that allow for real changes in people's behaviours, perceptions, or attitudes¹⁶. The transfer of knowledge alone cannot produce the behaviour change necessary for the success of projects. The project requires a major shift in public perception and depend on social acceptance for SWM treatment and disposal systems. To address this risk, the project will implement the SBCC and supporting action plan for generators and service providers for collective action for sustainable management of waste.

5.2.2. Social Attitude and Behaviour Change Communication Strategy

Regardless of the complexity of the KSWMP, the interventions at different stages will adopt an SBCC strategy which subsumes an audience centric use of content, mediums, and toolsfor stakeholder engagement and maximise impact.

¹⁶ WORLD BANK WORKING PAPER NO. 119. Communication-Based Assessment for Bank Operations.



Figure 5-1: Theoretical Framework of SBCC

5.2.2.1. Approach

The project will adopt a two-pronged intervention throughout the project period. This includes state-wide campaign led by political leaders and other influencers to indicate political commitment towards SWM, which will translate into actions for behavioural change of the citizens measured by the adoption of improved practices and acceptance of interventions. States response to the recent pandemic¹⁷ has created an enabling environment for Suchitwa Mission and Municipalities to partner with stakeholders who understand the system, the gaps, the risks. Kudumbashree, members of HKS, Municipal workers, ULB members, local leaders will be involved from inception, so that the campaigns are effective and responsive towards the needs of both generators and service providers.

5.2.2.2. Communication Plan

The communication plan will be based on information about stakeholders' knowledge, perceptions, attitudes, expectations, and practices. It will be assessed to identify areas that requires to be influenced and accordingly develop messages for state-wide campaign, for the communities and service providers who will be impacted by the specific investment. The plan, both for the state-wide campaign and for site specific investments will be developed to (a) segment target audiences; (b) identify behaviour changes required; (c) prepare appropriate content for different stages of the project which will culturally suitable in local language; (d) develop outreach approach or modality that balances between information dissemination and interactive communication; (e) identify effective medium, channels, tools; and (e) monitor response and receptivity to review and revise.

¹⁷Currently, Kerala has successfully managed the communication outreach for COVID response and behaviour change for prevention and control. This provides an opportunity to assess what worked and how- who were the influencers (Politicians, Celebrities and local leaders) and how can such models of successfully dealing with a pandemic be replicated in dealing with the perpetual issue of waste management.

5.2.2.3. Target Audience

Segmenting target group enables to focus upon them to match messages, accordingly, develop media products and services based on the specific needs and preferences of the target group. Tailoring an SBCC strategy to the characteristics, needs and values of important audience segments will improve the chances for desired behaviour change.

- Segmentation of target group can be done based on role and stake in the project, demography, location, socio-economic background, age, sex, access to technology and so on. This will include communication for the vulnerable groups, the risks they face, the role and participation expected from them and how the outreach must be customised for them.
- Analysis of target group can be done by understanding the existing knowledge, perception and behaviour, habits, fears, collective conscience, change desired under the project.

5.2.2.4. Communication Medium and channels



Figure 5-2: Communication Mediums and channels for SBCC

5.2.2.5. Set up Public Information Cell for two-way communication with media, citizens, and officials

- Kerala being a highly literate and politically sensitive State, the role of news media in creating awareness on social issues and shaping public perception is extremely high. Issues related to waste management is always a delight for newspaper and television journalists.
- Kerala has at least a dozen vernacular newspapers. According to the Indian Readership Survey 2019, the top vernacular newspaper had highest readership with over 17 million (nearly half of the State's population) readers followed by the second highest read newspaper with over 12 million readers. The third, fourth, and fifth positions have a combined readership of around 10 million. This shows most people (more than 90 percent) in the State read at least one newspaper and interested in what is happening around them.
- In addition, there are 9 dedicated news channels in Malayalam. A study conducted during the 2018 flood in Kerala shows the combined television news viewership in the State was around 84% of the population. All major newspapers and tv news channels have their own digital news platforms as the number of users are increasing daily. According to a recent report by the Internet and Mobile Association of India (IAMAI), Kerala's Internet penetration rate is the second highest in the country with 54 percent households, after Delhi NCR. Kerala is aspiring to become 100 percent by end of 2020. In addition, 64 percent of the population has smartphones.
- All these data show, the per capita exposure to news media in the State is well above 90 percent. Even though, the influence of news media on public is used in wrong connotations, it's penetration in public can be 'effectively used' for creating or transforming public perception on issues like SWM, which is a matter of serious concern for all urban households.
- In this context, it is relevant to establish a PIC to manage the overall public relation activities and media management. The PIC will function within the Project Management Unit (PMU)/SM and serve as a real-time communication interface between the PMU, media and public. The PIC will be manned by 2 professionals, such as Public Relation Expert, and Web & Social Media cum Graphic Designer. These experts will be directly hired by the SM. The public relation expert will keep track of news reports and manage mainstream media on a day-to-day reciprocal basis. And the social media cum graphic designer will be responsible for outreach through social media platforms and creating necessary graphics and materials for publicity/campaigns.

5.2.2.6. Roles and Responsibilities

Unit/ Personnel	Role
Communication Specialist	• Focal Point for all Communications under the project (will have counterparts in DPMU)
SPMU	Coordinate overall Communication Strategy
	• Plan, hire and monitor the media agencies, prepare budget,

 Table 5-1: Roles and responsibilities for IEC

Unit/ Personnel	Role
	implement, and document/report on all the activities
PIU hosted in SPMU	• Responsible for overall public relation and media management
	activities
	 Provide media related advise to Executive Director, SM
Public Relations	Overall PR activities
Expert	• Review and archive major news reports related to SWM daily and
(PIC, SPMU)	respond to negative reports
	Maintain response record
	• Organize/ facilitate press meets, media briefing sessions, press
	release, panel discussions, celebrity engagement, etc. as directed by
	• Prepare media kits with project related information, documents, and picture/video clips
Web & Social Media	Create/ manage social media accounts, (Facebook, Instagram,
cum Graphic	Twitter, YouTube Cannel, etc.) for the Project, and popularize it
Designing Expert (PIC, SPMU)	• Create graphics, videos, other publicity materials for social media campaigns or any other publicity activities required by the SPMU
	• Organize social media live broadcast for ED or any designated officer
	• Conduct social media surveys on various topics related to SWM
Communication	Branding and advertising
Firm, hired by	• Social Behaviour change communication material (design, illustrate,
SPMU	production)
	Print and publishing for display
	Outdoor media like hoardings, billboards
	 Design and print door to door dissemination (kits, posters)
	 Production of radio and television material
	 Media buying for television and radio bytes
	Production of short films and success stories
Communication	• Report and monitor the implementation of communication strategy,
Specialist, PMC	the effectivity of content, mediums and tools used
	• Review the outreach, the impact and identify gaps.
C	Provide support to improve coverage and response.
Communication	Focal Point for all Communications in the District
Specialists, DPMU	Provide inputs on customized communication requirements
	Implement Communication Plan at ULB level Degree and Deport on diagonization of yould be foodback
Support	Document and Report on dissemination as well as feedback
Organizations at	 Provide inputs on customized communication requirements Discomination of communication material for social mobilization and
each DPMII	Dissemination of communication material for social mobilization and behaviour change
	 Ensure outreach at door to door and all stakeholders in the III.B
ULB (council staff.	Key players in promotion information dissemination interaction
chairperson. ward	facilitation, and feedback
committees)	
Kudumbashree,	As the first point of contact on an everyday basis are also key players in
HKS and municipal	disseminating messages
waste management	
staff	

5.2.2.7. Broad outline of communication plan

Stage	Objective	Message	Target	Medium/Tool
Pre-	Create a buzz	Problem of Waste and	Waste	Launch Broadcast
Plannin	and interest	health implications.	generators and	Hoardings, TV
g	and address	The project is designed	Service	messages, Radio
	grievances	to enhance health	providers	messages, Newspaper
		benefits and has		ads, website banners
		responsive grievance		
		Suggage lies in		
		solloctive action		
	Clarify doubts	Difference in the design	Civil Society	Combination of
	to address	of the earlier projects	Activists Local	Broadcast and
	resistance	and the KSWMP and	leaders IILB	Interactive mediums
	resistance	benefits of adopting	leaders	Project documents and
		decentralised		frequently asked
		supported with		questions (FAOs),
		centralised systems to		budgets, data and
		manage scale of non-		projection on website
		biodegradable waste.		and hardcopies at ULB
				office.
				Workshops, talks,
				discussion forums chat
				rooms, App based
				interaction
	Role of service	Information on benefits	Ward	State and district level
	providers	and safeguards,	Members, Local	workshops. Reading
		understanding	leaders,	and reference material
		dialoguing with givil	from UVS	on proposed activities
		society	II UIII ПКЗ, Kudumbashraa	and roles.
		society.	RWAs	
			(Residents	
			Welfare	
			Associations),	
			Neighborhood	
			committees etc.	
Plannin	People are	Rules of engagement;	Waste	State-wide broadcast
g	aware of the	role of citizens in	generators ¹⁸	campaign announcing
	project,	planning and		the planning exercise
	participate in	implementation;		Endorsement by
	meetings to	role and responsibility		Influencers on Radio,
	develop plans,	of implementing		TV, Facebook, short
	endorse plans	partners		videos etc.
	and user	(administration,		Use of flyers,
	charges.	elected bodies, private		loudspeakers, SMS,

Table 5-2: Broad outline of communication plan

¹⁸ Outreach to vulnerable groups, FGDs with vulnerable communities - Separate planning or pre-planning meetings with women and different social - economic sub-groups, (youth, tribal) to ensure representation of all interests and needs in the plan

Stage	Objective	Message	Target	Medium/Tool
		agencies, citizens);		WhatsApp and ULB
		location and time of		offices (in advance) on
		meetings;		meeting location and
		key timelines to deliver		time.
		the sub-projects;		Draft plans on ULB
		important contact		website and offices.
		information of		Set up digital and
		implementing		information kiosks at
		partners; information		ULB office and central
		on data and		locations in the
		projections, the base		Municipality.
		for calculation of User		Live updates,
		Fee (grading and		photographs and
		subsidies); information		videos, minutes of
		on feedback forums		meetings to be
		and GRM; budget.		disseminated online.
Implem	Waste	Technical knowledge to	Targeted Waste	Instructional manuals
entation	segregation	segregate at source,	generators	on website
	and	manage biodegradable		Information through
	management	waste.		flyers, leaflets
				Key messages on
				hoardings
				Instructional videos
				(on local cable, digital
				kiosks, Facebook and
				WhatsApp)
				Motivational videos by
				Icons/Influencers
	a. 11			Radio Campaigns
	Collection,	Regularity, efficiency,	Targeted	Trainings, workshop,
	transport,	responsiveness, and	Service	hands-on support,
	Waste	customer satisfaction	Providers	guided mentoring,
	management,			peer interaction
	MFC			
	People are	Service Benchmarks	Targeted Waste	Interactive Customer
	satisfied with	GRM facilities	generators	Service rating /
	the project	Social Audit		Satisfaction (print,
	services			SMS, Telephone,
				website, app based)
				Public hearings and
				Social Audit (face to
				Social Addit (lace to
				lace, FGD based rating
				and feedback)
	General	Showcasing the work	Waste	Interviews, short films
	Information		generators and	and documentaries,
	and Promotion		service	shared via social
			providers	media channels,
				newsletter,
				newspaper, radio
				programs, and
		1		television programs

5.2.2.8. Feedback for effective monitoring of communication intervention:

Communication interventions are highly contextual, and that any communication intervention can change the conditions of the project, the development initiative needs to receive periodic feedback from the main stakeholders to redefine the intervention and the communication program in order to better accomplish the development goals. The social audit through its systematic process will identify the gap between the desired and actual impact of the communication program for taking corrective course of action and promoting good practices.

Chapter 6. Management System for Incentive Grants to ULBs

6.1. Brief Background on the Grant Management System

This component will finance the SWM activities including,

- a) primary collection and transportation systems for solid waste
- b) source segregation and treatment for BDW at decentralized level
- c) rehabilitation of the existing MCFs/RRFs and development of new integrated MRFs
- d) development of BDW management facilities
- e) closure/remediation of existing dumpsites
- f) public space cleaning, sanitization, waste removal activities as well as cleaning & sanitization of government offices, hospitals, community level waste recycling/processing facilities, protective gears, equipment, masks, chemicals, disinfectants etc. for sanitation and waste management workers
- g) operations and maintenance payments for performance-based contracts and tipping fee for regional disposal and
- h) implementation of environment and social risk mitigation actions as per ESMF-TDF-RPF.

Financial assistance will be provided to participating ULBs over and above their existing fiscal transfers from GoK (plan funds). ULBs will have the freedom to develop their own SWM plan and implement subprojects to utilise these grants (subject to standard procedures to be followed). The grants will have an unconditional component(Basic Grant) and an incentive component(Incentive Grant). The incentive component increases as the ULBs meet certain eligible criteria. ULBs are incentivized to identify land for disposal of waste and this addresses one of the key bottlenecks in the State for SWM.

The grants can be utilised across financial years (FY) which helps ULBs develop multi-year plans and multi-year subprojects. The grant cycle will be aligned with the Annual Development Plan process practiced by GoK and ULBs. Under this system ULBs are allocated a budget under the plan. ULBs propose subprojects that are identified consultatively. The plan is then approved by the State. ULBs then prepare the projects, seek final approval, procure approved projects, incur expenditure and submit bills to GoK. Payments are made by GoK directly to the vendors/ contractors. The project will follow the same system since it is already in operation and is well-accepted.

Component 2 follows existing GoK procedures wherever relevant, such as the Annual Development Plan process and Disbursement procedures. Further, KWSMP also has developed detailed technical guidelines for sub-projects, financial management procedures, procurement systems and environmental & social safeguards. The Grant Management Systemmakes

reference and provides a summary of these procedures. These are described in full detail in other sections of PIM.

This chapter on Grant Management System provides illustrations of Grant Administration through examples. It also includes a Microsoft Excel Worksheet that simulates various scenarios for illustration. The illustrations do not cover all possible scenarios (e.g. termination of all subprojects due to major non-compliance by the ULB). In case of any conflict between the procedures given in this manual and the illustrations, the procedures will prevail. 1) This Grant Management Section is organised as follows:

- a. Section 6.1 describes the Grant system and the rules governing allocation of grants. Eligibility criteria, utilisation of grants, disbursement, compliance etc.
- b. Section 6.2describes Grant administration procedures.
- c. Section 6.3 descries the institutional responsibilities.
- d. Section 6.4 illustrates Grant administration with an example.
- e. Annexures in Volume 3 that contain worksheets and others as referred below:
 - A6.1 Grant Allocation Ceiling for ULBs
 - A6.2 -Detailed Eligibility Criteria for Incentive Grants
 - A6.3- Detailed Verification Methodology for verifying the compliance of ULBs in meeting eligibility criteria
 - A6.4- Model ToR for Independent Verification Agency
 - A6.5 -List of Eligible Expenditures and Classification of Track 1 and Track 2 activities
 - A6.6- Format forULBs formal requisition to SPMU requesting to initiate verification exercise
 - A 6.7 Step by Step guide for Grant Administration

The term FY 20XX refers to the financial year for GoK starting on April 1, 20XX(-1) and ending on March 31st, 20XX, i.e. FY2022 refers to financial year 2021-22 starting on April 1, 2021 and ending on 31st March 2022.

The implementing agency will comply with the provisions of this chapter in the administration of Component 2. The implementing agency or GoK will not amend, waive or fail to enforce any provisions of this manual without the agreement of the World Bank.

6.2. Overview of Grants to Urban Local Bodies

1) Size of Grant – "Grant Allocation Ceiling." Each participating ULB will receive a single non-lapsable grant for the entire duration of the Project. This grant can be used to implement one or more eligible subprojects by the ULB (which could also be multiyear projects). The total size of Component 2 is US\$ 150 Mn. This will be divided among all 93 urban local bodies (ULBs). 80% of the outlay for component 2 will be divided among all ULBs in proportion to their population. The remaining 20% will be divided only among municipalities (excluding municipal corporations) in proportion to their population. The amount thus arrived at for each ULB will be the "Grant Allocation Ceiling" (GAC). The GAC will consist of an unconditional Basic Grant (BG) of 40% of the GAC; and Incentive Grants (IG) of remaining 60% of the GAC which are linked to the ULB meeting certain eligibility criteria.

2) Grant Allocation

- a) The unconditional Basic Grant (40% of GAC) would be allocated to a ULB on signing of Participation Agreement. The format for PA is provided in Annexure A 3.1in Volume
 3. The last date for signing of the Participation Agreement is December 31, 2022 after which the entire GAC of those ULBs that did not sign the Participation Agreement would lapse.
- b) The Incentive Grants would be allocated on meeting the eligibility criteria "a" to "e" in Table 6-1. Meeting Criteria (a) (3) below is mandatory since without access to a disposal facility, a ULB cannot utilise the Incentive Grants. These criteria are further detailed in Annexure A.6.2 in Volume 3. The last date for meeting criteria "a" to "e" is 31stMarch 2025 after which the part of GAC corresponding to the criteria not met would lapse. If Criteria (a) (3) is not met by 31st March 2025, the entire Incentive Grants would lapse.

Grant Allocation	Eligibility Criteria
Basic Grant (40%)	The Basic Grant (40% of GAC) would be allocated to a ULB on
	signing of Participation Agreement
Incentive Grants (40%)	(a) 40% of GAC would be allocated when the Participating ULB
	meets <u>all</u> of the following:
	(1) has prepared a multiyear city-wide plan for climate-
	smart and disaster-resilient SWM ("SWMP") which has been approved by SM;
	(2) has issued SWM by-laws that incorporate the
	principles of Kerala's Integrated Solid Waste Management
	Strategy 2020;
	(3) has confirmed access to/use of facility for safe
	disposal of waste, as per national SWM rules 2016 and
	other national regulations.
Incontive Grants (20%)	5% each of the CAC shall be allocated when the Participating III B
	meets each of the following criteria:
	(b) hired top-level staff in accordance with the structure approved by GoK.
	(c) signed one or more performance-based contracts for the
	Participating ULB's solid waste collection and transportation
	services;
	(d) developed a plan for user charges and operation and
	maintenance budgeting; and
	(e) implemented monitoring and evaluation including a grievance
	redressal mechanism.

Table 6-1: "Eligibility criteria" for Grant Allocation

- 3) Thus "Grant Allocation" (GA) is the part of GAC that has actually been allocated to the ULB at any point of time, based on the criteria that the ULB has met. GA determines the maximum expenditure a ULB can incur using Grants under Component 2. A ULB's GA will increase gradually as it meets various criteria (listed below) up to its GAC.
- 4) **Grant Utilisation:** The Grants will be provided to the ULBs as a subcomponent of the Annual Development Plan of the ULBs called Solid Waste subcomponent (or any other

nomenclature used by GoK). The Grants are non-lapsable and can be carried forward across financial years. The Grants can be used to implement subprojects that are multi-year (expenditure is incurred over more than one financial year). The Grants are performance based (ULBs need to meet the eligibility criteria) and are over and above the routine Annual Development Plan of the ULBs which are based on the State Finance Commission formula.

- 5) The Participating ULBs will prepare a Solid Waste Plan (which is also one of the Eligibility Criteria) which will be approved by Suchitwa Mission. The ULBs will follow the existing Annual Development Plan process to propose sub-projects. Prior to the beginning of each financial year, ULBs will select sub-projects from the Solid Waste Plan and include them as Solid Waste component in the proposed Annual Development Plan for the forthcoming financial year(s) and propose year-wise expenditure schedule. After approval of the Annual Development Plan by the District Planning Committee, the ULB can design, procure and implement sub projects following guidelines and conditions listed in this PIM. KSWMP has developed additional guidelines specific to the project and SWM sector which will be followed by the ULBs.
- 6) Eligible Expenditure: Subprojectswill be categorised as Track 1 (T1) or Track2 (T2).
 - a) Track 1 activities will be funded by Basic Grant only and will comprise of investments which do not require land and/or access to disposal facility. These can be initiated by the ULBs immediately on signing of the Participation Agreement. These include a) expanding the coverage of decentralized BDW management systems (generator and community level), b) upgrading the existing MCFs/RRFsc) closure remediation of existing dumpsites and development of incremental disposal cells as interim facility, d) routine public space cleaning/sanitization and other waste management activities related to COVID-19 like procurement of protective gears, and equipment for sanitation workers, financial support to existing women SHGs engaged for ongoing waste collection services and e) O&M payments for tipping fee or secondary transportation for regional disposal facilities.
 - b) Track 2 (T2) activities will be funded by Incentive Grant only and comprise investment subprojects which will generate waste that would require a final disposal facility. These can be taken up only after Eligibility Criteria (a) (3) "confirmed access to/use of facility for safe disposal of waste, as per national SWM rules 2016 and other national regulations" has been achieved. These include a) establishing/strengthening primary waste collection and transportation systems, b) developing new waste management/processing facilities and c) new MRF/recycling facilities for NBDW. The investments will be picked by ULBs from this menu as part of city SWM plans. The list of Eligible Expenditure for Track I and Track II is provided in Annexure A.6.5 in Volume 3.
- 7) **Expenditure Limit** defines the limit up to whicha ULB can utilise its Grant Allocation.At any point of time, ULB can incur expenditure on Eligible Expenditure up to the Expenditure Limit for each Track. The Expenditure Limit for Track 1 projects will be equal to the Basic Grant Allocation till date. The Expenditure Limit for Track 2 projects will be the Incentive Grant Allocation till date, provided Eligibility Criteria (a) (3) has been achieved. If not, Expenditure Limit for Track 2 projects will be nil.
- 8) **Disbursement:** The Kerala State treasury system and existing local government financial management systems will be used for disbursing grants to the ULBs. In line with existing

grants mechanisms, disbursement will not mean the actual/physical flow of cash to ULBs. Payments to contractors, vendors or suppliers will be made directly through the existing treasury mechanisms. After incurring expenditure, ULBs will submit the bills and supporting documents to DPMU which would then forward them to the SPMU for approval and for issue of instructions to the District Treasury for release of payments directly to contractors/vendors/ suppliers. Payments would be made up to the Disbursement Limit for the ULB (which is the Expenditure Limit less adjustments for any outstanding non-compliance in prior year expenditure, explained later under "Annual Triggers").

- 9) **Annual Triggers:** The ULB, as the agency responsible for implementing subprojects, needs to comply with the following conditions.
 - a) For each Sub-project, the ULB shall undertake an environment and social impact assessment and prepare and implement an environmental and social management plan and other safeguards management documents in accordance with the provisions of the ESMF (including stakeholder consultations, surveys, investigations, primary data collection and any other necessary field work as necessary to comply with the provisions of the PIM and the ESMF);
 - b) The ULB will have received an unqualified or qualified audit opinion from KSAD, which does not indicate observations that indicate pervasive financial management weaknesses and/or a pervasive lack of integrity of the financial statements, [for the financial year within two years of the period of review, i.e. for review during FY 2023, report for FY 2021 or FY 2022.]
 - c) The ULB shall have procured the goods, works and services for implementing Subprojects to be financed out of the Grant in accordance with the provisions of the Project Procurement Manual, part of the PIM.
 - d) The ULB shall have complied with the national SWM rules 2016, technical guidelines and operational procedures laid out in the PIM for planning, designing and implementing SWM investment Sub-projects (including climate and disaster resilience);
 - e) Each sub project is part of the Eligible Expenditure
- 10) There will be no prior review of the compliance of the ULBs with these conditions. Once the Solid Waste subcomponent of the Annual Development Plan is approved by the ULB and the subprojects are approved by Suchitwa Mission, the ULB has full authority for implementation. Its compliance with the Annual Triggers listed above will be reviewed on post expenditure basis annually in the fourth quarter. Depending on the nature of non-compliance, the ULB will be required to carry out remedial actions in the next FY, until which a part or entire Expenditure Limit may remain suspended.
- 11) **Disbursement Limit:** The Disbursement Limit will be the Eligible Expenditure less the amounts in suspension as above. The cumulative disbursements to a ULB will not exceed the Disbursement Limit. The Disbursement Limit will be constantly updated as and when a ULB completes remedial action and the non-compliance in previous year expenditure is redressed. At the end of the project, the ULB will be required to return Grant amounts that remain suspended due to any outstanding non-compliance.
- 12) **Reallocation of Grants at the end of second year:** The unutilised GAC of ULBs that did not sign the Participation Agreement by 31st December 2022 will lapse and be reallocated to

other ULBs that have signed the Participation Agreement. The reallocation will follow the same methodology as the original allocation, i.e. 80% of the amounts will be distributed among all ULBs(which are eligible to receive reallocation) in proportion to the population and 20% of the amounts will be distributed among only municipalities(which are eligible to receive reallocation) in proportion to their population.

- 13) **Reallocation of grants at the end of fourth year:** At the end of the fourth year (31st March 2025), the Grant Allocation will be reduced for those ULBs whose expenditure is less than 50% of current Grant Allocation. The revised Grant Allocation for such ULBs will be twice the expenditure incurred. A minimum Grant Allocation of 66% of current Grant Allocation or the value of contracts awarded will be assured. The unallocated GAC of ULBs that did not meet one or more Eligibility Criteria by 31st March 2025 will lapse.
- 14) The reduced or lapsed amounts will be reallocated among the fully eligible ULBs (those that have met all Eligibility Criteria) as per procedures in 32 and 33 (section 6.3.6- Reallocation), subject to a cap of twice their current expenditure under the project. Any unallocated grants remaining after the iterative reallocation exercise will be transferred to other components of the project.

6.3. Grant Administration

6.3.1. Determining Grant Allocation Ceiling

- 1) The GAC for all ULBs will be determined on or before the Effectiveness Date based on the population of ULBs as per Census 2011. Adjustments will be made for any changes in the ULB boundary since Census 2011. Suchitwa Mission will be responsible for a) publishing the list of ULBs covered by KSWMP, b) finalising the applicable population figures as per Census 2011 and c) calculating the GAC for each ULB. SPMU will amend the PIM with list of ULBs and their respective GAC and intimate ULBs of their GAC.
- 2) The GAC may be increased at the end of 2nd year and at the end of 4th year, reallocating unutilised GAC from ULBs which did not sign the Participation Agreement or did not meet all the Eligibility Criteria. The applicable procedures for the reallocation are described in 6.2.6.
- 3) A list of ULBs in Kerala, their population as per Census 2011 and their GAC is provided in Annexure A.6.1 in Volume 3. This is for illustration and this will be updated by Suchitwa Mission on or before the Effectiveness Date.

6.3.2. Grant Allocation

- 4) 40% of GAC (Basic Grant) will be allocated once a ULB signs the Participation Agreement as provide in Annexure A.3.1 in Volume 3.
- 5) Within one month of Effectiveness Date, the SPMU will develop detailed verification methodology(to be approved by SM) for verifying if a ULB has met the Eligibility Criteria. The verification methodology will become a part of the Grant Management System(Annexure A.6.3 in Volume 3).
- 6) The SPMU will appoint an Independent Verification Agency based on the Terms of Reference provided in Annexure A.6.4 in Volume 3.

- 7) Once ULBs have signed the PA,ULBs can submit documentary proof of meeting eligibility criteria to Suchitwa Mission at any time during a financial year (till 31st March 2025) for validation, and SPMU will direct the IVA to conduct quarterly validation exercises to determine if ULBs have met Eligibility Criteria (some or all). The IVA will complete the validation by the last day of the next quarter, and in case of the last quarter of a financial year, by the last day of February. For the last quarter of validation, i.e. quarter ending Mach 31, 2025, SM may permit validation to be completed by the first fortnight of April 2025 as an exception. Thus, ULBs can continuously increase their overall Grant Allocation. Once the validation exercise is completed by the IVA, SPMU will review the results and SM will decide on Incentive Grant Allocation to the ULBs. SPMU will intimate the respective ULBs of the results of verification and will also maintain and publish an updated list of all ULBs with their GAC and current Grant Allocation.
- 8) The Eligibility Criteria require a one-time check, and once the criteria are met, will not be checked again during the duration of the project. The validation will be done on a quarterly basis upon notification by the ULB that one or more criteria have been met. It is possible, but not likely given the type of grant conditions included, that once a criterion has been achieved and Allocation has been increased for a ULB, in future years the ULB does not maintain the criterion (e.g. the established GRM system may become dysfunctional. ULB may stop collecting user charges; the identified and agreed landfill may not be developed, etc.). Under this system, and to ensure predictability in allocations, it will not be prudent and/or possible to claw back the Allocation already made, or expenditure incurred. This is an acceptable risk in the interest of keeping the grants simple, ensure multi-year planning of expenditures and to avoid repayments/ clearances. During Mid Term Review of KSWMP, this system will be reviewed and if need be adjusted.
- 9) Any revision to the Eligibility Criteria will require prior concurrence of the World Bank.

6.3.3. Annual Planning and Expenditure Cycle

- 10) The project will follow the GoK's current system of annual planning, budgeting and disbursement that is being used for providing fiscal transfers to the local governments under the current planning guidelines.
- 11) Each ULB will prepare a city-level SWM plan (SWMP) in the beginning of the project, as per the national guidelines, state level SWM strategy and the detailed stepwise guidance provided in the PIM. Detailed guidelines for the preparation of SWMP are part of [Section 8.1]. After approval of the plan by SM, the SWMP will provide inputs to the Annual Development Plan process of the ULBs.
- 12) Annual Development Plan SWM subcomponent: The Annual Expenditure Cycle is illustrated in Figure 6-1. This cycle repeats every year. Based on the approved SWMP, the ULB will identify SWM subprojects and include them in the SWM subcomponent of the Annual Development Plan. In the initial years of the project, the SWMP may not have been prepared and approved, and therefore ULBs can propose subprojects identified following current annual development plan process. Once the SWM Plan has been approved, subprojects are expected to be identified out of the approved SWM Plan. The subprojects can be proposed for multi-year approval and therefore the annual development plan will also include phasing of expenditure of a subproject over multiple years.





- 13) The size of the SWM subcomponent will be guided by the Grant Allocation and Expenditure Limit prevailing at the time of approval. However, this is not a limiting factor. ULBs can propose an appropriate size of the Plan keeping in mind the eligibility criteria they are likely to meet during the year and obtain additional Grant Allocation; and revoke any suspended amount based on compliance measures. DPC, in anticipation of the ULB meeting additional Eligibility Criteria during the financial year, can approve subprojects in excess of prevailing Expenditure Limits. However, disbursement of grant will be dependent on meeting the Eligibility Criteria, securing the higher Grant Allocation and Expenditure Limit. Therefore, even though a higher Annual Development Plan outlay may have been approved, the ULB has the responsibility to phase the actual expenditure after achieving the additional Eligibility Criteria and securing the Grant Allocation and Expenditure Limits. The Annual Development Plan may be approved provisionally or in part, depending on the outcome of review of "Annual Triggers" and if any non-compliance has been observed. This is explained in further detail under 6.2.5.
- 14) While approving the Annual Development Plan, DPC will also ensure that all subprojects have funds fully tied up, either exclusively from KSWMP(preferably) or from other committed source of funds; and that KWSMP funds are not spread partially across many subprojects that may lead to incomplete projects. The DPC will also give preference to allocating KWSMP funds for multiyear projects carried over from previous years before approving new subprojects.
- 15) **Sub-project planning, design and implementation:** Once the Development Plan is approved by the DPC, the ULB will be primarily responsible for planning, design and implementation of the sub-projects approved in the Annual Development Plan. It will receive adequate technical assistance for design and implementation supervision by the DPMUs through dedicated district level TSCs financed under component 1. The ULBs will also have the option of delegating this responsibility to SPMU for complex investments or

where a group of ULBs and local Governments plan to collaborate for a cluster/regional approach for waste treatment/disposal. Even if the implementation responsibility is delegated to Suchitwa Mission, the responsibility for meeting all "Annual Triggers" will continue to rest with the ULBs.





- 16) The overview of subproject workflow is presented in Figure 6-2 and the detailed workflow is presented in to Section 3.5 (c) and Annexure A.3.7 and Annexure A.3.8 in Volume 3. For each sub-project, the ULB will be required to undertake (i) feasibility assessment of the various alternative technical solutions including climate and disaster resilience, environment and social risk screening and financial sustainability assessment, (ii) firm up the preliminary engineering designs and implementation modality (DBOT, EPC etc.), and (iii) environment and social impact assessment and management plan preparation. Technical procedures, frameworks and guidelines are laid out in the PIM for planning, designing and implementing SWM investment sub-projects and also to prepare and implement ESIA/ESMP and other safeguards management plans required as per ESMF [Chapter 8, Chapter 9, Volume 2 of the PIM and Section AA ESMF]. The TSCs will support the ULBs in undertaking all the technical work for sub-project preparation including planning, preparation of engineering designs and safeguards instruments etc. For the procurement and contract management, the ULBs will be required to comply with the project procurement manual.
- 17) The detailed procedures for technical review and approval will be detailed out in Annexure A.3.2, according to the size, level of complexity, risk, etc. of the different sub-projects. Accordingly, the ULBs will be required to submit the necessary documents to DPMU for their initial review, who will then submit to SPMU for final review and approval. For the sub-project activities which require the Bank's prior review and no-objection, SPMU will coordinate the process of submitting the required documents to the Bank and seek no-objection before authorizing the ULBs to proceed with implementation.
- 18) Once the technical approvals and clearances have been obtained from SPMU on the DPR/ESIA and other technical documents, the TSC will also support ULBs in undertaking the procurement process, engaging the works contractor and supervising the sub-project implementation. TSCs will assist the ULBs in awareness generation, community mobilization and stakeholder engagement activities, and in preparing periodic physical and financial progress reports.
- 19) Irrespective of the size of Grant Allocation; Expenditure Limits; or the size of the Annual Development Plan approved, Grants will be disbursed only against actual expenditure incurred on subprojects (subject to compliance with Annual Triggers).

6.3.4. Disbursement

20) The Kerala State treasury system and existing local government financial management systems will be used for disbursing grants to the ULBs. In line with existing grants mechanisms, disbursement will not mean the actual/physical flow of cash to ULBs.

Payments to contractors, vendors or suppliers will be made directly through the existing treasury mechanisms.

- 21) ULB will forward copy of the work orders/bills/ receipts etc. to DPMU along with the quarterly Grant Utilisation Report (as referred to in Chapter 11) for a post disbursement check by DPMU. Along with other compliances DPMU will also verify the expenditure to determine the ineligible expenditure if any and consequentially any disbursement that need to be withheld in the following period.
- 22) As per KSWMP design, once a subproject is approved under Annual Development Plan and the detailed subproject design is approved by SPMU, the ULB is responsible for implementation and for compliance with all the guidelines. This approach needs to ensure that disbursement is quick once a ULB incurs expenditure, and is not unduly delayed due to verifications, compliance checks, etc. Therefore, the review of the compliance of the subproject with annual triggers (whether safeguards have been met, procurement guidelines have been followed, etc.) will be on post disbursement basis (part of the "Annual Trigger" review in 6.2.5). This will ensure that payment to contractors, vendors and suppliers are quick for approved subprojects; and that any non-compliance attributable to the ULB does not introduce delays.

6.3.5. Verification of Annual Triggers

- 23) The verification of "Annual Triggers" involves two steps a) DPMU verifying the compliance of the ULB in the last quarter of a financial year and b) corrective actions by the ULB in the next year.
- 24) Each subproject in KWSMP needs to conform with the following guidelines a) Eligible Expenditure and Expenditure Limits; b) technical guidelines & national/state regulations for SWM subprojects; c) Environmental and Social Safeguards systems as per ESMF; d) external statutory audit; and e) procurement systems as per project procurement manual.
- 25) "Annual Triggers:" The ULB, as the agency responsible for subprojects, needs to demonstrate compliance with the following conditions for the expenditure incurred.
 - a) For each Sub-project, the ULB shall undertake an environment and social impact assessment and prepare and implement an environmental and social management plan and other safeguards management documents in accordance with the provisions of the ESMF (including stakeholder consultations, surveys, investigations, primary data collection and any other necessary field work as necessary to comply with the provisions of the PIM and the ESMF);
 - b) The ULB will have received an unqualified or qualified audit opinion from KSAD which does not indicate observations that indicate pervasive financial management weaknesses and/or a pervasive lack of integrity of the financial statements, [for the financial year within two years of the period of review, i.e. for review during FY 2023, report for FY 2021 or FY 2022.]
 - c) The ULB shall have procured the goods, works and services for implementing Subprojects to be financed out of the Grant in accordance with the provisions of the Project Procurement Manual, part of the PIM.

- d) The ULB shall have complied with the national SWM rules 2016, technical guidelines and operational procedures laid out in the PIM for planning, designing and implementing SWM investment Sub-projects (including climate and disaster resilience);
- e) Each sub project is part of the Eligible Expenditure described in Annexure A.6.5
- 26) Beginning each January, the DPMU will verify the compliance of ULBs with AT for the expenditure incurred since the previous review. Usually, this review will cover the first three quarters of the current FY and the last quarter of the previous FY. DPMU will carry out the review of the ATs for the ULBs in their respective districts and submit the report to SPMU. During the same period, in parallel, the annual development plan will also be in preparation. Approval of the Annual Development Plan for the ULB will depend on whether the ULB has complied materially with the ATs. Depending on the nature of non-compliance, the remedial actions to be carried out in the next FY may be one or more of the following:
 - a) In case of ULB failing to receive an audit report as above, entire disbursement in next FY will be suspended until an acceptable audit is provided.
 - b) If no corrective action is possible, expenditure incurred (related to the non-compliance) will be declared ineligible and will not be financed by KSWMP. In such a case the expenditure incurred will have to be met by non KSWMP sources, and the ULB may have to propose new subprojects (not under implementation already) to utilise its Grant Allocation.
 - c) Part of annual plan for next FY, equal to the amounts which are non-compliant, will remain suspended, until corrective action has been taken by the ULB.
 - d) Disbursement in the next FY may be suspended to the extent of non-compliant expenditure, till the non-compliance is rectified.
 - e) Specific subprojects related to non-compliance, may be suspended in part or full, until corrective actions are taken.
- 27) Based on the review of DPMU, the SPMU will determine the extent of non-compliance, the corrective actions to be taken by the ULB and the extent to which subprojects and/or disbursement will remain suspended until corrective actions are completed. The DPMU will accordingly notify the Disbursement Limit for the ULB for the next FY. The Disbursement Limit for the next FY will be equal to the prevailing Expenditure Limit for the ULB less outstanding non-compliance related to all expenditure till period of review, i.e. based on review of AT carried out during January-February 2023, the Disbursement Limit will be set for FY 2024 (2023-24). The Disbursement Limit at the start of FY 2024 will be the Expenditure Limit at the start of FY 2024 (i.e. April 2023) less the outstanding non-compliance related to expenditure incurred till December 2022. Thus, even though expenditure is incurred in FY 2024, there may not be any disbursement till recoveries towards outstanding non-compliances are completed. The Disbursement Limit will not be separately set for Track 1 and Track 2 projects during the implementation period; and will be reconciled once at the end of the Project. It may be noted that Expenditure Limit is regularly set separately for Track 1 and Track 2 projects.
- 28) During the next FY, the ULB may rectify the non-compliance in ATs of previous years, and to that extent, the access to the Grant Allocation or part thereof may be restored. Thus, the ULB will be able to incur expenditure up to its Grant Allocation less any unrestored suspended

amount. Suspended amounts can be restored during the financial year without waiting for the next review of AT in January.

- 29) In case no corrective action is possible, the respective non-compliant expenditure will be declared ineligible. However, since disbursement would have already been made, the ULB will need to a) refund the disbursements (in case Grant Allocation has been fully disbursed) or b) incur expenditure on another eligible subproject with its own source of funds to adjust the disbursements already made. Effectively, to avoid a refund, the ULB will need to incur equivalent expenditure on a new subproject out of other source of funds.
- 30) The DPMU or SPMU do not restrict the phasing of projects by the ULB within a FY once the annual development plan has been approved by the DPC. They would only limit the disbursements to below the prevailing Disbursement Limit for the ULB. Therefore, it is the responsibility of the ULB to continuously track its progress in corrective actions and limit the actual expenditure below the Disbursement Limit. Until the Disbursement Limit is restored or enhanced adequately, disbursements will not be carried out even if expenditure has been incurred by ULB on approved subprojects.
- 31) The DPMU will notify the Disbursement Limit prior to the last day of February for the next FY; and immediately during the year in case of restorations/ enhancements.
- 32) The PMC will support the DPMU and SPMU; and the TSC will support the ULB in compliance and corrective actions.

6.3.6. Reallocation

- 33) Surplus funds arising out of reduction in Expenditure Limit and lapse of GAC as above will be pooled and reallocated among the fully eligible ULBs for expenditure from year 5. Fully eligible ULBs are those that have met all criteria for basic grant and incentive grant as on March 31, 2025 (i.e. their Grant Allocation is equal to their Grant Allocation Ceiling) and have at least incurred expenditure of at least 50% of Grant Allocation. The reduced or lapsed amounts will be reallocated among the fully eligible ULBs as follows:
 - a. The revised Grant Allocation for a ULB can be up to twice their current expenditure under the project. A ULB that has met all criteria for basic grant and incentive grant, and whose expenditure is, say 80% of its Grant Allocation, could have a revised Grant Allocation of up to 160% of its current Grant Allocation, provided surpluses exist for reallocation
 - b. The ULBs eligible for receiving additional allocation will be those that have met all criteria for basic grant and incentive grant as on March 31, 2025 (i.e. their Grant Allocation is equal to their Grant Allocation Ceiling) and have at least incurred expenditure of at least 50% of Grant Allocation
 - c. The maximum additional allocation possible(equal to their current expenditure) for these ULBs will be identified and totaled. If the amounts available for reallocation from lapsed funds is higher than this total amount, each ULB will receive an additional allocation equal to its current expenditure. If the amount available for reallocation is lesser than the total amount (say only 80% of total requirement), then each ULB will receive pro rata allocation (80% of its current expenditure)

34) Any unallocated grants remaining after the iterative reallocation exercise will be transferred to other components of the project.

6.4. Institutional Arrangements

1) The institutional arrangements for Component 2 are aligned with the overall structure for the KSWMP. Key agencies involved in Component are the Suchitwa Mission, ULBs, District Planning Committee, State Program Management Unit and District Program Management Unit. Support agencies are the Project Management Consultant and the Technical Support Consultant. Activity-wise detailed responsibility matrix is provided in the respective sections of this Grant Management Systemand an overview is presented below.

Unit **Key Activities Decision making authority** Suchitwa Mission Implementation agency for Determining the GAC for each ULB. represented by administering Component 2 Allocate grants to ULBs. **Project Director** Reallocation of lapsed grants among other ULBs. Determining amounts to be recovered from ULBs at the end of the Project due to non-compliance. Approval for individual subprojects, depending on the size and complexity as per the sub-project guidelines of KSWMP. (refer to Section 3.7: Project Approval Matrix). Set expenditure Limits. Determining satisfaction of Annual Triggers by ULBs. SPMU, represented Managing the entire grant system. Determine non-compliance based by Deputy Project Annual budgeting and planning for on DPMU's review report. Director. Component 2. Determining corrective actions to Verify if eligibility criteria have be taken by ULBs and restoration of The SPMU will be been met. An IVA will verify the suspended amounts/sub-projects supported by the achievement of eligibility criteria. etc. Project All administrative actions such as Appraisal of sub-projects as per Management a) preparation of draft sub-project guidelines (refer to Consultant (PMC) Participation Agreement, b) Section 3.7: Project Approval in its activities. appointment of independent Matrix) verification agency, c) finalising verification protocol etc. DPMU Executing all district and field level activities. The DPMUs will be Communication channel between supported by the SPMU and the ULBs. district teams of Supporting District Collector and PMC in their DPC in review of SWM component activities. of annual development plan.

Supporting SPMU in appraisal of

sub-projects.

Table 6-2: Overview of Responsibilities related to grants
Unit	Key Activities	Decision making authority
	Review of Annual Triggers and progress reports submitted by ULBs. Verification of expenditure, bills and disbursement limits of ULBs. Supporting District Treasury in disbursement. Ensuring submission of periodic progress and compliance reports by ULBs.	
District Planning Committee. supported by the respective DPMU		Approving the SWM subcomponent of the Annual Development Plan following the existing GoK guidelines.
District offices of GoK supported by the respective DPMU	Disbursements will be made directly to contractors, vendors and suppliers will be made by the District Treasury as per existing GoK procedures.	-
ULBs Technical Support Consultants will support the ULBs in all their activities in Component 2.	Signing the Participation Agreement. Achieving Eligibility Criteria. Preparing multi-year SWM plan. Preparing SWM subcomponent of Annual Development Plan. Preparation, procurement and implementation of sub-projects. Compliance with all KSWMP guidelines, GoK guidelines and Grant Management Systemincluding compliance with Annual Triggers and corrective actions. Submission of bills to DPMU for disbursement of grants. Submission of periodic compliance	Multiyear SWM plan. Annual Development Plan outlay and choice of subprojects. Procurement. ULBs will follow applicable KSWMP and GoK guidelines.

6.5. Illustration

1) Figure 6-3illustrates the Grant rules.



Figure 6-3: From GAC to Disbursement

- 2) At the start of the program the GAC of a ULB is determined (Step 1). This is the maximum Grant the ULB can receive during the project. The GAC will be adjusted once after Year 2 and once after Year 4 by reallocating the lapsed GAC of ULBs that did not meet deadlines.
- 3) Actual Grant Allocation is made in Step 2 based on quarterly verification. Some part of GAC is not yet allocated since the ULB has not met all the Eligibility Criteria. As and when the ULB meets the remaining criteria, its Grant Allocation will increase and eventually match GAC.
- 4) The SWM component of the Annual Development Plan (Step 3a) is the planned expenditure of the ULB. It will be based on the SWM plan. The size of the annual plan could be lower than the Grant Allocation since the ULB cannot take up all sub projects at once; and also, since its multi-year SWM plan may have an inbuilt phasing and sequencing. Therefore, there is an unutilised Grant Allocation, which the ULB will utilise in later years. The Annual Development Plan for a financial year is finalised in the last quarter of the previous financial year; therefore, the sizing of the plan will be based on the Grant Allocation which the ULB anticipates reaching in the following year. Thus, the size of the Annual Development Plan need not match the Grant Allocation. It could be higher or lower depending on the plans of the ULB, but it cannot exceed GAC.
- 5) In the fourth quarter of the previous FY, the SPMU would have also reviewed the compliance of the ULB with Annual Triggers for the expenditure already incurred. It is possible that some subprojects did not comply with the Annual Triggers, but expenditure has been incurred and disbursements have been made. Based on the extent of non-compliance, the SPMU would identify amounts that would be suspended from disbursements of the forthcoming FY (Step 5). The ULB would have been able to address some non-compliance (5b) during the financial year, but some non-compliance may still be outstanding (5a).

Therefore, during the FY, amounts corresponding to the outstanding non-compliance will continue to remain suspended and will not be payable.

- 6) Due to implementation bottlenecks or time overruns, the ULB may implement only a part of its annual plan (Step 3b). Therefore, actual expenditure is less than planned expenditure.
- 7) Step 4 indicates actual disbursement. This is equal to the actual expenditure (3b) incurred less amounts that remain suspended(5a). Therefore, actual disbursement at any point of time (Step 4) may be less than actual expenditure, even though the ULB has adequate Grant Allocation. The term expenditure here refers to the value of work completed and certified by the ULB.
- 8) The working of Grant Allocation system is illustrated through a numerical example in Table 6-3: Illustration of Grant Administration for a small ULB of population approximately 37000. A small ULB of approximately 37,000 population (as per Census 2011) has been taken for illustration. All the values in the table are for illustration only. The detailed rules applied in this illustration (e.g. Eligibility Criteria for Grant Allocation, rules for reallocation) are described in the individual sections of the Grant Management System. All values are **cumulative progress** at the end of the year. During the course of the financial year, the status of expenditure, disbursement etc. would vary; and the end of year status will not fully represent the status during the year.

All Values are in Rs.	End of	Cumulative Progress					
Cr.	Project	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
1. Grant Allocation	8.10	6.23	6.86	6.86	6.86	8.10	8.10
Ceiling (GAC)							
1a. Multi-year SWM	7.40	0.70	1.64	3.00	5.61	7.01	7.40
plan and yearly							
planned expenditure							
outlay as per SWM							
plan							
2. Grant Allocation	8.10	2.49	3.43	4.11	6.86	8.10	8.10
based on eligibility							
criteria met							
3a. Annual	7.40	0.70	1.64	2.03	5.61	7.01	7.40
Development Plan							
(KSWMP component)							
3b. Actual Annual	7.36	0.45	0.96	1.92	4.77	6.65	7.36
Expenditure							
4. Net disbursement	6.57	0.45	0.78	1.67	4.28	5.33	6.57
after adjusting for							
outstanding non-							
compliance (from 5c)							
5a. Annual Trigger	4.62	0.30	0.73	1.58	3.40	4.12	4.62
review- Non-							
Compliance to be							
addressed in next FY							

Table 6-3: Illustration of Grant Administration for a small ULB (population approximately 37000)

All Values are in Rs.	End of	Cumulative Progress					
Cr.	Project	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
5b. Non-compliance	3.34	-	0.12	0.48	1.08	2.08	3.34
redressed							
5c. Outstanding non-	1.28	-	0.18	0.25	0.5	1.32	0.78
compliance of							
previous years							
5d. Part recovery of	0.78	NA	NA	NA	NA	NA	NA
non-compliance from							
disbursements							
5e. Amounts to be	0.49	NA	NA	NA	NA	NA	NA
refunded by ULB to							
fully address non-							
compliance at end of							
Project							
6a. Reallocation at end			+0.63				
of Year 2							
6b. Reallocation at						+1.24	
end of Year 4							

Note:Due to rounding off, some numbers may not match.

Step 1. The GAC for the ULB at the start of the Project is Rs 6.23 Cr. The ULB signs the Participation Agreement and starts participating in the project. At the end of Year 2, some ULBs have not signed the Participation Agreement and their GAC lapses. This is reallocated among other ULBs including this ULB. As a result, its GAC increases to Rs 6.86 Cr (based on Step 6a). Similarly. after Year 4, the GAC of ULBs that did not meet all the Eligibility Criteria is reallocated including to this ULB(based on Step 6b). Its GAC increases to Rs 8.10 Cr as a result.

Step 1a: The multi-year SWM plan prepared by the ULB (Step 1a) has an outlay of Rs 7.4 cr. This is higher than its starting GAC of Rs 6.23 Cr. However, since the ULB receives two additional allocations, the final GAC (8.10 Crores) is higher than the SWM plan outlay. Thus, the ULB would be able to fully implement its initial SWM plan. It could have also updated its SWM plan to match it to its final GAC, but it has not done so. The SWM plan has a year wise phasing of expenditure.

Step 2: The ULB signs the Participation Agreement in the first year itself and receives 40% Basic grant immediately (2.49 Cr). It meets all eligibility criteria gradually, and at the end of Year 4, its Grant Allocation has equaled its GAC (revised) of 6.86 Cr. Thus, its GAC does not lapse. Its GAC is further revised to 8.10 Cr at the end of the fourth year.

Step 3a: Every year, the ULB proposes a SWM subcomponent of the Annual Development Plan which is based on the SWM plan. The phasing of expenditure is as per the master plan except for Year 3, where it is lesser than the masterplan, probably since the subprojects may not be technically ready for implementation.

Step 3b: The actual expenditure falls short of plan in the first and second years. It is able to increase the pace of implementation in later years, ending up with final expenditure of Rs 7.36 Cr, a shortfall of only Rs 0.04 Crores as compared to the planned expenditure at the end of the Project. Further, the ULB also does not fully utilise its GAC since its masterplan was smaller;

though it would have been able to propose additional subprojects in years 5 and 6 as its GAC increased after reallocation from other ULBs.

Step 4: The ULB incurred an expenditure of Rs 0.45 Cr in the first year. As there are no outstanding compliance issues since this is the first year, the expenditure is fully disbursed. In later years, there are outstanding non-compliances from previous years. Therefore, disbursement is consistently less than expenditure. At the end of the Project, the disbursement is only Rs 6.57 Cr as against an expenditure of Rs 7.36 Cr.

Step 5: Each year the review of "Annual Triggers" identifies non-compliance (Step 5a). These are corrected in the following years, but not fully (Step 5b). Out of Rs 0.3 Crore of non-compliance related to Year 1, Rs 0.12 crores is corrected in Year 2, leading to an outstanding non-compliance of Rs 0.18 crores at the end of Year 2. The disbursements of second year are therefore reduced (in Step 4) to recover this non-compliance of the first year that is still not corrected. Thus, the disbursement in the second year is less than the actual expenditure by Rs 0.18 crores (the outstanding non-compliance - 5c). This "Annual Trigger" and adjustments cycle continue till the sixth year. At the end of the project outstanding non-compliance is Rs 0.78 Cr (Step 5d). This is deducted from expenditure and therefore the actual disbursements are only Rs 6.57 Cr against an expenditure of Rs 7.36 Cr.

Step 5e: The Annual Trigger review of the sixth year identifies further non-compliances (Rs 0.49 crores). The disbursements for the year have already been made by January when the review comments. The project duration is completed and therefore this cannot be adjusted against future disbursements for the sixth year. Therefore, the ULB has to refund this amount of Rs 0.49 Cr (Step 5e).

Step 6: In the last quarter of the second year, the GAC of ULBs that did not sign the Participation Agreement are reallocated. This ULB benefits from the reallocation and Rs 0.63 Cr is added to its GAC (Step 6a). However, its GAC is still short of its SWM plan outlay. At the end of the fourth year, the GAC of ULBs that did not meet all the eligibility criteria is also reallocated and this ULB benefits from the reallocation by Rs 1.24 crores (Step 6b). This second reallocation takes its GAC higher than SWM plan outlay.

Overall, the ULB secured adequate GAC to implement its SWM plan in a timely manner. However, it did not propose additional subprojects to fully absorb the additional GAC it was allotted during the project. A small amount of expenditure (Rs 0.04 Cr) remained unspent at the end of the project. Due to non-compliance in following the relevant guidelines and due to not correcting them fully in the subsequent years, it received less disbursements than actual expenditure(Rs 0.78 Cr); and also had to refund part of disbursements (Rs 0.49 Cr).

Chapter 7. Technical guidelines for SWM sub-projects

The project is designed to support investments at ULB level to develop new/upgrade the existing SWM facilities (Component 2) and regional level investments for development of processing and recycling facilities for municipal solid waste which will be directly undertaken by SPMU and SM (Component 3). These activities will be preceded by development of a ULB level SWM Management Plan, which will provide detailed set of activities and sub-projects to be undertaken by ULBs during the Project duration of 6 years. The ULB level SWM plan will be prepared by ULBs and approved by the Project Director prior to ULBs committing expenditure under Component 2. The ULB level SWM Plan will be complemented by appropriate project plans at SPMU level for regional level investments. For the investments proposed to be undertaken at the ULB level, the project will support a hybrid service delivery model by supporting both decentralized and centralized waste management solutions with customized suite of technology options suited to the geographical and demographical context of Kerala. The regional level investments will include the development of regional processing and recycling facilities for municipal solid waste, construction and demolition waste and medical waste, regional sanitary landfill facilities (SLF) and transfer stations for solid waste disposal, and closure/remediation of existing waste dumpsites. Table 7-1 provides a list of sub-projects that will be supported under these components:

			De alternal Level Level attended		
OLB Level investments – Component 2		Regional Level Investments –			
		00	inponent o		
a)	Primary collection & transportation	a)	Regional Recycling/ Treatment /		
	handcart/tricycles and vehicles and		Processing Facilities		
	secondary Transportation vehicles.				
b)	Equipment for Household/community level	b)	Transfer Stations		
	SWM treatment facilities by adopting	റ	Regional Dumpsite closure and		
	technologies specified/ recommended in	cj	remediation and development of		
	herein.		incremental disposal cells as interim		
c)	Setting up Biodegradable Waste Treatment				
	Plants such as centralized Composting	d)	Creation of regional sanitary landfill		
	plants/ Bio methanation Plants.		facilities		
d)	Setting up Sanitary Landfills (single cells or				
	multiple cells) as intermediary facility.	ej	Regional - C&D waste processing		
e)	Closure or Remediation of existing		facilities		
	dumpsites	f)	Regional - Biomedical waste		
f)	Setting up/Upgradation of MCF,MRF –	-)	treatment facilities		
	(Restoration or construction including				
	procurement and installation of equipment)	g)	Integrated waste management facilities		
g)	Other activities:		including two or many of the above		
	Routine public space				
	cleaning/sanitization and other waste				

Table 7-1: List of sub-projects supported under Components 2 and 3

ULB Level Investments – Component 2	Regional Level Investments – Component 3
 management activities related to COVID19 like procurement of protective gears and equipment for sanitation workers. Financial support to existing women self- help groups engaged in ongoing waste collection services Payment to C&T contractors (ref in #1 under component 1 projects in this table) Implementation of environment and social risk mitigation actions as per ESMF-TDF-RPF 	
• Operation and maintenance support for tipping fee for regional disposal facilities.	

Given below is the flow chart of MSW and C&D waste.



Municipal Solid Waste Management flowchart

Figure 7-1: Municipal Solid Waste Management Flowchart

7.1. Preparation of SWM Plan by ULBs

The value chain of municipal solid waste management typically consists of seven stages: waste generation, segregation & storage at source, primary collection, secondary collection, transportation, processing and disposal. Currently, there are several gaps and challenges at each step of this value chain which includes reduced collection, further reduced recycling and dumping of unprocessed waste. There is a strong need to treat waste as a resource and focus attention on waste minimization with active community participation adopting the concept of Reduce, Reuse, Recycle and Recover (RRRR) as an integral part of SWM strategy and take planned measures to ensure implementation of SWM Rules 2016. The PIM focusses on an integrated approach to SWM in urban areas which includes a combination of initiatives at the ULB level and at a regional level.

a) Preparation of a SWM Plan:

A SWM Plan, which will be the backbone for planning, design and implementation of subprojects under component 2 will have to be prepared by ULBs with technical support from their respective TSCs and approved by the Project Director prior to its implementation (please refer Responsibility Matrix – C2-RM1 attached at Annexure A.3.2 in Volume 3. for institutional responsibilities). The following shall be the key components of the integrated SWM planning:

Aspects	Details (as is)	Plan (provide detailing of the			
Waste Minimisation and Source Segregation	 Current waste reduction practices if any Current source segregation level Challenges in source segregation 	 Plan for further reducing waste Plan for increasing source segregation Target segments 			
Source Treatment	 Number of units distributed Number of units currently working and life of these Type of waste Successful source treatment models Willingness of citizens Land availability in individual generator premises 	 Optimal source treatment levels/targets Source treatment promotion plan and yearly targets Number of each category of source treatment unit to be distributed Any subsidy/discount or free distribution Plan for audit of source treatment – frequency, actions during audits, formats, reporting of audit to Suchitwa Mission SOPs for each method 			
Collection and Transportation	 Extent of C&T & frequency Types of waste Extent of C&T & frequency Manpower engaged- and 	 Coverage of C&T (100% of balance BDW after source treatment and 100% NBDW mandatory) Manpower engagement models Manpower requirement 			

Table 7-2: Key components of the integrated SWM planning

Aspects	Details (as is)	Plan (provide detailing of the following as part of the SWM plan)
	 agencies and existing municipal workers" Challenges -Type of premises , geography & roads Vehicles engaged and adequacy Condition of vehicles – including regular cleaning & maintenance 	 Vehicle requirement with type of vehicle, capacity of vehicle etc. Manpower allocation for C&T Transportation plan (primary and secondary) with vehicle allocation and manpower allocation with route depiction on map Operation and maintenance plan for Vehicles Collection timing and weekly rest days plan for staff
Transfer stations/secondary segregation locations	 Existing transfer station/segregation points Area Challenges/issues Public grievances 	 Area requirement Identified land Activities planned Arrangement for weighing collected waste Staff allocation at transfer stations Machinery/equipment monitoring plan
Resource Recovery Recycling	 Current recycling efficiency Percentage of recyclables Collection and accumulation of recyclable plastics Management of non- recyclable 	 Waste Quantities Integration of informal sector Inert management
Processing	 Existing processing practices Community facilities Legacy waste Sale of compost or other products Accumulation of compost Residue disposal 	 Land availability – area, location, geo tags etc. Processing plan- centralized /community Capacity estimation Method of treatment Forward linkages for by products like compost, biogas etc. Residue disposal Need for regional facilities Willingness to participate in regional facilities
Disposal	 Site details as per site selection criteria Contour map Hydro-geological report 	 Quantity of waste coming to SLF after processing Future projections of Waste to SLF Allocation of funds

Aspects	Details (as is)	Plan (provide detailing of the following as part of the SWM plan)
Dumpsites	 Number of dumpsites in the city along with area The volume of legacy waste as estimated Waste analysis of the legacy waste 	 Type of remediation suggested – biomining or closure Area that that can be recovered for use
MIS , Monitoring ,Compliant redressal system		 Route Management using tracking system Real time monitoring ICT enables complaint redressal system
IEC	Current IEC activities	 IEC Plans Target segments and coverage Tools for IEC Locally relevant agencies/ groups and in all above gap identifications & proposals

b) Implementation of sub-projects:

After the approval of the SWM Plan by the Project Director, ULBs will commence the Planned activities/projects by undertaking the Planning, Design and Implementation activities by following the Technical Guidelines detailed herein and by following the operational procedures detailed in Chapter 8 [please refer Responsibility Matrix C2-RM2 to C2-RM7 attached in Annexure A.3.2 in Volume 3for institutional responsibilities and the sub-project flow charts attached at Annexure A.3.7 and Annexure A.3.8 in Volume 3for project wise activities]. Similarly, SPMU will conduct a detailed project planning for regional investments and obtain approval from the Project Director and LSGD prior to commencing the Design and Implementation activities by following the Technical Guidelines detailed herein and by following the operational procedures detailed in Chapter 9 [please refer Responsibility Matrix C3-RM1 to C3-RM8 attached in Annexure A.3.2 in Volume 3for institutional responsibilities and the sub-project flow charts attached at Annexure A.3.7 and Annexure A.3.8 in Volume 3for project wise activities]. These activities include preparation of detailed conducting detailed technical due diligence and feasibility studies, DPRs, engineering drawings, and obtaining Administrative and Technical Sanction from respective authorities as per the Project Approval Matrix attached at Annexure A.3.2 in Volume 3.

7.2. Technical Guidelines for Waste Minimization, Segregation, Collection and Transportation of Solid Waste

The entire process of Waste minimization, segregation, storage at source, collection and transportation shall be in line with the SWM Rules 2016, State Policy -2018, SWM Strategy as notified by LSGD [refer G.O. (Rt) No. 811/2020/LSGD dated01/05/2020]and as per the Guidelines presented in this document and amendments from time to time.

The broad breakup of the four steps of waste minimization, segregation & storage at source, collection and transportation is presented in the flow chart.



Figure 7-2: Flowchart four steps in C&T of SWM

7.2.1. Waste Minimization

The ULBs shall ensure that the waste minimization program containing the following are an integral part of the SWM plan. This plan shall include at a minimum the following:

- Define the waste minimization strategy and set targets including defining types of waste and quantities against each type
- Identify main generators of waste.
- Define sectoral waste minimization potentials.
- Framework for effectively implementing EPR and other supporting agencies

The following section contains the technical guidelines that the ULB needs to adopt for achieving waste minimization across different entities.

a) <u>Reduction of waste at source</u>

The ULBs shall undertake the following initiative based on the profile of the generator in addition to enforcement of the Single Use Plastic Ban imposed by Government of Kerala with a view to minimise waste in the city.

Source	Measures to be evaluated and enforced by the ULB to reduce waste at
	source
Households	 ULBs through appropriate IEC initiatives shall make regular communication to households on the following to undertake surveys at regular frequency to understand behavioural changes towards waste minimization Use cloth, jute bags for shopping & multi pocket cloth bags for purchase of vegetables;
	 Avoid taking plastic carry bags from the vendors

Table 7-3: Measures to reduce waste at source

Source	Measures to be evaluated and enforced by the ULB to reduce waste at source
	 Use refills wherever possible and avoid purchasing in small packs
	 Purchase non-perishable items in bulk:
	Segregate the waste and sell/handover clean recyclables to
	vendors/recyclers
	 Do home composting and use the compost in kitchen garden
	 Use of tap (filtered) water instead of mineral water to reduce plastic bottle
	waste
	 Use reusable material instead of disposable such as cutlery, plates etc.
Hotels	ULB's shall issue directives to generators falling in this category to promote
&restaurants,	waste reduction
Marriage&	 Practice green protocol – use ceramic, steel, glass items which can be
function halls	washed and re-used
	 Use of filtered tap water instead of mineral water to reduce plastic bottle waste
	 Use eco-friendly plates, cups, straws, spoons, forks, etc.
	 Pass on food waste as animal feed (Pig farmers collect such waste)
	 Use eco-friendly table mats such as naner/hamboo mats
	 Use coir floor mats
Offices	III Bs through appropriate IFC initiatives shall make regular communication
onnees	with the generators in this segment on the following:
	 Practice green protocol
	 Make serious efforts to get furniture, computers, printers etc.; repaired
	before discarding them as unserviceable
	Reduce the use of paper to the extent possible, use recyclable paper and
	both sides of paper for writing or printing
Shops, malls,	ULB's shall issue directives to generators falling in this category to promote
textile shops	waste reduction
_	 Provide cotton/jute bags to consumers only on demand and at additional
	cost
	 Refrain from keeping items for sale in plastic bags
	 Keep grains in reusable jute bags or recyclable bags/containers
	 Promote& practice sale of groceries & other product in a loose form
	 Set up refill counters for oil, liquid soap and other similar products;
Production	ULB's shall issue directives to generators falling in this category to promote
centers	waste reduction
	 Use recyclable packaging material
	 Avoid ornamental packaging
	 Promote manufacturers to reduce packaging and take back the packaging
	material for recycling or reuse
	 Motivate industry to design products that are durable, repairable, can be
	recycled at the end of their useful life
All generators	shall be encouraged to do an audit and make list of what all they can avoid,
reuse, recycle.	

b) Reuse of Waste

The ULBs as part of the plan shall accommodate the following

- Plan for drop off centres (reuse centres), swap shops in city to facilitate deposit of discarded but otherwise usable/repairable items.
- Promote circular economy in making such items available to the poor and needy
- Reuse NBDW to manufacture usable goods.
- Plan for alternative productive use of C&D waste in road construction, landfill, etc.
- c) ULBs shall Promote 'Extended Producer Responsibility (EPR)' and plan to set upreverse logistics where retail chains use their distribution system to collect broken or damaged products for repairs, reuse, disposal etc. ULB shall develop a framework based on Plastic waste Management Rules 9.1, 9.2 & 9.3. In the event, the same is not practically enforceable, the ULB shall collect fee/charges from the producers and utilize the same for engaging informal sector on a contractual basis (governed by SLBs) and also in IEC activities.

7.2.2. Segregation and Storage of Waste at Source

The ULBs shall strictly enforce among all waste generators the segregation of waste in terms of Rule 4 of SWM Rules, 2016 into the following 3 main components.

- (i) Biodegradable waste
- (ii) Non-biodegradable waste
- (iii) Domestic Hazardous Waste

Store sanitary waste separately and hand over to waste collector.

The enforcement by the ULB shall also include ssegregation and separate storage of waste at source as listed below. The list shall be consistently updated from time to time based on changes in the definition of waste categories introduced by Government of India or Government of Kerala as the case may be.

Category	Type of waste
Biodegradable	Food waste of all kinds; cooked/uncooked: Kitchen Wastes, Fruit and
Waste	Vegetable peels, meat, fish, Bones, egg Shells, flowers & garden leaves,
	grass, etc.
Recyclables, Inert,	Paper, card boards, cartons, Glass, ceramic, Plastic, Metals, Foils, Rags,
Sanitary waste	Leather, Rexene, Rubber, Thermocol, and packaging materials Wood,
	coconut shell, Sand silt/ stone, inert;
	Sanitary waste- used diapers, sanitary towels or napkins, tampons,
	condoms, incontinence sheets etc. warped separately
Domestic	Used /expired medicines, used, injection needles and syringes after
Hazardous waste	destroying them both;
	Thermometers & mercury containing products;
	Paints, oils, lubricants, thinners & empty containers, chemicals, solvents
	and their empty containers;
	Fluorescent tubes, Spray/ aerosol cans, pesticide, insecticide containers,

Table 7-4: Categories of waste & types of waste covered in each category

Category	Type of waste	
	batteries, discarded medicines;	
	Thermometers and other mercury containing products.	
The bulk waste, garden waste, C&D waste have to be kept in premises separately or taken to		
area notified by the ULB for the purpose of storage/treatment & disposal.		

Planning, design & implementation of segregation & storage at source: The planning process has to be carried out by ULB in consultation with stakeholders.

a) Planning Process:

The ULB shall ensure that the planning process is consultative with the stakeholders across generator categories. This shall at a minimum include the following aspects. The ULB shall notify these requirements in line with 327 (1) Kerala Municipality Act, 1994.

- Assessment of source level storage requirements
- IEC plan with stakeholders (through necessary medium) to drive the agenda of waste segregation and storage at source as a mandatory responsibility
- Finalize the bin requirement based on generator profile, waste quantity, compatibility with the collection vehicle and ease of handling while transferring to C&T vehicles.

b) Design aspects

The ULBs while considering the design of the C&T system shall consider storage capacity based on density of waste. Indicatively - Wet waste $(400-500 \text{ kg/ m}^3)$ Dry waste (200-300 kg/ m³) and the quantum & type of waste generated at the premises.

The general requirements for designing storage bins are:

- Size: Bins should be large enough to accommodate waste quantities considering the generation volumes (including 100% spare capacity as a contingency). For e.g.; household having 5 members, the expected daily generation of waste would be around 1.5 kg biodegradable wastes, non-biodegradable waste would be around 0.3 0.5 kg having a density of about 200 300 kg/ m³. However, such containers shall not exceed 40 litres capacity (for households) with load not exceeding 25 kg could be used for manual transfer of waste into the collection vehicle.
- For institutional and commercial segments, the generators shall be encouraged to have sizes of storage containers customised to suit their requirement. Wheeled bins (DIN EN 840) ranging from 60 – 1100 litres could be used for storage of waste in large premises.
- The **shape** used shall facilitate easy emptying with a larger dimension on top and shall be stable without risk of overturning
- **Durability**: The containers should be sufficiently durable, resistant to mechanical damage and corrosion. Household bins may be of high-density polyethylene (HDPE)/low-density polyethylene (LDPE) or durable plastic or metal, rubber , and larger bins for commercial, institutional or market premises may be of metal or HDPE/LDPE of virgin material, rubber etc.

- **Top lid/cover**: All bins should have a top HDPElid or hinged/sliding door which has to be kept closed to prevent odor, fly nuisance, water entering during rains etc.
- Bins/containers must be compatible to loading vehicles.

The ULBs shall use the indications provided in the following table for storage planning for wastes across categories.

Source	Storage of Segregated Waste				
	Biodegradable waste (Green Colour Bin)	Non-biodegradable waste (Blue color bin)	Domestic Hazardous waste (Brown color Bin)		
Households	10-15 litres capacity plastic/ reinforced plastic/ HDPE LDPE/metal, rubber bin with lid	20 litres capacity plastic/ reinforced plastic/ LDPE/meta rubber bin with lid is least preferred -	20 litres capacity plastic/ reinforced plastic/ LDPE/metal/rubber bin with lid for holding the waste for one month		
Hotels & Restaurants	60 -1100 litres capacity- LDPE/HDPE/metal bins-two/four wheeled -DIN –EN standard	60-1100 litres capacity- LDPE/HDPE/metal bins- two/four wheeled- DIN –EN standard	60-120 litres–Two wheeled DIN –EN standard		
Shops, offices & institutions	20-60 litres -more than one number if required. 220-1100 litres in supermarkets and Malls- wheeled -DIN – EN standard	20-60 litres - more than one if required 240-1100 litres in supermarkets and Malls - wheeled -DIN –EN standard	20-60 litres - more than one number if required.		
Market Stalls	40-60 litres bin- LDPE/HDPE forstalls 1100 litres DIN-EN standard Bin / 2.2-4.5 m ³ MScontainer in the waste collection yard	40-60 litres bin- LDPE/HDPE forstalls 1100 litres DIN-EN standard Bin / 2.2-4.5 m ³ MS container in the waste collection yard	60 litres - more than one number if required or wheeled bin of 120- 240 litres capacity per stall		
Vegetable & fruit stalls	40-60 litres bin- LDPE/HDPE forstalls 1100 litres DIN-EN standard Bin / 2.2-4.5 m ³ MScontainer in the waste collection area	40-60 litres bin- LDPE/HDPE forstalls 1100 litres DIN-EN standard Bin 2.2-4.5 m ³ MS container in the waste collection yard	60 litres - more than one number if required		
Meat, chicken & fish stalls	40-60 litres non- corrosive bin 1100 litres DIN-EN standard Bin / 2.2-4.5 m ³ MScontainer in the waste collection area	40-60 litres non- corrosive bin 1100 litres DIN-EN standard Bin / 2.2-4.5 m ³ MScontainer in the waste collection area	60 litres non-corrosive bin - more than one number if required		
Large	1 1100 litres	1100 litres	ou litres- more than one		

Table 7-5: Specifications for Three -Bin System of Waste Storage at Source

Source	Storage of Segregated Waste			
	Biodegradable waste (Green Colour Bin)	Non-biodegradable waste (Blue color bin)	Domestic Hazardous waste (Brown color Bin)	
Marriage/town halls	DIN - EN standard bins matching to Municipal Collection system	DIN - EN standard bins matching to Municipal Collection system-	number if required.	
Hospitals, nursing homes	40-60 litres capacity bin for non-infectious food & biodegradable waste Large hospitals – DIN –EN standard 1100 litres bins	40-60 litres capacity bin for non-infectious non-biodegradable waste & biodegradable waste Large hospitals – DIN –EN standard 1100 litres bins	Store waste as per Bio- medical Waste Handling Rules 1998	
Construction/ Demolition waste	Dumper/ Skips of 3- 4.5 municipality depending	m ³ or of the size and cap on the collection vehicle	pacity specified by e deployed	
Garden Waste	Store within premises/Synchronize trimming of gardens with the schedule of municipal collection / Deposit in large community bin or to the municipal vehicle arriving on pre-determined days			
Dry Bulk waste –Broken furniture, damaged beds, pillows and similar items or give to charity	Store separately and handover bulk waste collection crew of ULB. Deposit at Drop off facility at MCF or at site notified by ULB.			

7.2.3. Collection and Transportation of Waste

The ULBs shall develop C&T Plan in compliance with Clause 15 of SWM Rules 2016 Manual of Solid Waste Management - 2016 Chapter 2 in Part 2 of the Manual gives detailed technical guidelines on Collection & Transportation. Target is 100% for collection and transportation as suggested in Service Level bench marking - Ministry of Housing and Urban Affairs, Govt. of India

Based on the ULB level SWM plan, the ULBs shall adopt any one of the following C&T arrangements for waste

- 1. System linked with secondary storage containers.(container station) where the primary collection equipment/vehicle such as containerized handcart /tricycle transfers the waste to color coded secondary storage containers *and these container are emptied by large designated collection vehicles to take to waste to respective treatment facility or MRF as the case may be.*
- 2. System where the primary collection is done through handcart /tricycle/ small motorized vehicles having partition for separate collection of Biodegradable & non-biodegradable

wastes and deposition of segregated wastes directly at the respective treatment facility /MRF - *bin-less system*.

3. System linked to transfer station where long distance transportation is necessary. Here primary collection vehicles take the segregated waste to transfer stations or locations where an additional facility is provided for transfer of segregated waste into large containers to facilitate transportation to processing facility at a long distance. This system may be adopted where the processing facility /MRF is situated at a distance greater than 15-20 Km and it may be ensured that no littering takes place while transferring waste to the designated vehicle and NBDW is moved directly into MCF/MRF.



Figure 7-3: Flow chart –Collection and transportation

The former one requires secondary storage area where skip containers will be kept for transfer of waste from primary collection vehicle, while the second one requires no containers, but space for vehicle to vehicle transfer –Transfer point. Split level transfer stations shall be planned by the ULBs in case of a regional/cluster level facility, requiring long distance transportation

The ULBs shall adopt among the following as options for C&T vehicles:

- Push carts or tricycles provided with 6/8 containers, each of 40 litres size (25 kg with waste) for lifting and unloading to secondary container/vehicle.
- Motorized vehicle: Auto three-wheeler(1.5 cum)/Mini truck (2.25 cum) and LCV with side loading facility (3.00 cum).All vehicles will have high light tipping facility to enable tipping directly to container/hopper of refuse compactor/treatment yard

The options for secondary collection vehicles are:

- Refuse compactor: 6 /12/14/18 m³ capacity
- Dumper placer/skip loader dual or single 3.5 /4.5 /6m³ skip/ dumper
- Hook loader for bulk transportation of 20-25 TPD for long distance haul.

Electrical and compressed natural gas (CNG) vehicles shall be introduced initially for primary collection .In the later stage of the Project , vehicles with compressed bio-gas may be inducted in the fleet on establishing Bio-CNG plants

a) Planning, Design and Implementation of C&T System

This section briefly describes a collection & transportation plan with minimum exposure of waste, and which avoids multiple and manual handling of waste and on the principle of **no waste no ground**". Table 7-6provides an outline of vehicle and equipment proposed for the system

Sources	Primary Collection		Secondary
	Vehicle	Collection frequency	collection & transportation
Households, Settlements, small/medium non- domestic sources having narrow access	Hand cart with 6 nos. – each 40 litres capacity bins with one waste collector/ Tricycle with 6/8 nos. 40 litres capacity bins with one waste collector Covers 200-250 households/day	Daily collection of segregated wet & wet waste and need based collection of domestic hazardous waste ULBs have option to collect dry waste weekly once/twice	Refuse Collector 6 - 16 m ³ capacity with hopper for collecting waste from designated collection/transfer point for to biodegradable & non- biodegradable waste treatment facility
Residential and commercial areas having motorable access roads	High lift mini tipper 1.6 -1.8 m ³ driver + two waste collectors LCV or Roll top mini covered truck-2- 3 m ³ driver+ two waste collector1500 - 2000	Daily collection of biodegradable waste and weekly collection of non- biodegradable waste.	Direct transfer of waste to processing facility/MRF if situated within 15 km or through refuse collector/ compactor of 6 -16 m ³ capacity
High rise Residential apartments, Shopping Malls, commercial complex, Community & marriage hallsDepending upon the size of complex and capacity of RC deployed Refuse collector of 10 -16 m³ capacity with universal bin lifting system to		Daily collection of biodegradable waste and weekly collection of non- biodegradable waste.	Direct transfer of waste to processing facility. In exceptional case, if distance to processing facility is over 25 km, the compactor may transfer the waste in

Table 7-6: Primary Collection & Transportation System

Sources	Primary Collection		Secondary	
	Vehicle	Collection frequency	collection & transportation	
Vegetable ,Fruit , meat markets	Refuse collector of 10 -16 m ³ capacity with universal bin lifting system/container lifting arm or vehicle to pick up skip containers Driver + 1 helper	Do	Do	
Garden waste	High lift mini tipper – 1.6 -1.8 m ³ Refuse collector with universal bin lifting system	Once a week	Refuse collector of 10 -16 m ³ capacity with universal bin lifting system	
Street sweeping	Sweepers cart with six 25-40 litres bins; Transfer to mini high lift tipper or container of 1100 litres capacity	As per street sweeping schedule	Refuse compactor /Refuse collector	
Drain cleaning for removal of silt & debris- Tertiary and secondary drains	Wheelbarrow with detachable container – transfer to heavy duty skip Mini tipper with hopper and grab attachment for silt removal and for emptying filter baskets ¹	As per drain cleaning schedule	Direct transfer to the landfill site through skip lifter	
Construction/dem olition waste	In skips/small tipping truck	Need based	Interim storage site /Processing site	

Based on the above tables, a breakup of planning, design & implementation activities are presented in Table 7-7.

Table 7-7: Guidelines for Planning, Design & Implementation of C&T system

Planning Aspects

Primary collection – ULBs shall

• Prepare ward wise inventory of all generators

- Identify the markets/streets having large commercial / institutional areas which need or can be served directly through large compactor machine
- subdivide every congested pocket identified in each Ward that need to be served through hand cart/tricycle into micro-pockets of 200 -250 households each. Subdivide rest of the households and establishments in each ward into cluster of 1500-2000 households/shops etc. to be served by motorized vehicles.
- Accordingly decide the % of coverage by manual operated and motorized vehicles. E.g. 60-75% door-to-door collection through motorized vehicle and 25 40 % door-to-door collection through containerized tricycles or handcarts .May also consider the terrain conditions and limitations in engaging women in manual carts
- Prepare a complete list of such clusters to be served through handcarts/tricycles and through motorized vehicles and work out the need of manpower tools and vehicles as per the number of pockets to be served on a daily basis adopting the following yard stick.
- 1 waste collector with containerized handcart for 200 households
- 1 waste collector with containerized tricycle per 250 households
- 1 high lift tipper (LCV) covered waste collection vehicle (up to 3 m³) with partition with I driver and two waste collectors per 1500-2000 households
- Provide for 10% spare handcarts /tricycles and 20% spare motorized vehicles at city level for replacement at the time of breakdown

Option 1: Secondary collection points – ULBs shall

- Place Containers/skips required for wet & dry waste at Secondary collection point assessing relevant waste volumes
- Choose logistically convenient locations closer to both sufficiently wide roads and proximate to areas served by manually operated vehicles.
- Flood-prone areas should not be selected.
- Should not be close to dense habitat area, on the riverbank, canal, lake
- Locate in the existing/erstwhile secondary collection points or in ULB /GoK owned land. The number of such facilities may be decided based on quantity of to be transferred
- Secondary collection point serving as container station should have area to place at least two skip containers 3.5 /4.5/6 cum /1.1 cup wheeled containers
- Provide containers in all Municipal markets
- Direct all large scale generators to earmark location within their premises

Option 2: Transfer Points in Bin-less system

Transfer points are same as secondary collection points, but without containers.

Secondary collection points can either be aligned parallel to the road or perpendicular depending up on the shape of site –Shall not cause hindrance to regular traffic

Secondary Transportation

- Detailed route configurations and collection schedules should be developed for the selected collection system.
- The size of each route depends on the amount of waste collected per stop. Distance between stops. Loading time, Traffic conditions, Method of collection
- Assess the requirement based on the frequency and quantity of waste to be transported daily and routes to be covered

- Frequency of collection may be determined by the type of waste to be collected, density of area, and climatic conditions. For instance, biodegradable waste should be collected daily in hot and humid areas of Kerala
- Plan for direct transportation of motorized primary collection vehicle (3 cum or higher capacity vehicles) to processing site within a distance of 5 -10 km
- Transportation beyond 10 kms by refuse compactors of capacities 12/14/18 cum
- Provide 20% spare motorized vehicles at city level for replacement at the time of breakdown.
- Fleet should contain at least two specialized vehicles like Dumper placer/RC so as to continue operation even when one gets out of order.
- All traditional trucks requiring manual loading, and box type hand carts requiring tipping to ground for transfer are to be phased out. A phasing out plan should be prepared accordingly

Operational Aspects

- Fix and notify waste collection start time, average trip time and rest, break times, end times and strictly enforce the same
- Use of the Ward Maps on which field supervisors, can plan the direction, timing and number of trips (maximum three) to complete the coverage of their 200 doorstep pickups for hand carts and 1500 for High lift tipper.
- All Secondary waste storage containers or skips at secondary collection points should have hinged/sliding doors to keep closed (capacity ranging from 1100 lit – wheeled bin. 3.5 cum./4.5 cum. skips)
- Refuse compactors of capacities 6/12 cum. capacity as secondary collection vehicle having universal bin lifting facility. Higher capacities -14 /18 cum. with bin and container lifting arm
- All Secondary waste storage containers designed to facilitate mechanical lifting to avoid multiple handling
- All secondary storage area/transfer point should be paved with positive slope towards side drain
- Route: For every collection trip, define and indicate on a micro-pocket map, with landmarks the starting, ending and transfer (unloading) points for every individual collection route and arrow marks for direction of pushcart movement. End points may be the same as starting points for convenience
- Heavy duty skip loaders can be used for C&D waste and drain slit collection. All traditional trucks requiring manual loading, and box type hand carts requiring tipping to ground for transfer are to be phased out.

Operational Aspects

- Fix and notify waste collection start time, average trip time and rest/break times, end times and strictly enforce the same
- Use of the Ward Maps on which field supervisors, can plan the direction, timing and number of trips (maximum three) to complete the coverage of their 200 doorstep pickups for hand carts and 1500 for High lift tipper.
- Route: For every collection trip, define and indicate on a micro-pocket map, with landmarks the starting, ending and transfer (unloading) points for every individual collection route and arrow marks for direction of pushcart movement. End points may be

the same as starting points for convenience

- Timings: Estimated pushcart start time, average trip time and punctual break times (say 30 minutes about two hours after starting) and end times must be fixed and strictly enforced.
- Unloading: After every trip, pushcarts will be empty the contents to the hopper of RC and then proceed for their second trip. The Hand cart collection crew will be assisted by the helper in the RC to lift and unload the bins
- The High lift tipper works in similar way and transfer the waste directly to hopper of RC (or container at Container station) using the high lift tipping mechanism
- Synchronization between primary and secondary collection is very essential in order to avoid spillage of containers, littering or manual handling, reduce idling time of vehicles and crew
- The MRF facilities employ workers to sort /segregate received materials for further processing/disposal. Trained rag pickers may also be engaged for the job
- Adequate repair and maintenance system should be there for vehicles and equipment and to ensure vehicle availability between 80-90%.
- Provide PPE including uniform, fluorescent jacket, hand gloves, raincoats, appropriate footwear and masks
- Provide training to the workforce, to use Sanitizer & soap for disinfecting, washing etc.
- Maintain continuity of staff to get fully familiarized with local residents and lanes & bylanes
- Provide ward Maps showing clusters and service route to facilitate monitoring of service by the supervisors
- Define and indicate route for every collection trip, on a micro-pocket map, with landmarks showing the starting & ending points
- GIS based system to optimize/monitor the transportation

Material Collection Facility - ULBs shall

- Provide for MCF in the area served by manual carts/tricycle for dry waste
- Minimum one MCF for 20 sq. km area.
- Locate close to existing roads which are wide enough for movement SWM vehicles like refuse compactor without causing traffic issues. These facilities may preferably be located in the existing/erstwhile secondary collection points or in ULB /GoK owned land
- Flood-prone areas should not be selected
- Access for SWM vehicles including refuse compactors
- The facility must be both environmentally and aesthetically acceptable.
- Facility require vehicle maneuvering space without hindering road traffic
- Should not be close to dense habitat area / the banks river, canal, lake
- 1-2 tons dry waste storage (2 to 3 days)-50 sqm area
- ULB generating less than 50 TPD of MSW may have 2-4 MCF, while those generating 50-100 TPD may go for 3- 6 nos. and those above may have 5- 10 nos.
- Provide space for temporary storage of domestic hazardous (15-30 days)
- Provide space for temporary storage for sanitary waste 1 day maximum
- MCF should be developed complying Kerala Building Rules and amendments
- Green belt should be provided on the periphery which should be protected by fence

T	Out flow t	o MRF	1 1 1 1
	Temporary storage Primary segrigation	Out flow c domestic for dispos	of sanitary& hazardous sal
Inflow from hou other sm	useholds and	Drop off	

Figure 7-4: Concept of Material Collection Facility;

b) Street sweeping & drain cleaning

ULBs shall preparing street sweeping schedule covering all roads, public places based on the norms as prescribed in SWM manual 2016. The planning shall include: Preparation of list of road & public places, parks & markets requiring sweeping and categorizing in to:

- Roads/public places requiring daily sweeping
- Those requiring alternate day sweeping, one on three days, one on a week etc.
- Locations where litter bins to be placed: parks, bus stations, bus waiting shelters, parking lots etc.

ULBs shall adopt Sweeping in single 'beat' i.e. one sweeper with individual hand cart/tricycle and long handle broom or sweeping in 'two beat' lengths working in pair. Two sweepers carry one hand cart or tricycle. They jointly cover two beat lengths; collecting the sweepings in containerized handcart/tricycles. This involves:

- Transferring the sweeping to High lift tipper or RC container of 1100 litres capacity;
- Emptying litter bins in the handcart/tricycle in the area;
- Roadside grass trimming, cleaning small drains
- Transfer the street sweepings to Mini high lift tipper/RC for subsequent transportation to landfill site without mixing with organic waste

ULBs shall for the purpose of estimating tools/vehicles required

- Estimate the requirement of beats, sweepers and tools required
- Design of tools and equipment (brooms, metal plates, sweepers cart etc.), required including litter bins, road margin grass trimmers (chargeable battery operated)

ULB shall explore the use of Small vehicle attached with grab to scoop debris, silt from drain pits and drain mouths. Filter baskets may be provided at discharge end of secondary drain discharging to canal/ lake. Regular removal of waste accumulated in the filter basket. Lifting of the basket can either be manual or with hooking facility attached to vehicle. A single vehicle may be used for scooping silt as well as lifting filter basket –

Refer Section 8.3 on Engineering design. *Such a system not only improves collection, but reduces the clogging of drains, contamination of water bodies.*

c) Maintenance of Vehicle & Equipment

Wherever the ULBs decide to procure C&T vehicles independently of manpower required for the C&T operation, they shall plan a minimum vehicle availability of 80 % availability for waste management operations. They shall also provide for basic servicing facilities in house including washing, battery charging etc. For major repairs and annual maintenance, the ULBS shall choose a comprehensive maintenance contract. The ULBs shall have the option of integrating annual maintenance into the vehicle procurement contract or have separate arrangements with maintenance agencies depending upon cost benefit and convenience keeping in mind the target of 80% vehicle availability. The ULB shall also draw up a preventive maintenance schedule of C&T equipment and vehicles aligning with the stipulations by the manufacturer. The vehicle and equipment should be periodically painted as those are exposed to corrosive materials. The following infrastructure is recommended for the preventive maintenance of vehicles. The ULB shall make available the following for maintenance purposes.

- Recovery vehicle for attending break downs;
- Stock of essential spares, tyres, oil, auto electric items, hose& pipes of hydraulic system;
- Battery chargers, tyre inflators, vulcanizing facilities;
- Welding units electrical and gas welding;
- Water servicing facilities;

Such facilities shall be there for all vehicles and equipment including manual carts . ULBs shall upgrade the yard and parking facilities for vehicles and provide basic servicing facilities .If no yard is available, the facility may be provided in the existing treatment/landfill site or any other site owned by ULB

The ULB shall also provide for trained and skilled manpower for preventive maintenance activities:



Figure 7-5: Preventive maintenance activities

The driver of each vehicle should submit a report in a prescribed format at the end of the shift to be attended by the maintenance crew before the next day shift.

For a comprehensive C&T contract, ULBs shall ensure that regular and annual maintenance are an integral part of the contract.

d) <u>MIS & Monitoring System</u>

MIS and Monitoring of Collection and Transportation shall be aligned as per the requirements stipulated in Chapter 10 of this document.

7.3. Technical Guidelines for Processing & Treatment of MSW

The major constituents of waste are: (1) organic/biodegradable fraction, (2) non-biodegradable, (3) recyclable fraction, (4) non-recyclable fraction, (5) inert and (6) domestic hazardous fraction.

The ULBs or SM in line with the Solid waste Management rule no. Rule 15 (v) facilitate construction, operation and maintenance of solid waste processing facilities and associated infrastructure on their own or with private sector participation or through any agency. Preference shall be given to decentralized processing (to minimize transportation cost and environmental impacts) such as:

(a) bio-methanation, microbial composting, vermi-composting, anaerobic digestion or any other appropriate processing for bio-stabilization of biodegradable wastes;

b) waste to energy (WTE) processes including refused derived fuel for combustible fraction of waste or supply as feedstock to solid waste-based power plants or cement kilns.

Technical and operating procedures for the above shall be aligned to the Advisory on Material Recovery Facility for Municipal Solid Waste CPHEEO - 2020 and SWM Manual- 2016 (Part II). The recommended process shall comply with the ESMF of the Bank.

7.3.1. Materials Recovery Facility for Processing of Non-Biodegradable Waste

ULBs or SM as appropriate shall in line with SWMR 2016 shall set up MRFs in line with the SWM plan. The facility shall maximize resource recovery and minimize waste going to landfill. The processes to be performed in the MRF shall include.

- Separate recyclable fractions of plastics, paper, card boards, metal, glass etc.
- Sell/handover recyclables to authorised recyclers or scrap dealers
- Arrange to send Non-recyclable combustible waste shall to proximate cement plants for co-processing/RDF based WTE Plants.
- Shred and hand over non-recyclable plastic for road construction
- Inert to Landfill

The ULBs shall preferably channelize wet waste before reaching MRF for disposal. The ULBs shall have MCF (basically a secondary storage facility) at local level wherever possible where such fractions can be separated, and dry fraction transported to MRF. Guidelines for establishing MCF is presented in the foregoing section on Collection & Transportation. MCFs in the ULBs should be linked to Centralized facility –MRF. The ULB/SM shall establish the MRF as an integrated facility and never as a standalone facility.

The following flow chart shows the management of dry waste:



Figure 7-6: Dry waste Management

Indian Road Congress has prepared guideline on use of plastic for road work- IRC: SP:98-2013. Strict controls have to be there while preparing the shredded plastic and implementing road work adhering to:

- use of waste plastic waste such as cups, carry bags, polythene and polypropylene foams.
- not to use Polyvinylchloride as it is toxic in nature.
- keep dust and other impurities less than morethan 1%.

Control heating of plastic to less than 180°C to so that no toxic fumes generate.

The agency implementing road work shall be responsible for the technical monitoring involving the checking of temperature of the mix, quantity and type of waste plastic and bitumen and should ensure quality assurance regime. Training of the contractors and workers should be made mandatory focusing on health and safety of the workers. They should be made aware of the perils of overheating the plastic.

The micro plastic contamination & leaching issues are yet to be studied in detail. The ULBs and SM shall ensure that these projects, processes and other linked activities adhere to the Bank's ESMF requirements.

CKCL under the guidance of SM may carry out a feasibility study to establish regional facility preferably in existing industrial parks for processing plastic/leather/ rubber waste, etc. to make granules/block/tile etc.

Types of Material Recovery Facility

MRF is classified in to three types depending upon the quantity of segregated dry waste to be sorted further and processed. They are manual, semi-automated and automated as provided in table below. MRF capacities may range from less than 2 TPD in small ULBs to 100 TPD in

large cities of Kerala. The size shall be aligned with the expected waste volumes. ULBs up to 2 lakh population shall plan one MRF and twofor ULBs above 2lakh to 5 lakhs. Larger ULBs above 5 lakhs shall have two to three MRF with a view to make logistics more efficient. The ULBs shall decide on the type and number of MRF based on technical assessments undertaken, the storage requirements-may be one/two weeks-, cost benefit and practicality among other factors.

Manual MRF	Semi-automated MRF	Automated MRF
Equipment required		
Weighing scale	Weighing scale/Weigh bridge	Weigh Bridge/Weighing scale
Manual loading to	Manual loading to sorting plat	Mechanical loading
sorting plat form	form/mechanical loading	
Sorting tables	Sorting table/ conveyor	Sorting table/ conveyor
-	Trommel	Trommel/ Magnetic separator
		(optional)
-	Baler	Baler
Shredder	Shredder	Shredder

Table 7-8: Types of Material Recovery Facility¹⁹

The ULBs shall decide on manual and mechanical processes (more efficient than the former) at the MRF considering the quantity of waste to be handled, end product and cost considerations. Manual MRF is suited for small quantities of input up to 2-3 TPD. The process of MRF starts with reception of waste and covers the following:

- 1. **Sorting:** Includes presorting predominantly a manual operation to separate bulky/ large pieces and packets of wastes. Mechanical, bulky waste sorters are also used in semi-automated and automated MRF. Mechanical sorting involves processes used to segregate the different waste streams in the pre-sorted waste. Mechanical processes require specialized equipment for segregation of commingled municipal waste. Mechanical sorting typically employs the following processes:
 - a. **Screening**: For efficient separation of wastes into two or more size distributions. Two types of screens are used in MRF- disc screens and trommels
 - b. **Electro-magnetic separation**: Electromagnets are used for separating ferrous metals from mixed waste
 - c. **Air classification:** The residual waste stream is passed through an air stream with sufficient velocity to separate light materials from heavy material, specifically for separating out lightweight plastics and paper from the mixed stream.
 - d. **Non-ferrous metal separation:** This segregates zinc, aluminum, copper, lead, nickel, and other metals. An eddy current separator removes non-ferrous items from the waste based on their electrical conductivity.
 - e. **Optical system (sensor based):** This system separates various grades of paper, plastics and glass, which are not sorted out in the air classifier.
- 2. **Shredding:** Sorted materials after segregation, if large for further use or processing, should be reduced to smaller sizes by shredding.

¹⁹Adapted from Advisory on Material Recovery Facility for Municipal Solid Waste, CPHEEO -2019

3. **Baling:** Bailing is done to transport the waste especially paper and plastic.

ULBs shall make choice of equipment based on target capacity and the nature and composition of incoming waste. Shredder shall be included for shredding plastic for road work. Bailer shall be included for larger facilities. Each of the choices shall adhere to Bank's ESMF requirements.

The planning and design of MRF will have the following steps:

- Site selection
- Design
- Construction and operation

Siting Criteria

ULBs/SM shall the following key aspects to be considered while locating MRF are:

- i. Accessibility, land use, and geology
- ii. MRFs need to be located close to existing roads, but traffic resulting from the movement of waste collection trucks should be considered.
- iii. As per criteria laid out by KSPCB a periphery width of 20 m around the core area and 10 m wide green belt required. The siting guidelines for MRF are provided in Table 7-9.Minimum distance of 130 meters from sensitive receptors such as schools, hospitals, parks, and residential areas is required. The MRF may be located in the existing centralized treatment/disposal facility or in unban fringe area away from denser pockets of habitation. If the area is zoned, an industrial zone is preferred. While locating along with the common waste management facility, the rules and guidelines for the same should be adhered to.

Sr. No.	Activity	Area /Distance
1	Core activity area	Area requirement depends on the quantity of waste to be received. Sorted and for accommodating machinery as listed in table
2	Utility area	Width of 20 m around the boundary of core activity area
3	Green belt	Width of 10 m around the utility area
4	Interface area	Width of 100 m around the utility area
5	Buffer space	Minimum 130 m from the core area to the boundary of the
	area	property of Sensitive receptor

Table 7-9: Siting guidelines for MRF

Source: KSPCB Guidelines

The land to be earmarked for the processing plant should include core waste processing area, utility area and green belt

- i. MRFs should be sited in flat or gently sloping, stable areas to reduce excavation cost and avoid problems of slope stability.
- ii. Wetlands, low lying areas and flood-prone areas should be avoided.

Design Factors

Typical MRF should be in a warehouse-type building with roofing enclosed by a perimeter fence for security. The warehouse design will minimize the placement of columns that could interfere with the efficient movement of materials and equipment. The ground level should be kept at least 1.00 m above maximum flood level. As the life the building will be more than 60 years, provision for expandability - to be able to handle increasing amounts or types of materials- should be considered. land area for construction for additional area shall be considered for future expansion without shifting/ demolishing the existing. It should have the following components:

- 1. Receiving or tipping area,
- 2. Sorting/processing area,
- 3. Storage area for recyclables, residuals storage area,
- 4. Equipment area: Shredder, Bailer
- 5. Bins are commonly used to store recyclables and residue before shipment to market/disposal site
- 6. Space for an office- admin/ record room/first aid room
- 7. Loading area for residuals and processed recyclables
- 8. Washroom/Changing room

Area requirements:

- Manually operated MRF of 2tpd capacity would require a floor area of around 50 m²
- Semi-automated to fully mechanized facilities would require areas ranging from150 m² to 1500 m², excluding parking, green belt and buffer zones areas.

Receiving area should have the capacity to receive at least 2 days' worth of the MRF's processing capacity. Finished product storage area shall be limited to two to three weeks so as to avoid large storage of material which is inflatable. Hence it is important to move the finished (sorted / shredded /bailed) material to recycling plant/RDF plant Shredding of plastic for road work should be done during summer months when there is demand .In rainy season , the material may be taken for RDF along with other regular RDF material

MRF should be floored with concrete, strong enough to carry wheel loads and withstand the abrasion generated by the continual use of hard rubber and steel-wheeled forklift trucks. Consider adding hardeners and dust proofers to protect the concrete. Adequate space must be provided on-site for truck maneuvering, truck storage etc.

It should also be provided with the basic connections for water and three phase electricity and adequate space for the entry and exit of waste trucks. It should have firefighting systems/fire extinguishers as per fire safety guidelines. This becomes a crucial requirement as the material handled is dry and inflammable. Adequate storm water runoff collection and landscaping are key factors for the area around the MRF.

OPERATIONAL ASPECTS

MRF operations start with the arrival of waste, inspection, and placement of mixed or segregated waste into the receiving area. Bulky or unusual materials are removed for disposal or sale to recycling facilities. The rest of the waste is placed on a conveyor for semi-

automated or fully automated sorting or on sorting tables for manual sorting. Workers standing along the conveyor spot and remove any trash or other mistakenly placed material and separate the recyclables, such as paper and carton, tin cans, metals, plastics are separated either manually or mechanically.

The recovered recyclables are weighed and temporarily stored in designated bins/or space earmarked. When sufficient quantities have been accumulated, flattened, and baled; paper is stacked; and glass is stored in jute bags then bulked up. The non-recyclable combustible fraction is stored separately. Part of it is shredded for roadwork depending on the demand while the other part is transported to cement /WtE plant. The residual materials are temporarily stored and then disposed-off in a sanitary landfill. Records of the amount of incoming and outgoing waste must be kept for monitoring purposes and for regular validation of the facility mass balance.



Figure 7-7: Concept of MRF

7.3.2. Management of Biodegradable Waste

As per Integrated Solid Waste Management Strategy of GoK-2020, potential technologies for centralized treatment are:

Table 7-10: Potential technologies for treatment of organic waste

Composting	Bio-methanation
Aerated Composting technology • Aerated Static Pile (ASP) technology	Wet /Dry digestion technology Biogas to Electricity generation
 In-vessel technology including Rotary 	 Biogas to Compressed Biogas (CBG)
Drum	• Co-processing of biodegradable waste
 Vermi-composting Technology 	with Septage



Figure 7-8: Flowchart for organic waste treatment

Suitability of the suggested technologies is presented in Table 7-11.

Technolog y	Feed stock	Power requirement	Odour control Leachate control/treatme nt	Applicabili ty & land requireme nt	End product market
Aerated static pile	Partly segregated/fu lly segregated	Positive/negati ve forced aeration – power for aeration and sieving	Possible with covering by coarse –compost / Bio-filter Leachate,0.4-0.5 cum/ton - can be sprinkled over the windrow. /and treated in LTP	5-300 TPD 0.80 ha for 50 TPD	Low when mixed waste composti ng done. Medium with Segregate d waste
Vermi compostin g	Fully segregated organic fraction with less spicy material – preferably partly decomposed	Passive, power for sieving	Vermi wash /vermin leachate used as liquid fertilizer.	1- 10 TPD 0.20 ha land for 2 tpd	Medium to high
Rotating drums. moving	Mostly segregated. Requires	Agitation, mechanical turning, forced	Less, reduction possible with finished compost	In modules of 5-50 tpd	Medium with Segregate

²⁰ Subject to ESIA.

Technolog y	Feed stock	Power requirement	Odour control Leachate control/treatme nt	Applicabili ty & land requireme nt	End product market
bed	addition of saw dust or finished compost for moisture control	aeration, Power for sieving	cover / Bio-filter 0.0305 cum leachate can be re-circulated /treated.	in modules 0.25 ha land for 20 tpd	d waste
Bio methanati on	Segregated organic fraction	power for shredding	less, methane to be collected,	1,5, 10- 200 TPD – large plants in modules of 50 TPD 150 sqm for 1 TPD, 500 sqm for 5 TPD for traditional type Bio-CNG require 1.20 ha for 50 TPD	High as cooking gas/ CNG or power.

• Unlike open windrow composting methods, the aerated static pile and in-vessel methods provides direct control over aeration. This is the advantage of the system, which can be used to reduce fermentation time. Further, leachate generation is minimal as presented in table 7-11

- The calorific value of biogas is 5000–6000 kilocalories per cubic meter (kcal/m³) depending on the methane percentage. The biogas, by virtue of its high calorific value, has tremendous potential to be used as fuel for power generation through either internal combustion engines or gas turbines.
- Biogas can be used for: Cooking or heating fuel, power generation, Gaseous automotive fuel—after stripping carbon dioxide (CO₂), hydrogen sulphide (H₂S), and moisture called compressed biogas (CBG). Since in the last couple of years, interest is rapidly growing in CBG as an alternate fuel for automobiles. Sustainable Alternative towards Affordable Transportation (SATAT) an initiative launched in October 2018 by the Ministry of Petroleum & Natural Gas in association with Public Sector Undertaking (PSU) Oil Marketing Companies (OMC) viz. Indian Oil Corporation Ltd., Bharat Petroleum Corporation Ltd. and Hindustan Petroleum Corporation Ltd. aims at utilizing biogas as an alternative fuel for automobiles



Figure 7-9: (left) Aerated static pile; (right) Rotary drum

PLANNING ASPECTS

The ULBs/SM shall plan the land requirement based on waste volume estimates over a 15year period considering waste generation profile and estimated population. Considering the same, the ULB shall decide between upgradation of existing plant or creation of facility at a new site.

SITE SELECTION CRITERIA FOR ORGANIC WASTE TREATMENT

The ULB shall select Site and Technology considering air emissions, gas, odor, leachate, quantities which can be treated, segregation requirement, site suitability, sensitive receptors, site safety aspects including soil types etc. If the facility is to be located in the common treatment & disposal facility, the rules and guidelines related to the same may be complied. If it is an independent facility, the selection criteria should comply the SWM Rules-16 and the guidelines issued by CPCB/KSPCB as given in Table 7-12.

Sr. No.	Activity	Area /Distance	
1	Core activity	Area requirement depends on the quantity of waste to be	
	area	processed	
2	Utility area	Width of 20 m around the boundary of core activity area	
3	Green belt	Width of 10 m around the utility area	
4	Interface	Width of 100 m around the utility area	
	area		
5	Buffer space	Minimum 130 m from the core area to the boundary of the	
	area	property of Sensitive receptor such as schools, hospitals, parks,	
		Lakes, rivers and other large water bodies	
6	Other requirements		
А	Located at a distance of 20 km from airport		
В	The site should not fall in the CRZ zone regulations		
С	At least 2 lane road access and sufficiently far from National and State Highways		
D	If the area is zoned, an industrial zone is preferred		
Е	Away from densely habituated locations		
F	No wet land /flood prone area should be considered		
G	The water table should be below 2.00 m from the ground level		
Н	Shall comply with Bank's ESMF requirements		

Table 7-12: Site selection criteria for Organic waste Treatment Facility

DESIGN ASPECTS – AERATED STATIC PILE

Site development

- The site should be developed ensuring that its ground slope is sloping away from the plant
- Peripheral cut off drains should be provided to prevent entry of rainwater to the site
- Internal drains to collect storm water and discharge it into secondary drain of the area. The storm water drain shall be designed and constructed in such a way that the surface runoff water is diverted so that leachate from solid waste locations do not get mixed with the surface runoff water. Provisions swale may be considered along the periphery
- Peripheral fencing & green belt with plants of thick foliage three-layer planting
- All weather internal road and sufficient parking area for SWM vehicles and of staff/workers.

Compost shed

- The entire plan area including preprocessing, post processing, maturity area, should have 100% roof covering with sufficient height for operating material handling equipment
- steel structure with light weight roofing sheets with anti-corrosive coating, cement concrete flooring, of suitable size, PVC mesh protection over 80 cm parapet wall, all around to prevent entry of birds, dogs etc. with the following provisions

Pre-processing section:

- Receipt/segregation platform 50 cm high (raised floor)to spread one day's waste and to remove all non-biodegradable items and:
- Trommel with 80 mm screen along with a feeder conveyor, reject conveyor and process conveyor. The screened material is sent to the Aerated Static Piles (ASP), while the rejects are passed through sorting belt for manual picking of larger biodegradable material for size reduction in shredders.
- A shredding machine to cut over size waste into sizes less than 75mm size

Treatment Section

- Compost pad area provided with floor aeration system and leachate collection drains. The aeration system- two aeration lines on the floor of one pile –Option 1 to embed the pie with wood chips .Option 2 : to provide aeration channel with dimpled plate cover with wood chips and coarse compost (rejects from 16mm screen
- Blower with timer: capacity depends on the height and length of the pile. Pipes of 100 mm to 200 mm diameter perforated less perforation close to the blower with number increasing to facilitate even flow of air. Designed for air flow rates for a 3-meter-high pile should be 35-40 m³/hr./m² of floor area
- Provisions for management of leachate including its collection and treatment.

Refinement section

• This section will have 4mm vibro screen/trammel with gravity separator, aspiration system for screening cured material & rejects, glass, metal, inert. The screened material will be sent to the storage/bagging area. The rejects will be transported to landfill

Odor control: Bio-filter:

- Covering the windrow with a layer of compost will reduce the odor
- contaminated air is sucked and passed through bio-filter for further elimination bad odor

The area estimation shall include loading, unloading, ancillary activities

Operational aspects of composting

Aerated static pile	Rotary drum composting
Feedstock material received should be pre-processed to ensure supply of clean feed stock	
free from plastics, metal, glass and domestic hazardous material	
Reduce the size of waste and mix with	Add sawdust to reduce moisture content
bulking agent (sawdust, wood chips/course	Add the waste mix from the top end keeping
compost) to make porous feed stock	the rotation at the design speed
compost fibrous rejects above the aerated	
nines and place the feed stock -4-5 m wide	
and 2-3 m high	
Cover the pile with a 15 cm layer of compost	-
to reduce odour, fly nuisance	
During startup, their blower should run on a	Air is blown from the discharge end
fixed time schedule keeping pile temperature around 55°C	monitoring temperature and keeping the same around 55°C and periodically rotate be
As the compost temperature rises, the blower	drum
'off' time can be extended to increase cooling.	
Similarly, shorten the blower 'on' time as	
active composting declines.	
Keep the windrows for an active composting	Start continuously removing the decomposed
period of – 21 -28 days	material from bottom of the drum after the
	active composting 7-14 days
Curing 40-50 days	Curing 45-60 days
Post processing –Sieving and separating rejects	
Collect, recalculate leachate /treat complying Sch II of SWM Rules 2016 and as per KSWMP	
Guidelines	

Leachate Management : Compared to windrow composting, the leachate generation is much less in ASP (0.4 - 0.5 cum/ton/day) and rotary in-vessel (0.03-0.05 cum/t/day).Schedule II of SWM Rules prescribes treatment requirements of leachate before letting it out .The following options shall be considered :

• Recalculating the leachate to control moisture requirements

- Treatment process may include biological processes such as activated sludge, aeration, nitrification/denitrification, physical processes such as activated carbon adsorption, ultra-filtration etc.
- One alternative of treatment would be evaporation of leachate water in shallow ponds, cultivated wetland with vetiver.
- Evaporated in solar ponds.

Reject management: The rejects (5-15%) from compost plant will consists of fibrous material , plastics glass, silt, stone etc. The fibrous and combustible matter is segregated and transported for conversion as RDF, while the inert material is hauled to landfill site .

BIO-METHANATION

Anaerobic digestion is a natural bacterial process by which a consortium of anaerobic bacteria is biodegrading organic matter in an environment without oxygen. The process generates a mixture of containing methane (55-65%), Carbon dioxide (35-45%) H_2S (100-10000 PPM) water vapor ammonia and liquid digestate. The gas is purified, and methane used as cooking gas, for production electricity and as auto fuel (CBG, pipeline injection)

Plant Requirements

- a) Reception and preliminary waste storage
- b) Feedstock preparation, sorting size reduction and cleaning
- c) Bio-filter to reduce smells and organic compounds
- d) Digester
- e) Gas Storage-gas holder
- f) Gas cleaning system
- g) Safety Equipment (pressure relief devices, safety
- h) Valves, gas flares etc.)
- i) equipment necessary to handle the biogas:
- j) Pipes Flow meters Condensate traps
- k) power unit /further cleaning of Gas & CBG Unit
- l) Digestate storage & Digestate Upgrade


Figure 7-10: Flow diagram of Bio methanation process

Planning Treatment/processing plants:

The ULBs supported by the TSC shall following the steps below in planning treatment/processing plants. The project preparation shall contain the following

- Feasibility study,
- Detailed planning of the biogas plant
- Permission procedure
- Construction of the biogas plant 6.0peration and maintenance plan

Feasibility study shall adequately capture the following:

- Establishing expected feedstock collection methods quantity, quality and overall logistics, transfer stations, hours of reception, etc.
- Bio-gas utilization potential like Power generation /Bio-CNG
- Digestate management must be studied carefully since the disposal of digestate is often the largest operational cost of a biogas plant. All possible avenues of disposal, transformation or treatment must be taken into consideration to ensure that the final strategy for digestate management is the most efficient in the interest of optimal project economics.

Site Selection Criteria: The criteria discussed in the foregoing section (for Treatment Plants) will be applicable here. In addition to that:

- The site should meet proper zoning, and environmental regulations (proximity to houses, rivers, wells, etc.).
- The site must also be easily accessible by road for the feedstock to come in, and the digestate to come out without causing too much traffic nuisance to the neighborhood

• Finally, the site must be close to an energy grid (gas or electrical) in order for the biogas energy to be transmitted efficiently.

Design Aspects

Many modern biogas plants operate at thermophilic process temperatures as the thermophilic process provides many advantages, compared to mesophilic and psychrophilic processes It requires reduced retention time making the process faster and efficient.

An important parameter for dimensioning the biogas digester is the hydraulic retention time (HRT). The HRT is the average time interval when the substrate is kept inside the digester tank. HRT is correlated to the digester volume and the volume of substrate fed per time unit, according to the following equation,

HRT = VR / V HRT hydraulic retention time [days] VR digester volume [m³] V volume of substrate fed per time unit [m³/d]

Digesters are fabricated with steel installed on a concrete foundation. Steel plates are either weld or bolted together and seams have to be tightened. Steel digesters are always installed above ground- Refer section 8.3 for more design details.

The other design requirements are:

- soil Investigation and foundation & structural design of all civil works
- site Development including excavation, filling, and utility services (drainage, sewer, water, etc.).
- power supply and automation (sensors, PLCs and actuators).
- material handling: solid waste reception & conveying, liquid pumping, gas compression, etc.
- all aspects of ventilation, fire protection, lighting, non-process electricity and plumbing.
- to handle all aspects of ventilation, fire protection, lighting, non-process electricity and plumbing.

Safety measures are required within all phases of a biogas project development/operation to mitigate the following risks:

- Fire
- Explosion
- Confined space hazards
- Gas poisoning (H₂S, NH₃)
- Hydraulic discharge
- High pressure gas or liquid leaks
- Rotating mechanical equipment
- Pathogens (diseases)
- Electrical system hazards

All biogas storage facilities must be gas tight and pressure-resistant, and in case of storage facilities which are not protected by buildings, they must be UV-, temperature- and weatherproof. Before starting-up the biogas plant, the gas storage tanks must be checked for gas tightness. For safety reasons, they must be equipped with safety valves (under-pressure and over-pressure) to prevent damages and safety risks. Explosion protection must also be guaranteed, and an emergency flare is required. The gas storage facility must have the minimum capacity corresponding to one fourth of the daily biogas production. Normally, a capacity of one or two days gas production is recommended.

The AD system may be wet AD where the feed stock solid content is 10-20%, whereas in Dry AD the solid content is high (20-40%). The operational aspects discussed here mainly relate to wet AD.

Operational aspects

The key operational aspects are:

- **Feed stock:** Stable and continuous supply of suitable quality and quantities of feedstock plays an important role in the operation of a biogas plant.
- **Feedstock sorting and separation**: sorting and separating impurities and problematic materials from the feedstock substrate .
- **Sanitation :** . Sanitation is usually carried out to avoid contamination of the whole feed stock
- **Crushing** : Feedstock crushing prepares the surfaces of the particles for biological decomposition and the subsequent methane production
- **Mashing, homogenizing :** Mashing of feedstock is necessary in order to obtain feedstock with a higher water content, which can be handled by pumps. Mashing should be done in storage tanks or pre-digesters, before pumping the material into the main digester. Liquids used for the mashing process depend on availability and are usually raw liquid manure, digestate, process water or even fresh water. Besides pumpability, substrate homogeneity is another important factor for the stability of the AD process.
- **Feeding system** : The feeding technique depends on the feedstock type and its pumpability. Pumpable feedstock is transferred from storage tanks to the digester by pumps
- **Stirring:** Optimal operation of the digester requires active stirring using mechanical, hydraulic or pneumatic equipment.
- **Storage of Bio-gas**: Before starting-up the biogas plant, the gas storage tanks must be checked for gas tightness and the working of all safety system.
- **Biogas flares**: Biogas flares must be operated when more biogas is produced than it can be used for energy generation. This can happen due to extraordinary high gas production rates or through Breakdown/maintenance of the energy recovery system
- The digested substrate is pumped out of the digester through pumping sequences and transported through pipelines to storage facilities, in the vicinity of the digester, where digestate can be temporarily stored
- **Digestate Storage, Conditioning/upgrading:** separation of solid matter (fibers) from digestate, using screw type separators shall be carried out. The solids are

composted. Part of the liquid is mixed with fresh water for preparing feed stock, while the other part is let to sewage line or on-plot treatment as par guidelines in Schedule II of SWM Rules 2016 and Guidelines of State PCB and KSWM project.

Choice of Technology for Cluster level treatment

ASP & In vessel composting technically, operationally viable and environmentally better option than open windrow composting However the market potential of compost is not encouraging for establishing economically viable projects . Viability of Bio-methanation (Power or CNG) is getting more accepted in terms of end product market potential and benefit of GHG emission issues. Gasification of bio-dried waste and slow pyrolysis technologies are upcoming technological solutions,but viability requires further studies for the type of MSW in Kerala .Moreover SWM rules restrict treating/processing of un-segregated waste. In the context it may be noted that GoK Strategy notified in 2020 recommends Biomethanation to power /Bio CNG technologies at Cluster level. ULBs will have option for setting city level plants for quantities of 15-20 tpd of segregated organic waste.

MoHUA, GoI has issued guidelines on Municipal Solid Waste Management on a Regional basis for developing regional arrangements for waste management whereby a single, relatively large site is developed to serve the waste disposal requirements of a group of ULBs. Accordingly, ULBs in consultation with SM/State Govt. may opt for regional level waste treatment. All regional or city level facilities shall adhere to Bank's ESMF requirements. Chapter 9 of this document briefly presents the operational aspects of regional/cluster level treatment plant

DECENTRALIZED TREATMENT OF BIODEGRADABLE WASTE

As per Rule 4 (6, 7 & 8) of SWM Rules, 2016, it is mandatory for markets, hotels, restaurants, and all institutions and gated communities to have an area exceeding 5000 m² to treat biodegradable waste within their premises. The State Strategy on Integrated SWM sets coverage of decentralized treatment as 20% in three years. Advisory on on-site and decentralized composting – SBM (Urban) 2018, GoK circular in February 2008 and subsequent modifications provide a number of options for decentralized systems and some are being operated successfully. Table 7-13provides a list of such systems. The ULBs shall as a part of the SWM plan bring out the approach towards domestic treatment of BDW, the preferred processing options for each of the different generators.

Source level	Processing options		
Household level ²¹	Pot composting (including 3 pot composting)		
	Kitchen bin		
	Bucket composting		
	Bio-composter		
	Bio digester pot		
	Vermi composting -Indoor unit		

Table 7-13: Options for decentralized treatment of Bio-degradable waste

²¹ These are the recommended options under the project. However, with technological advancements over the project period, if ULB prefers other new government approved technologies for source treatment, it may do so after appropriate technical clearances.

Source level	Processing options
	Bio-gas plants 0.5 -1.00cum
Hotels, hospitals, gated	Aerobic bio-bins (CREDAI model)
communities, high rise residential	Organic waste converters
buildings	Aerobic bins (Thumboormuzhi model)
	Bio-gas plants
Markets	Bio-gas plants-fixed dome 1-2 TPD
	Organic waste converters
Community level	Aerobic bins,
	Aerobic bins (Thumboormuzhi model)
	Vermi composting
	Rotating drum

- The composting systems are basically in vessel: clay, plastic or ferro cement bins /concrete rings. The capacity requirements for composting vessels 2 kg/day for a family of 4-5 members for 30 days Two bins/pots of 25-30 lit capacity will cater the requirement
- The bio-gas units (household are portable, made of FRP/Plastic floating dome type for households and for small nondomestic sources. The capacity requirement is 0.5 m³ and 1 m³
- Community/institutional level composting: Bio-bins /Aero bins in modules as per the required capacity / Vermi composting
- Institutional leveled biogas 50- 2000 kg [mainly fixed dome constructed with reinforced cement concrete (RCC) digester]

Broad specification of various types given in section on Technical specification



Bio-bin –Housing complex



Fixed dome –markets/malls



Aero bins –community lefel



Figure 7-11: Decentralized Biogas and composting units

Source: Harith Kerala Mission (HKM) training guide, Suchitwa mission, Government of Kerala

Planning aspects: ULB shall ensure coverage of these requirements based on targets and identifying the sources to be covered and locations. The whole process will have to be done in consultation with Residents/Market /Merchants /Hotel owners associations

- Identify the waste generators covered under SWM Rule 4 (6, 7 & 8)
- Conduct a survey to of households/schools for their willingness (1) to opt for composting/biogas and (2) set up kitchen garden/ school garden using own compost

- Make a list of parks /gardens/municipal markets where ULBs can initiate composting/bio-gas units
- Identify sites to initiate community composting/biogas plants
- Formulate plan for setting up polishing unit/units for sieving the raw compost collected from community/institutional units including enriching the compost and marketing under a brand name.
- preparing action plans for educating the community to organizing themselves to set up suitable decentralized waste management plans
- advising appropriate technologies to the households / Residents Welfare Association (RWA) / CBOs
- providing technical support in implementation, operation and maintenance of the Decentralized units
- monitoring and supervision of the Decentralized Solid Waste Management (DSWM) Plan and recommending appropriate future targets for the effective implementation of DSWM and achieving the objectives of the program
- bio-gas plants to be established in a place fully exposed to sunlight
- The Institutional level Bio-gas plant should be closer to the point of gas use. Longer pipeline increases the risk of gas leakage. The plant should be at least 10 meters away from any well or any other underground water or any other building to avoid risk of damages. The site should have adequate slope to drain away the rainwater. The slurry from the biogas plant to flow away from the plant by gravity to the treatment facility.
- A green belt of minimum width 3 m may be provided all around the plant site

Design & Implementation

Table 7-14 presents the step by step activities required for household & institutional/community level plants. The ULB shall ensure proper training of the households, residential associations and other generators who opt for domestic treatment and community level treatment

Table 7-14: Design & implementation of decentralized units for treatment of organic waste

Composting –Household level

Composting Container and accessories

- Clay, plastic or ferro cement bins /concrete rings with top lid/cover. The capacity requirement for composting vessels is 2 kg/day for a family of 4-5 members for 30 days Two bins/pots of 25-30 lit each capacity will cater the requirement.
- Bins/pots with bottom hole or tap fitted on the bottom side for collection of leachates,
- A knife to chop the waste
- One mini garden hand shovel, a meter-long stick for turning the compost while emptying the pots/bins
- A leachate container to collect the leachate from the bottom hole/tap
- Safety gloves and mask

Operation

• Find a suitable place outside the house (balcony / terrace / parapet, courtyard, backyard, etc.) which ensures good aeration and day light. If kept in yard, protect from

rain

- If in yard, place it at an elevated area so that it will not get inundated during rains. Place a stone or brick over the lid to keep safe from rats, rodents, dogs etc.
- A starter mix compost/saw dust mixed with inoculum /cow dung may be used as starter which will be spread at bottom before putting 1st layer of kitchen waste
- Feed segregated bio-degradable waste, Large pieces of waste may be chopped. Hand full of dry leaves, paper, pieces of cardboard can also be used occasionally to have carbon to balance CN ratio. While feeding take care not to pour water/liquid into the bin. Too much of water can make process anaerobic.
- Maggots may scavenge inside the pot. They are larvae of the 'Black Soldier Fly' which feeds on food discards and is a natural controller of house fly population. These maggots normally do not come outside the pot; The maggots will grow, and some may leave as flies and some die within the pot. They help us in reducing the volume of waste inside the pots.
- Once in a week sprinkle diluted curd (spoiled curd, spoiled and fermented curries, cow dung etc.) or diluted milk into the composter for boosting the process of composting. The bacteria present in these liquids help the composter to speed up the process. Other inoculums may not be necessary, but can be used to aid composting, reduce odor
- Collect leachate in the container, dilute and use in kitchen garden
- Once the first pot is filled, keep it aside and start using the second pot. Place the leachate container under the second pot. The second pot will get filled in next 30 days, by then you will find that the waste in the first pot have already turned into dark colored dry substance (semi decomposed compost) without any odor. These are somewhat stabilized compost and empty this into a bag and reuse the pot again and again. In this way you can use two pots on a rotation basis continuously for years

Odor & fly control

- If there is bad odour, keep the lid open for some time for aeration, put some old compost or saw dust to absorb moisture. Reduce water content when feeding, turn the waste.
- 3-4 teaspoon of salt in the container will reduce the smell and possible breeding of insects. Empty regularly to avoid breeding of mosquitoes. The leachate may be diluted with water (1:20) and sprayed to plants in kitchen garden.
- Cover the facility with fly /mosquito proof net. If house flies are found hovering around the pots, dissolve 2 pieces of camphor in 25 ml of cooking oil and apply it on the rims of the pots as well as around the hole in the bottom with a piece of cloth or painting brush.
- Vermi composting pots protect from rats and ant. Provide collection tray to collect vermi-wash. Use gloves when separating manure and worms

Community /Institutional level

Bio-bins: Capacity - 40-45 Kg/day of kitchen waste (40 families)

- FRP bins of size 180 cm x 75 cm x 75 cm or nearest size with cover 2nos
- Sprayer: A Sprayer of one litre capacity to spray dung water.
- Steel fork: 1 large and 1 small.
- Steel pot: A steel pan of 40 cm diameter to draw out the compost.
- A steel cutting knife.

- Find a suitable place in the yard. The site should not be flood prone. Alternatively, it can be placed on terrace of high-rise building
- A roof cover is preferred to keep waste/ for sorting it and chopping
- Wash basin & hand wash soap should be provided

Operation

- The biodegradable waste sorted from the source are cut or chopped into small pieces and put into the bin.
- Occasionally spray dung water/inoculum.
- Turn the waste and mix it occasionally may be once in two days
- After the first bin is full (15-20 days) use the second bin for depositing the waste
- When the second bin is full, the waste in the first bin would have become compost.

Odor & fly control

- If there is bad odour, keep the lid open for some time for aeration, put some old compost or saw dust to absorb moisture. Reduce water content when feeding, turn the waste.
- Cover the facility with fly /mosquito proof net.

Aero -bin Capacity - 15-20 Kg/day of kitchen waste (20 families) in a 2-bin unit

- 120cm x 120cm x 120cm size bin with ferro- cement having four verticals at corners and horizontal ferro- cement members (8to 9 nos.) of 7.5 cm wide inserted in the grooves of the verticals leaving a gap of 4 to 5cm between two horizontal bars
- an inward sloping floor with a drainage hole with mesh cover at the center to drain off leachate
- drainage hole connected to a leachate collecting tank through a 150 mm PVC pipe leading to leachate collection tank of capacity of 5 litres/household served
- Leachate treatment
- Bins housed in a well-ventilated place with roof and on cement floor, provision for drainage and soak pit for leachate, ramp for trolley etc.
- A small sorting table to sort out large fraction
- Space for storing dry leaves & non-compostable material
- Shovel to spread the biodegradable waste.
- Safety gloves and mask
- Wash basin & hand wash soap

The entire unit shuld be under a roof

Operation

- A 6-inch layer of fresh cow dung is laid as the first layer.
- A 6-inch layer of dried leaves is laid on top of the cow dung layer.
- Above that 6-inch layer waste is added and inoculum containing enzymes made from cow dung is sprayed, this hastens composting.
- Alternate, 6-inch layers of dried leaves and waste sprayed with inoculum is repeated till the bin is filled.
- Once the first bin is filled, start using the second bin. By the time the second bin is filled the contents in the first bin will turn into compost. If not, take it out and dry it in dry beds.

Adding more number of bins can serve as a small /medium community unit with door-to door collection arrangements.

A green belt of minimum width 3 m be provided all around the plant compound inside the walled area. It is recommended to plant "Mahagony "plant on the outer row, Bamboo/ Aryveppu on the second row and hedges on the inner row. Flowering plants like Chemparathi/ Arali/Mandar /Mulla can also be planted on the third row and maintained to reduce the pollution nuisance and increase the aesthetic value of the plant complex.

Bio-gas – Household level

Bio-gas units for household are portable, made of PVC/LDPE/HDPE,FRP/Plastic The capacity is 0.5 m³ and 1 m³-with water jet.: with circular shape as digester and floating gas holder.

Accessories

- Control valve for regulating gas –IS standard
- Gas flaring system
- Septic tank to discharge the slurry
- Inlet device with PVC pipe of diameter 110mm
- Inlet chamber with a plastic/FRP mug having circular shape and with a lid.
- Outlet device wit PVC pipe of 63 mm.
- A plastic can of 10 litre capacity to be used for collecting slurry
- Rubber hose of 25 mm (4kg/cm²) diameter for conveyance of biogas
- Stove wit single burner.
- A net to cover the floating dome equipment to prevent mosquito breeding

Operation

- Start up by adding cow dung with equal quantity of water
- Waste feeding after chopping and mixed with water in the ratio 1:1
- Daily feeding of easily degradable waste in slurry form or solid waste mixed with equal quantity of water (rice water or other kitchen wastewater used for washing of rice, vegetables, meat etc. is preferable
- Not to feed the wastes of slow degrading nature like straw, soil, eggshells, fibrous materials like banana leaves, coconut shells, coconut coir, pseudo stem etc.
- Not to feed toxic substances like fungicides, insecticides, pesticides, detergents
- Clean the inlet chamber after each feed
- Keep the maximum quantity of daily feed less than designed quantity
- Daily removal of slurry in plastic cans and disposal as manure / disposal into septic tank with soak pit arrangement
- Mix the substrate at least weekly for preventing scum formation
- Utilize the gas for cooking

Biogas 300 -2000 kg capacity for Institutions

Fixed dome-type for markets 300 kg -2000 kg/day - digester constructed underground in masonry with pre-processing room to accommodate pulverizing machine and an

inlet mixing chamber to mix the pulverized waste -Land area: 200 sqm -450 sqm

- Pre-processing room with space to accommodate the pulverizing /grinder mixer machine and an inlet mixing chamber for mixing the pulverized waste.
- Provision of a platform outside the room with extended roof and ramp, to receive the waste digester
- Inlet mixing cum feeding tank near to the digester, with locking arrangements for feeding waste to the digester
- Inlet devices with PVC pipe of diameter 150 mm, connecting the bottom of the inlet
- mixing chamber located inside the pre-processing room for conveyance of pulverized waste to the inlet feeding tank and connecting the inlet feeding tank and the digester
- Digester with reinforced cement concrete and brick masonry lining on both sides and having the following;
- Bottom slope of digester shall be 1 in 8 for easy withdrawal of sludge.
- Pumps of screw type or submersible type or external chemical process type for pumping water, slurry and sludge.
- Pre-digester tank for increasing the efficiency of main digester/digesting of slow digesting items for plants of capacity 1 Ton and above
- A Pulverizing machine /grinder mixer for reducing the size of waste larger than 20mm and to mix the same with water and putting it into inlet mixing tank inside the preprocessing room. Waste to be converted into slurry form by mixing it with equal volume of water to feed into the digester for easy and clog free digestion
- Pre-filter tank with four number of chambers in series with baffle walls in between. The slurry from the outlet manhole passes through the baffle walls and flow to the septic tank. Certain amount of slurry gets settle down in the pre-filter which is to be cleared periodically. This is to reduce the load on the septic tank.
- Septic tank soak pit system for treatment and disposal of effluent from biogas plants.
- Rubber hose for conveying gas 20 mm diameter,min 40 metres long, moisture trap, H2S scrubber, pressure blower, fire arrestor, regulator and a gas stove to spend the gas.
- Control Panel for monitoring / operation

Optional items

- A balloon storage facility for storage of at least ³/₄th of biogas generated in a day.1/4th
- quantity of the gas produced in a day is stored inside the floating gas holder chamber of the digester itself.
- Water heater working on biogas be mounted on the wall of the pre-processing room,
- with all safety arrangements and plumbing. Hot water be utilized to mix with the feed waste.
- Gas measuring meter for supplying the gas to the nearest domestic/commercial customer/s.
- Solar water heater for making hot water to mix with the water to maintain the temperature where considered necessary in plants of 1000kg to 2000 kg
- Biogas engines of single mode fuel (using methane gas only) in special cases only after required approval
- Facility for utilizing the electricity generated for operating equipment in the plant/ lighting the plant area

- Facility for flaring of excess gas with automatic or semi-automatic flame ignition.
- Facility for Biogas cleaning for removal of water vapour and H2S concentration to 100 ppm or less

Operation

- Start up by adding cow dung and equal quantity of water
- Waste feeding after chopping and mixed with water in the ratio 1:1
- Daily feeding of easily degradable waste in slurry form or waste mixed solid with equal
- quantity of water
- Limit the quantity of daily waste feed below the designed capacity
- Maximum particle size of waste shall be 20 mm
- Daily removal of slurry into Septic Tank Soak Pit system
- Clean the inlet chamber after each feeding and keep it closed
- Not to feed wastes of slow degrading nature like straw, soil, eggshells, fibrous
- Mix the substrate or rotate the drum at least weekly for preventing scum formation
- Skilled Manpower for Operation of the Plant.
- Operation and maintenance contract with the executing agency/ supplier

More options of Treatment of organic fraction is briefly presented in Engineering design in Chapter 8 of this document.

7.3.3. Technical Guidelines For C&D Waste Management

C&D waste contains mainly concrete, masonry (bricks, mortar), sand, gravel, metal, wood and others like ceramic, broken pipes, and miscellaneous items. Almost 95% of the C&D waste can be processed & reused as building material, road sub-base and as landfill cover material.

C&D waste Management Rules 2016 mandate generators:

- To keep the construction and demolition waste within the premise or get the waste deposited at collection centre so made by the local body or handover it to the authorized processing facilities of construction and demolition waste.
- Waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month shall have to pay for the processing and disposal of construction and demolition waste generated by them, apart from the payment for storage, collection and transportation
- Construction and demolition waste shall be utilized in sanitary landfill for municipal solid waste of the city or region

As per Rule (9) sub-rule (4) of C&D waste Management Rules the 'Procurement of materials made from construction and demolition waste shall be made mandatory to a certain percentage (say 10-20%) in municipal and Government contracts subject to strict quality control'. GoK may take appropriate measures to enforce this.

ULBs are responsible in:

• Making arrangements and place appropriate containers for collection of waste and shall remove at regular intervals or when they are filled, either through own resources or by appointing private agency

• Getting the collected waste transported to appropriate sites for processing and disposal either through own resources or by appointing private operators;

Planning for collection, storage, processing of C&D waste

- Assess the C&D waste generation in the ULB
- identify an interim storage space for storing the waste generated
- provide containers skips to store such waste
- Provide a fleet of skip loaders & skips for transportation
- setup processing facility : setting up a processing facility at ULB level will not be viable when the economies of scale and land requirement is considered .Hence a cluster /regional facility may have to be developed to cater a number of ULBs .

The subsequent part of this section presents the planning, design, implementation aspects of collection, interim storage and ULB level re-use of materials

The first step towards the developing C&D waste management system is to assess the quantity of C&D waste arising. ULB shall carry out an assessment of quantity based on the thumb rule of Technology Information, Forecasting and Assessment Council (TIFAC) presented in table below.

Table 7-15: C& D waste generation trends in India

Activity	Generation rate in kg/sqm
New construction	40-60
Demolition	300-500
Repair /renovation	40-50

It may be noted that the C&D waste reaching municipal stream is only a part of the waste generated as some quantity is used at construction site itself while demotion waste is sold to private parties. On arriving a reasonable estimation of waste, ULB shall identify a site for temporary storage.

Table 7-16: C&D Waste – Storage at source, transportation & secondary storage

Storage at source

- Segregate the C&D waste
- All generators to store the waste within the construction/demolition site preferably in skips matching to the skip loaders of the ULB. ULB may provide skip own hire if requested for
- C&D waste generation of more than 20 tpd or 300 tons/project shall present management plan to ULB and get approval before implementing the project

Transportation

- Small quantities arising from repairs etc. of note more than one skip load should be transported to interim storage site either by generator or though the ULB
- Large quantity generators shall transport directly to processing site either thorough own arrangements or availing municipal facility

Interim storage site

- Locate close to existing roads which are wide enough for movement C&D collection vehicles like Heavy duty skip loaders without causing traffic issues. These facilities may preferably be located in the existing disposal site
- Site close to schools, hospitals should be avoided
- Wetlands, low lying areas and flood-prone areas should be avoided
- Facility require vehicle maneuvering space without hindering road traffic
- Should not be close to dense habitat area / the banks river, canal, lake
- ULB may provide only one such facility if the travel distance is only 10 km .If more two/three sites may be designated
- Provide space for temporary storage for 15-30 days
- Storage skips may be provided to avoid dumping on ground
- Green belt of trees of thick foliage should be provided on the periphery to arrest dust.
- The area may be provided with peripheral fence
- Provision of storm water drains to prevent stagnation of surface water in the site
- The discharge of storm water from site should be done be providing silt pit so that no debris escape to city drain

Part of the C&D waste can be used without processing for Municipal works like landfill cover, road subbase etc. Processing of remaining waste preferably done in a centralized/regional facility.

Recycling of C&D waste starts with segregation of residual material such as plastic, wood, metal fragments, etc. (constituting 10% of the total waste as per TIFAC study on composition). The remaining bulky waste is fed into crushers and reduced to smaller and smaller sizes, with size fractions separated depending on end use. Fines are typically best recovered with a "wet process". A simplified diagram depicting C&D waste processing is shown in Figure below.



Figure 7-12: C&D waste processing

The coarse and fine aggregates of various sizes can be used directly as recycled aggregates in construction or used to manufacture a range of pre-cast products like paver blocks, kerbstones, CC blocks

Recycled Coarse Aggregate may be used in concrete for bulk fills, bank protection, base/fill of drainage structures, pavements, sidewalks, kerbs and gutters, etc.

Up to 30 percent of natural crushed coarse aggregate can be replaced by the recycled concrete aggregate.

This percentage can be increased up to 50 percent for pavements and other areas which are under pure compression specific to the standards and practices pertaining to construction of roads.

Operation procedures of regional C&D waste facility is briefly presented in **Chapter 9**

7.3.4. Management of sanitary waste and domestic hazardous waste

As stated in foregoing section on Collection & Transportation of waste, separately wrapped sanitary waste part of dry waste should be collected. The sanitary waste so collected either reaches MCF or MRF where it is segregated separately.

CPCB guidelines 2018 envisage the options .The feasible options in Kerala are shown in the table below.

Options envisaged in CPCB Guidelines 2018	Feasible options in Kerala	
options entrouged in dr ob duidennes 2010		
(a) Send the segregated sanitary waste to available waste management options/incinerators for final disposal/incineration. (Treatment Storage and Disposal Facilities (TSDF) or Common Biomedical Waste Treatment Facilities CBMWTFs)	Sending it to Facility operated by IMAGE	
(b) The sanitary waste, if collected as part of segregated non-recyclable dry-waste may feed for Waste to Energy plants.	No WtE plants function in Kerala now and hence this option may not be feasible	
(c) ULBs may also install a stand-alone common incinerator for disposal of sanitary waste	CorporationsandMajorMunicipalities may install incineratorscomplying with specification of bio-medical waste incinerator -ScheduleII C of SWM rules 2016	
	Utilization of this facility by neighboring municipalities based on agreed terms	

Table 7-17: Feasible options for management of sanitary waste

The other suggestions of CPCB which shall form part of the SWM program of ULBs are :

Create awareness of the negative consequences of poor waste management on health and the environment due to sanitary waste.

Support from private sectors in development of menstrual waste management products that are environmentally friendly and accessible for women and girls.

Industrial Groups/ Commercial Groups to involve in sanitary waste management (collection to disposal) under Corporate Social Responsibility (CSR) and promotion of Extended Producers Responsibilities (EPR) for providing pouch /wrappers for safe handling of sanitary wastes and decentralized deposit centers.

Ensure implementation of sanitary waste guidelines and policies and monitoring of Key Performance Index (KPI) and inclinators.

ULBs must conduct the training sessions in schools and communities along with the key messages of Hygienic practices as per the Menstrual Hygiene Management (MHM) Guidelines

Domestic hazardous waste: As stated in foregoing section on C&T system, ULB shall collect domestic hazardous waste through doorstep or through drop off facilities provided . Though National SWM Manual 2016 suggests setting up of drop off facilities in every ward or zone, the feasibility should be studied by ULB based on land availability and public acceptance. The PIM is suggesting setting up such facility along with MCF & MRF. Secondary collection system will get the waste collected from these centers at frequencies determined by ULB for subsequent transportation to the nearest treatment disposal facility –TSDF or as specified by KSPCB.

7.4. Technical Guidelines for the Sanitary Landfills

a) WHAT IS A SANITARY LANDFILL?

A sanitary landfill refers to an engineered facility for the disposal of MSW designed and operated to minimize public health and environmental impacts. SWM Rules, 2016 define sanitary landfilling as a process for final and safe disposal of residual solid waste and inert waste on land in a facility designed with protective measures against pollution of ground water, surface water, fugitive air dust, wind- blown litter, bad odour etc.

b) MANDATE TO SET UP SANITARY LANDFILL IN SWM RULES, 2016

Rule 15 (w) of SWM Rules, 2016 mandates municipal authorities to undertake on their own or through any other agency construction, operation and maintenance of sanitary landfill and associated infrastructure as per schedule 1 of the Rules for disposal of residual waste. This schedule provides comprehensive specification for sanitary landfilling which includes criteria for site selection, development of facilities at the landfill, operation and closure on completion of landfilling, pollution prevention, water and air quality monitoring, plantation at landfills, post care of landfill and closure and rehabilitation of old dump sites.

Type of waste permitted to be landfilled as per the SWM rules 2016:

- (i) non-recyclable, noncombustible, Non-biodegradable and inert waste (by its nature or through pretreatment)
- (ii) commingled waste (mixed waste) not found suitable for waste processing or recycling
- (iii) pre-processing and post-processing rejects from waste processing plants.

<u>Exception:</u> Till the time waste processing facilities for composting or recycling or energy recovery are set up, the waste can be sent to the sanitary landfill. These exceptions shall be overridden by the project requirements under KSWMP wherein specific time bound targets are to be achieved

Sanitary landfilling is not allowed for the following waste streams:

(i) biodegradable waste or garden waste

- (ii) dry recyclables, combustible waste
- (iii) hazardous waste (needs hazardous waste sites with special containment)

c) TECHNICAL GUIDANCE GIVEN IN NATIONAL SWM MANUAL 2016

Chapter 4 of Manual on Solid Waste Management, 2016 part II (page 349 to 423) addresses all technical aspects of Municipal sanitary landfills whereas annexure 7 in part III of the manual (page 103 to 108) provides a typical design of sanitary landfill. Municipal authorities may refer to these provisions of Manual for detailed understanding on the subject.

The various aspects of the landfill are briefly enumerated below:

7.4.1. Essential Components of Sanitary Landfills

The essential components of MSW landfill is given below and enumerated in the figure below. The Project Authority (ULB or SM) shall ensure that these essential components are considered in the project plan independent of the model of project implementation. These will be applicable for both the above cases.

- A liner system at the base and sides of the landfill which prevents migration of leachate or gas to the surrounding soil.
- A leachate collection and control facility which collects and extracts leachate from within and collection and control facility (optional for small landfills) which collects and extracts gas from within and from the top of the landfill and then treats it or uses it for energy recovery. There are 2 types of gas collection systems a) Passive and b) Active.
 - a) The Passive system is implemented when the gas quantum is less, with less quantity of methane. This system releases the gas in the air
 - b) The Active system is implemented when the gas quantum is large with high quantity of methane. The gas is collected by gas collection & conveyance system and used after cleaning.
- A final cover system at the top of the landfill which enhances surface drainage, prevents infiltrating water and supports surface vegetation.
- A surface water drainage system which collects and removes all surface runoff from the landfill site.
- An environmental monitoring system which periodically collects and analyses air, surface water, soil, gas, and ground water samples around the landfill site.
- A closure and post-closure plan which lists the steps that must be taken to close and secure a landfill site once the filling operation has been completed and the activities for long-term monitoring, operation and maintenance of the completed landfill.



Figure 7-13: Essential Components of Sanitary Landfills Source: CPHEEO Manual 2000 - CPCB

Legend for the above figure is shown below.

1. Geological barrier	8. Landfill body
2. Impermeable base liner	9. Filling and compacting in layers
3. Drainage layer	10. Gas venting system
4. Leachate collection system	11. Protective cover system
5. Storm - water drain ditch	12. Gas collectors
6. Bordering dams	13. Groundwater control
7. Circulation roads	14. Re-planting

The planning and design of a sanitary landfill will have the following steps:

- 1. site selection
- 2. sanitary landfill design
- 3. construction of a sanitary landfill
- 4. sanitary landfill operation
- 5. closure and post-closure plan

7.4.1.1. Site Selection Criteria

Selection of a sanitary landfill site shall be governed by the strategy identified in the state policy and SWM strategy and the municipal solid waste management (MSWM) plan of the ULB. Decision on constructing local landfill or regional landfill is based on SWM plan.

It is essential to know the quantum of waste that would be coming to the site to ascertain the size of land that would be required. This is based on the present waste generation and the estimated waste quantity that would be coming to the SLF over the next 20-25 years. (estimation is based on population growth and per day capita waste generation) (see the section on landfill design below). The availability of the cover soil within the site is also an important factor in site selection.

The process to be followed in both the cases (Local/ Regional) is just the same. Site selection usually includes the following steps, which are described in the section below:

- 1. Location criteria: Refer to the criteria used to identify location of the landfill.
- 2. Identification of potential search areas in consultation with the Town Planning Department
- 3. Development of a list of potential sites
- 4. Data collection for potential sites (secondary data)

- 5. Field visit for local verification and identification of potential sites
- 6. Selection of a few best-ranked sites;
- 7. Preliminary environmental impact investigation and
- 8. Final site selection

A working committee may be set up by the SPMU to see all the sites and recommend selection of appropriate site considering following aspects.



Figure 7-14: Flow sheet for Site selection

1. Location criteria

The criteria given as per the Rules and the manual are listed below for ready reference. "Guidelines for the Selection of Site for Landfilling" from CPCB should also be referred. It also includes guidance for developing a site sensitivity index potential site.

Sr. No	Place	Minimum Siting distance
1	Habitation	200 m
2	Rivers	100 metres (m) away from the flood plain
3	Lakes and water bodies	200 m
4	Non-meandering water (canal, drainage etc.)	30 m
5	Highway, railway line, Water supply wells	200 m from the centre line
6	Coastal regulation zoning Sanitary Landfill site	Not permitted
7	Earthquake Zone	500 m from fault line fracture*
8	Flood prone area (100-year flood plain)	Not permitted
9	Ground water table	The bottom of the landfill liner should be 2m above the highest water table.
10	Airport	20 km**

Table 7-18: Location criteria for sanitary landfills

* The urban local bodies (ULBs) located in seismic zone 4 and zone 5 should consult the seismic fault map before finalising the site for the sanitary landfill. They should also ensure that when the sanitary landfill is designed, the seismic factors are taken into consideration in determining the stability of the landfill structure. (Kerala is in zone II)

** In a special case, a landfill site may be set up within 10–20 km away from the airport or airbase if there is no objection certificate from the civil aviation authority or air force as the case may be.

2. <u>Identification of potential search areas in consultation with the Town Planning</u> <u>Department</u>

The potential areas need to be searched by the members of the committee or suggested by the ULB (Town Planning dept) to the committee. The search areas help in identifying potential sites for sanitary landfill with waste generation as a centre and preferably within the ULB boundary. The transportation distance is one of the main criteria in the search area.

3. <u>Development of a list of potential sites</u>

After demarcating the search area and considering the various locational criteria, areas having potential for site development should be identified with the help of a map. Potential sites for sanitary landfill development should also conform to the long-term land use goals

4. <u>Data collection for potential sites (secondary data)</u>

Once the potential landfill sites are identified, the sites further need to be screened by using secondary data maps using the site selection criteria. The objective is to exclude unsuitable

sites which do not meet the criteria. All areas that do not meet specified criteria will be indicated in the map will be ruled out. Only the areas meeting the norms will be taken to the next step of investigation. The data to be collected is given below in the table:

Sr. No.	Data	Information	Source
1	Topographic Maps	The topography indicates low and high areas, natural surface water drainage patterns, streams, and rivers as well as roads, railways, and location of airports	Survey of India
2	Soil maps	These maps, primarily meant for agricultural use, show the types of soil near the surface	Indian Agricultural Research Institute (IARI)
3	Land use plans	These plans are useful in delineating areas with definite zoning restrictions. There may be restrictions on the use of agricultural land or forest land for sanitary landfill purposes	Town planning authority or municipality.
4	Water use plans	The plans indicating the following items: private and public drinking water wells, drinking water supply line(s), wells located on surface water bodies and open wells protection areas for drinking water	
5	Flood plain Maps	These maps are used to delineate areas that are within a 100-year flood plain.	Irrigation Department
6	Geologic maps	These maps indicate geologic features and bedrock levels. They may be used to identify predominantly sandy or clayey areas	Geological Survey of India (GSI)
7	Aerial Photographs, satellite imagery, Google maps	These can identify surface features such as small lakes, intermittent stream beds, and current land use, which may not have been identified in earlier map searches.	
8	Groundwater maps	These maps indicate the depth to ground water as well as regional ground water flow patterns.	Ground water boards or minor irrigation tube well corporations
9	Rainfall data	Precipitation data are used for designing the amount of possible leachate in cities	Indian Meteorological Department (IMD)
10	Wind rose maps	Wind rose maps indicate the predominant wind direction in the area, based on which the location and orientation of the landfill footprint has to be decided	IMD
11	Seismic data	The seismic activity of a region has to be considered in the design of sanitary landfills; landfills should ideally not be located in zone 5 seismic zone. However, in case of siting in zone 5,complete structural analysis should be carried out for designing the landfill and the design should include	GSI or National Geophysical Research Institute (NGRI)

Table 7-19: Data collection for potential sites

Sr. No.	Data	Information	Source
		appropriate structural controls	
12	Road maps	Road maps indicate accessibility of the potential site.	

5. <u>Field visit for local verification and identification of potential sites</u>

A site reconnaissance will be conducted by a site visit as part of the preliminary data collection and map screening. All features observed in various maps will be confirmed. The possible sites should be evaluated on the basis of the topographical conditions and the suitability of the landfill site, namely:

- a. sufficient land size
- b. flat area with low inclination
- c. connection to highways and conditions of the access roads
- d. flooding during monsoons
- e. land use and soil type
- f. depth to groundwater table (as observed in open wells or bore wells)
- g. information on the sub-ground from clay, stone, or sand pits
- h. crossing of electrical lines
- i. actual settlement patterns (eventual new or informal settlements)

6. <u>Selection of Best Ranked Sites</u>

The CPCB guidelines for selection of landfilling sites, enumerate a selection process based on the Site Sensitivity index. The sites identified are ranked on the basis of defined criteria for the preliminary environmental impact investigation and then a final site selection is ranked. (Guidelines for selection of site for Landfilling-CPCB-Feb 2003).

7. <u>Preliminary Environmental Impact Investigation</u>

On the basis of the ranking scores of various sites, two or three sites may be chosen for a preliminary environmental impact investigation. The impact of the sanitary landfill will be assessed and potentially quantified according to the national rules and the local conditions. The preliminary environmental investigation should conclude in a rough comparison of assessed alternative sites among themselves as well as with the null alternative (i.e., if the project was not carried out)and suitability of the sites.

8. <u>Final Site Selection</u>

The final selection of the site from amongst the best-ranked alternatives should be done by comparing:

- a. environmental impact
- b. social acceptance
- c. land availability
- d. transportation costs It may be compared on the basis of average hauling distance from the centre of the waste generating area
- e. sanitary landfilling costs (site specific costs are to be considered, if any)

Note - Once the site is selected, it should be earmarked by the Town planning dept for the SWM activity. A suitable buffer zone must be immediately marked so that no development activities are allowed. Farming in the buffer zone is allowed.

The <u>statutory clearances</u> that will be required, but not limited to, are as follows:

- Environmental Clearances: Water (Prevention and Control of Pollution) Act, 1974;Water (Prevention and Control of Pollution) Cess Act,1977; Air (Prevention and Control of Pollution) Act, 1981; Environment (Protection) Act, 1986, and Rules;
- Environmental Impact Assessment Notification, 2006
- Clearance from the State Pollution Control Board
- Clearance from the Airport Authority
- Fertilizer Control Order Clearance for compost-based plants (when processing and disposal at same location)
- Land use from the Revenue Authority
- State Electricity Authority Clearance for providing grid connectivity
- Public Liability Insurance Act, 1991 and Rules, 1991
- Industries (Development and Regulation) Act, 1951
- Factories Act, 1948
- Motor Vehicles Act, 1938, amended in 1988 and Rules, 1989
- Petroleum Act, 1934
- Energy Conservation Act, 2001

Non-statutory Approvals

- Proof of Possession of Site
- Bank Loan Sanction Letter and Agreement
- Bank Appraisal Note
- Water Supply Agreement
- Power Purchase Agreement
- Municipal Solid Waste Supply Agreement with Municipal Authority

7.4.1.2. Site Investigations

To carry out a proper design of the sanitary landfill, the in-depth information of the site parameters is necessary for the selected site as the design is directly dependent on these features. A thorough data should be collected for the following:

- Subsoil investigation
- Groundwater or hydrogeological investigation
- Surface water investigation
- Topographical investigation
- Environmental investigation
- Traffic investigation

Hydrogeological Assessment:

An assessment of the hydrogeological settings of a landfilling site is necessary to ensure that the site is conducive to the proposed design of the landfill, which should be in line with the specifications of the SWM Rules, 2016. An effective groundwater and leachate monitoring plans should be developed to assess the impact of the landfill.

The identification of unsuitable soils that would not support the overburden of the proposed fill height needs to be carried out. An analysis of the groundwater flow and pressure should result in the determination of groundwater flow paths and inform leachate control mechanisms and contingency plans for failure of the leachate liner. Future monitoring of groundwater quality should be against a reference of baseline conditions (normally done before the landfill starts).

Within the site, the location of the boreholes should be along the ground water flow path, both hydraulically upgrade and downgrade to the footprint of the landfill, at least 5 meters away from the footprint of the landfill. In addition, groundwater monitoring as per specifications in the SWM Rules, 2016 is mandated. The design of the landfill should consider this hydrogeological information to prevent failure of containment.

The objectives of a hydrogeological assessment are to:

- (i) determine the physical, hydraulic, and chemical properties of the surface material and bedrock where appropriate
- (ii) define groundwater flow characteristics and potential contaminant migration pathways
- (iii) determine the structural integrity of the sub-grade to support the landfill including its construction and any overlying facilities
- (iv) determine the availability and suitability of the soil for cover and liner uses
- (v) establish a groundwater monitoring network
- (vi) determine the feasibility of the contingency plans for contaminant control.

The hydrogeological investigation report for a site should include:

- (i) ground surface contour plan showing surface watercourses and surface water bodies
- (ii) a contour plan of the water table, showing expected directions of ground water movement
- (iii) piezometric contour plans for each aquifer, showing expected directions of groundwater movement
- (iv) a description of any aquifers and their interconnection, with generalized estimates of groundwater flow, and the potential flow paths and contaminant attenuation capabilities in the event leachate leaves the waste fill area in planned or unplanned quantities
- (v) a description of the background quality of the groundwater, and the existing and potential uses of the groundwater
- (vi) site plans and cross sections of the hydrogeological conditions
- (vii) the identification of any unstable soils or unstable bedrock

(viii) a water balance analysis considering precipitation, surface water drainage, infiltration, groundwater flow, exfiltration, and evapotranspiration.

Surface Water Assessment:

An assessment of the surface water conditions on the proposed landfill site and in the vicinity of the site (500 m) is required to ensure a stable landfill that is not impacted by or impacts surface water.

The surface water assessment report should include:

- a general description of the surface water features of the area (watershed) in which the site is located and the surface water features in the vicinity of the site (flood plains, natural watercourses and water bodies, municipal drains, drainage paths, and boundaries)
- a detailed surface water investigation to assess water quality, quantity, and habitat conditions (e.g., benthic community inventory) of the surface water features identified on the site, any surface water features flowing through the site, and any surface water features receiving discharge from the site, including:
 - a. An interpretation of the results of the detailed surface water investigation including:
 - i. plans showing all existing surface water features
 - ii. a description of current surface water quality, and the existing and proposed surface water uses.
 - b. A site drainage plan showing the drainage of surface water at the site before the site is established, during operation of the site, and following site closure
 - c. Plans, specifications and descriptions of the design features, control facilities and operational procedures to isolate, contain, convey, control or treat the surface water, on and off site, prior to its discharge to the receiving watercourse(s). The plans, specifications and descriptions should consider both clean surface water sources (off-site and on-site flows separated from landfill operations through control mechanisms like berms and ditches) and potentially contaminated storm water (on-site flows originating from landfill areas)

Table 7-20: List of investigations required

Sr.No.	Parameter	Minimum Requirements	Expected output
1	Subsoil	(a) For Landfill design -	Geological report
	investigation	(i) Two boreholes per hectare of land;	
	_	minimum 3 boreholes; up to 10m below	
		base of landfill; recording soil strata, ground	
		water level, bedrock level	
		(ii) One to two in situ permeability tests per	
		hectare of land	
		(iii) Performance of SPT (Standard	
		Penetration Tests) and collection of	
		undisturbed samples from boreholes	
		(iv) SPT an collection of un-disturbed	
		samples at all level	
		Soil Investigation - Classification, gradation	

Sr.No.	Parameter	Minimum Requirements	Expected output
		Atterberg's limit, Bulk density, dry density, water content, cohesion, Angle of Internal friction, Proctor density, Optimum moisture content, coefficient of permeability, strength, compressibility (v) Collection of seismic data (b) For borrow area of liner material and cover material - (i) Two test pits or shallow boreholes per hectare of borrow area; minimum five pits (ii) Laboratory tests - classification, Proctor compaction, permeability and strength tests (c) For approach road to landfill - (i) As per IRC codes	
2	Ground water/ Hydrogeologic al Investigations	 (a) One ground water well (per aquifer) for every hectare of land; minimum four wells - one up-gradient, three down-gradient (b) Observations of groundwater level fluctuations and groundwater flow (c)Collection of groundwater samples (monthly/bimonthly) for groundwater quality testing for 1 year prior to landfill construction. (d) Collection of hydrometeorological data from India Metrological Department – rainfall and evaporation data (e) Performance of flood routing analysis for one in100-year flood (f) Collection of surface water samples(monthly/bimonthly) for water quality testing one year prior to landfill construction. 	Hydrogeological Report - ground water flow direction, gradient, bedrock profile, surface water & drainage, Aquifer attributes - depth, range, Average yield, transmissivity, storage coefficient.
3	Topographical Investigation	 (a) Collection of detailed topographical maps of surrounding area from Survey of India (b) Topographical map with 0.5m contour interval by Total Station/drone method. 	Contour survey in AutoCAD file giving all natural and man features
4	Environmental Investigation basis	 (a) Collection of samples on monthly/bimonthly surface water samples, ground water samples and air samples (b) Transportation to certified testing laboratory and testing for regulatory parameters (c) Vegetation/ecology mapping survey (d) Well Water Samples -1 up gradient, 2 down gradient (minimum) for drinking water quality parameter (e) Surface Water Samples - 1 up gradient, 2 down gradient (minimum) (f) Sampling & analysis on monthly for 	Analysis report

Sr.No.	Parameter	Minimum Requirements	Expected output
		methane, hydrogen sulphide and other	
		gases on a monthly basis.	
5	Traffic	(a) Collection of data on existing traffic -	Report on traffic –
	Investigation	daily traffic volume and peak hour traffic	present and future
		volume - for six months	estimation due to
		(b) Road condition survey for existing road	landfilling traffic to
		with suggestions for	be considered
		strengthening/widening.	
6	Waste &	(a) Waste characterisation of fresh waste	Analysis report
	Leachate	collected from bins – Physical and chemical	
	Investigation	– minimum 5 samples	
		(b) Waste characterization of old waste	
		collected from different depths in existing	
		waste dumps or sanitary landfills including	
		heavy metals. Geotechnical properties of	
		waste- fresh and old – minimum 5 samples	
		(c) Collection and laboratory testing of at	
		least 5 samples of leachate from just	
		beneath existing waste dumps or sanitary	
		landfills.	

The Environmental and Social Impact Assessment need to be done parallelly as per the world Bank ESMF guidelines

7.4.1.3. Landfill Planning and Design

Design Life

The life of a sanitary landfill comprises of an active period and a closure and post-closure period. The active period should typically range from 20 to 25 years depending on the availability of land area. The closure and post-closure period, for a sanitary landfill will be monitored and maintained for 15 years after the active period is completed. This is applicable to a single ULB as well as a regional landfill site. The site must be chosen in such a manner that the site is ideally a square. Narrow strips of land are not suitable for landfill as the required volume is not possible.

The landfill is built in phases; each phase being of maximum 5 years capacity. A landfill is operated in phases because it allows the progressive use of the landfill area, such that at any given time a part of the site may have a final cover, a part being actively filled, a part being prepared to receive waste, and a part undisturbed. A <u>'phase'</u> consists of cells, lifts, daily cover, intermediate cover, liner and leachate collection facility, gas control facility and final cover. It is recommended that a 'phase plan' may be drawn as soon as the landfill layout and section are finalised. The term <u>cell</u> is used to describe the volume of material placed in a landfill for one day(see figure below). A cell usually has a depth of 2m of waste covered with 150mm of soil at the end of the day. The purpose of daily cover is to control the littering of waste, prevent rats, flies, odour and fire accidents.



Figure 7-15: Phasing of landfill – layout Source: CPHEEO Manual 2000 - CPCB



Figure 7-16: Phasing of Landfill in cross section Source: CPHEEO Manual 2000 - CPCB



Figure 7-17: Showing cell, slopes and daily cover Source: CPHEEO Manual 2000 - CPCB

Waste Volume and Landfill Capacity Calculation

It is necessary to ascertain the waste volume going to the sanitary landfill based on current waste and waste projections based on next 20-25 years. It is also necessary to know the waste rejects that would be coming out from the processing plant that is either working or is planned in the future. Based on certain assumptions, a preliminary landfill design calculation has been given below:

Example of a Preliminary Design of Landfill

The example given below is only a preliminary design of a landfill. It does not cover the detailed design

A. BASIC DATA

- a) Current waste coming to the Landfill 200 TPD (This is the waste coming after the processing has been done. i.e. Inert rejects to SLF)
- b) Design life Active period = 25 years
- c) Closure and post closure period= 15 years
- d) Topography Flat ground
- e) Subsoil Sandy silt up to 20 m below ground surface, underlain by bedrock
- f) Water table 10 m below ground surface
- g) Average total precipitation 750 mm per year

B. LANDFILL CAPACITY, LANDFILL HEIGHT, LANDFILL AREA

- a) Current waste coming to the Landfill 200 TPD
- b) Estimated waste generation after 25 years 400 TPD
- c) Total waste generation in 25 Years 0.5 (200+400) x 365 x 25 = 27,37,500 tons
- d) Total waste volume (assumed density 0.85 tons/ m^3) = 27,37,500/0.85 = 32,20,588 m^3
- e) Volume of daily cover $(10\%) = 0.1 \times 32,20,588 = 3,22,059 \text{ m}^3$
- f) Volume of liner and cover systems = $0.125 \times 32,20,588 = 402,573 \text{ m}^3$
- g) First estimate of landfill volume = 32,20,588 +3,22,059 + 402573 = 39,45,220 m³
- h) Likely shape of landfill Rectangular in plan (length: width= 2:1)
- i) Primarily above ground level, partly belowground level
- j) Area restrictions Nil
- k) Possible average landfill height 17 m
- l) Area required = $39,45,220 \text{ m}^3/17 \text{ m} = 232,072 \text{ m}^2$ (23.20 hectares)
- m) Approximate plan dimensions = 690m X 345 m
- n) The minimum area required for the green belt (9m) and road (6m) will make the area
 = 27.00 Ha.(The total landfill area should be approximately 15% more than the area required for landfilling to accommodate all infrastructure and support facilities as well as to allow the formation of a green belt around the landfill

Note- That a suitable buffer zone will be required outside this area where no residential and commercial activity will be allowed. Agricultural activities can be allowed.

a) The typical landfill section has been shown earlier.

Landfill layout

The disposal site will comprise of the landfill and the facilities along with it. There is a list of minimum facilities that are required at site. These facilities cost a lot and hence it would be good to have a large parcel of land, so that the overhead cost gets distributed. In case the site is small, then these facilities will have to be developed again at the new site. A typical disposal site has been enumerated below for understanding purpose. It must be noted that a layout has to be developed for each site separately. (tailor designed)

The landfill plan and the landfill area are determined by the topography of the land. The landfills may take the following forms:

- a) Above ground landfills (area landfills) mostly done in areas where excavation below ground is not possible like high ground water table or hard rock. Cover material may have to be hauled in by truck or earthmoving equipment from adjacent land or from borrow-pit areas
- b) Below ground landfill (trench landfills) It is ideally suited to areas where an adequate depth of cover material is available at the site and where the water table is not near the surface. The soil excavated from the site is used for daily cover and final cover. The excavated area is lined with low-permeability liners to limit the movement of both landfill gases and leachate.
- c) Slope & Valley landfills–This type is used mostly in hilly regions as flat ground for landfilling is difficult to locate. Slope landfills and valley landfills have to be critically designed. Control of inflowing water from hillside slopes is a critical factor in design of such landfills. Hydrogeology of the site plays an important role long with surface water drainage.
- d) A combination of the above–The contours of the land determines the design of the landfill. Each Landfill has to be designed separately (tailor designed). It is recommended that the landfill section be arrived at keeping in view the topography, depth to water table and availability of daily cover material.



Figure 7-18: Typical landfill site Source: CPHEEO Manual 2000 - CPCB

The following minimum facilities are required at site:

- 1. Site fencing The site must have a fence all around to prevent infiltration of man and animal.
- 2. Site control office 3 m x 5 m (portable cabin)
- 3. Access roads–Main road should be 12m wide (6m on each side) tar road with divider with parking area. A 5m wide tar road / WBM along the boundary& temporary roads for vehicle movement could be 4m mud roads
- 4. Weighbridges (computerized) Two weighbridges (minimum one) of 50 ton capacity complete with CCTV camera and live viewing remotely by the ULB.
- 5. Office Building 30M X 10M To house the office and the laboratory in the same premise.
- 6. Equipment workshop and garage 30 m x 20 m building. Vehicle cleaning can be adjacent to the workshop.
- Leachate holding tank Suitable size (2 days retention) based on the water balance method. It should be placed in such a manner that it should be used for minimum 2 phases.
- 8. Daily soil depot placed in a suitable corner to store the soil for daily cover and intermediate cover.
- 9. Leachate treatment facility 40 m x 20 m. The size could be finalised based on the treatment system adopted.

- 10. Gas flaring facility 20 m x 10 m (if required)
- 11. Surface water gutter placed at the base of the landfill at the periphery. The size will have to be based on the highest intensity (per hour) of the rainfall.
- 12. Surface water sedimentation tank Based on the rainfall intensity, a tank will have to be designed
- 13. Monitoring wells should be suitably placed after studying the hydrogeological report. Minimum 1 upstream and 3 down steam

7.4.1.4. Guidelines for Leachate Collection System

Leachate Generation

Leachate is generated on account of the infiltration of water/liquid into landfills and its percolation through waste as well as by the squeezing of the waste due to self-weight. Leachate is a contaminated liquid that contains a number of dissolved and suspended materials. The primary criterion for design of the leachate collection system is that all leachate should be collected and removed from the landfill at a rate sufficient to prevent a hydraulic head greater than 300 mm on the HDPE liner. The main sources of leachate include:

- i. moisture content of waste entering the landfill
- ii. infiltration from direct precipitation on the waste surface
- iii. surface water flow onto the active face of the landfill.

Significant quantity of leachate is produced from the 'active' phases of a landfill under operation during the monsoon season. The leachate quantity from those portions of a landfill which have received a final cover is minimal. The quantum of leachate should be assessed based on the "Water Balance method. It can be simply defined as

- **a) Generation Rate in 'Active Area'**: The leachate generation during the operational phase from an active area of a landfill may be estimated in a simplified manner as follows:
 - Leachate volume = (volume of precipitation) + (volume of pore squeeze liquid) (volume lost through evaporation) (volume of water absorbed by the waste).
- **b) Generation Rate after Closure:** After the construction of the final cover, only that water which can infiltrate through the final cover percolates through the waste and generates leachate. The major quantity of precipitation will be converted to surface runoff and the quantity of leachate generation can be estimated as follows:
 - Leachate volume = (volume of precipitation) (volume of surface runoff) (volume lost through evapotranspiration) – (volume of water absorbed by waste and intermediate soil covers).

For landfills which do not receive run-on from outside areas, a very approximate estimate of leachate generation can be obtained by assuming it to be25 to 50 per cent of the precipitation from the active landfill area and as 10 to 15percent of the precipitation from covered areas. On a thumb rule basis one can estimate the leachate generation for preliminary design as follow:

Example Calculation: Estimation of Leachate Generation

Average Total Precipitation = 750 mm/year Plan area of operating phase = 10000 sq.m. Assuming 80% precipitation in 4 months (monsoon period) = 600 mm/4 months Peak leachate Quantity (thumb rule basis) = (0.6*10000)/120 = 50 cu.m. per day

A leachate tank should be of minimum 2 days retention time. The structural design of the tank will have to be based on the bore log data and the geological report. This leachate should be regularly pumped to the leachate treatment plant or taken away to the treatment plant.

Leachate Quality

The important factors which influence leachate quality include waste composition, elapsed time, temperature, moisture and available oxygen. It is also influenced by the climatic conditions and the landfill operational practice. Leachate is a dark brown liquid which oozes from the waste. The typical range of leachate quality is available in the SWM CPHEEO manual.

Leachate Collection

The leachate collection system is placed over the HDPE liner. While designing the landfill base it is important to have a 2-3% slope in one direction based on the contour drawing. A leachate collection system (LCS) has to be put in place to collect the leachate. The LCS consists of three main components: (i) a drainage layer (300 mm thick) – mostly made of rounded gravel/ rounded metal – 20-40mm size, (ii) collection pipes(made of HDPE having hole or slotted) – there are 2 types pipes- header pipe and lateral pipes (iii) a nonwoven geotextile (punched) layer – mostly 400 gsm or 800 gsm which acts as a separator and filter which prevents clogging. At no time should vehicles be allowed to pass over the geotextile without a buffer layer in between.

The leachate from the waste will be collected in the drainage layer system and in the secondary drainpipes made of HDPE and will be directed by the main leachate pipes outside the waste body. This leachate is then collected in a pit from where it could be transferred by gravity or pumped based on the level of the tank. To minimize the generation of leachate, the system should be designed in a way that only filled areas and currently operated areas are connected to the leachate collection system. The other sections should be connected to storm water ditches by using a storm water bypass system. Therefore, the landfill area should be divided into strips of several filling sections. It is also important to note that the LCS has to be in line with the phasing plan.

LCS Pipes

Drainpipes are made of HDPE and slotted or holed on 2/3 of the pipe circumference. The diameter is determined from the water balance method. The secondary pipe should be minimum 160 mm and the main header pipe should be 250 mm. The wall thickness of pipes should be calculated considering the overburden stress due to filling height of waste. The perforated HDPE pipes are embedded in the gravel layer. The network of HDPE pipes collects the leachate and are connected to an LCS pit/sump. Leachate from the sump is to be pumped to the proposed leachate treatment plan for disposal. The leachate can be held in a pond in

case the land is available. The specified distance between the secondary drainpipes should be around 25-35 m. The HDPE pipes are connected by welding.



Figure 7-19: Placement of Leachate pipe in the landfill Source: CPHEEO Manual 2000 - CPCB

Leachate Treatment

The type of treatment facilities to be used depends on the leachate characteristics and volume. Typically, treatment may be required (prior to discharge) to reduce the concentration of biodegradable and non-biodegradable organic material, specific hazardous constituents, ammonia and nitrate ions, sulphides, odorous compounds, and suspended solids.

The appropriate leachate treatment scheme would significantly depend on the organic content of the disposed waste. As per the SWM Rules, 2016, biodegradables should not be disposed in landfills. However, absence of processing facilities or the presence of organic content in rejects from processing facilities, landfills are not devoid of biodegradable material. The concentrations of these biodegradables would vary from landfill to landfill. Laboratory tests should be conducted to ascertain the quality of leachate in every landfill. The leachate could be

- discharged to wastewater treatment system for co-treatment
- re-circulated through the landfill
- treated using biological or physicochemical treatment
- evaporated in solar ponds.

Based on the chemical characteristics of the leachate, treatment may include biological processes (e.g., aeration, activated sludge, nitrification or de-nitrification), chemical processes (e.g., oxidation, neutralisation) and physical processes (e.g., air stripping, activated adsorption, ultrafiltration, etc.).

Leachate treatment of large landfills requires substantial area of land as well as investment. In case of smaller landfills, a more practical way could be to take the leachate to the nearest sewage treatment plant (STP). In many countries, co-treatment of leachate with sewage is practiced successfully. However, depending on the age of the waste, the chemical composition of the leachate varies and results in significant loads of different constituents at different times on the STP. The biochemical oxygen demand (BOD) and nitrogen load are critical and should be considered before assessing whether an existing STP can handle the incoming leachate. The treated leachate may be discharged to surface water bodies, after ascertaining the quality as per the norms for discharge to inland water systems specified in the SWM Rules, 2016.

7.4.1.5. Liner System – Detailed Design and Construction Aspects of Liner Systems

The main purpose of the sanitary landfill is to minimise the leachate formation, collect all the leachate generated and restrict the movement of leachate and gas beyond the landfill. As discussed earlier, the landfill can be designed above the ground or below the ground or partly above and partly below. This is decided by the topography and the underlying hydrogeological report. It is extremely important to have a proper sealing system at the base and the sides to prevent the pollution of the environment.

The leachate generated in the landfill needs to be collected through a leachate collection system and treated before being discharged to the environment. The above the ground landfills have an advantage of draining the leachate by gravity by maintaining proper slopes. If water table is not close to the ground surface, landfill base can be at a level below the ground by excavation, to accommodate more waste per unit area of land. But in case of below the ground landfills, it needs to be designed and constructed appropriately to address the issues like pumping of the leachate out for treatment. Availability of electricity to draw the leachate out or else the leachate will build up beyond the permissible limit of 300mm above the liner.

Base Sealing System







The base liner system could vary depending upon the site conditions like water table, soil type topography etc. The construction can be done by following the procedure mentioned below:

- 1. Excavate the soil to the required line and level. The slopes need to be constructed and compacted in layers to get 95% Proctor density compaction. The slopes need to be stable (generally 1V:2.5H). This needs to be checked during the design stage.
- 2. Check that the proper slope is maintained to collect the leachate. The base should have a slope of 2-3% for leachate collection.
- 3. The natural soil should be levelled and compacted to achieve 95% Proctor density compaction tests.
- 4. Clay sealing liner/ Compacted Clay Liner (CCL)- It comprises of three layers of clay or equivalent amended soil, at least 300mm thickness each. In case adequate clay is not found in the vicinity, amended soil mixed with bentonite can be used. The permeability of the CCL must be less than kf ≤1 x 10-7 cm per second (cm/s). Regular moisture, compaction and permeability tests will have to be carried out at site as per the IS standards.
- 5. In case, the soil permeability cannot be amended to the above permeability, the Geosynthetic Clay liner (GCL) can also be used. GCL is a factory manufactured liner and hence has an assured quality and is easy and fast to install. Before the use of the GCL, the base needs to be compacted with existing soil layer of 500mm. The GCL should be purchased from the approved list of manufacturers only. (see the technical specifications)
- 6. High-density polyethylene geomembrane The HDPE geomembrane should have a minimum standardised thickness of 1.5 mm thickness. Only HDPE geomembranes that comply with the requirements of American Society for Testing and Materials (ASTM) or corresponding standards should be used. The HDPE Liner should be from the approved list of manufacturers only. (see the technical specifications)
- 7. Protection layer A layer of geotextile should be used to protect (cushion) the HDPE liner from puncturing. The geotextile should be 400grams per square meter (g/m2) for bottom liner. If the planned height (height +depth) of the landfill is more than 20 m, geotextile should be 800 g/m2.
- 8. Leachate drainage layer A leachate drainage layer should be 300mm thick made of rounded gravel, ensuring a permeability greater than 10-2 cm/sec. In case the gravel is not available in required quantity, rounded metal of 20-40mm size can be used.
- 9. Separation layer Geotextile of 400 gsm will have to be used as separation and filtration layer between the drainage layer and the waste on top.

7.5. Biomedical Waste Management in Kerala -Guidelines

7.5.1. What Is Biomedical Waste?

The biomedical waste management (BMWM) Rules 2016 define biomedical waste as any waste generated during diagnosis, treatment, or immunisation of human beings or animals, or research activities pertaining thereto etc.

7.5.2. Mandate Under Biomedical Waste Management Rules 2016

The Rules mandate that every biomedical waste occupier (generator) shall ensure that biomedical waste is handled without any adverse effect to human health and environment and that biomedical waste should be treated and disposed of as per the Rules. The Rules
further provide for establishment of common biomedical waste treatment and disposal facility through engagement of an operator for the collection, reception, storage, transport, treatment and disposal of biomedical waste and restrict individual occupiers from setting up of onsite or captive facilities if a common facility is established within 75 km radius on the consideration that individual captive facility by health care facility would require larger capital investments and needs to employ dedicated trained staff for the operation and maintenance of individual facility.

In view of above mandatory provisions in the rules CPCB has formulated guidelines for setting up of Common Biomedical Treatment and Disposal facilities in the country.

Looking to the size and population of the state and distance between north and south ends of the state being greater than 500km, an urgent need is felt to set up at least one additional common BMWM facility in the state in compliance with Biomedical Waste Management Rules 2016 and keeping in mind the advice of WHO as under:

 Table 7-21: Key components in national Waste Management Plan
 Plan

Key co	Key components in a National Waste Management Plan					
1.	Assessment of the existing situation					
2.	A regulatory framework and national guidelines					
3.	National and regional waste treatment/disposal policies					
4.	Holistic and 'green' purchasing policies					
5.	Commitment from all stakeholders (e.g. government and the public)					
6.	Designated authority					
7.	Training systems					
8.	Access to resources(e.g. equipment, skilled personnel)					
9.	A system for monitoring and evaluation					

Source: WHO (2000)

7.5.3. Guidelines for Setting Up and Operationalizing Biomedical Waste Treatment Facility

The Suchitwa Mission shall undertake the following measures for setting up and operationalizing common BMWM facility.

1. Assessment of gap in service delivery

- SM shall undertake assessment of biomedical waste to be generated in the state based on the healthcare facilities (HCF) and institutions falling under the BMWM Rules 2016.
- Exclude those facilities falling within 75 km from the existing facility at Kanjikode, Palakkad district (IMAGE). As an exception, those falling outside 75 km limit shall be included in IMAGE on a case to case basis.
- SM shall consider following factors in waste generation by HCF.
 - Size of the facility
 - \circ Proportion of in- and out-patients
 - Type of facility and specialization
 - Its bed occupancy rate
 - Proportion of use of reusable items

- The team assessing waste quantities shall consider only the BMW and exclude the MSW waste volumes.
- Studies have also shown that hospitals that had implemented a segregation program could reduce clinical waste production by two thirds when compared with other hospitals
- Healthcare without Harm recommends that disposal costs could be reduced by 40-70% through the implementation of a waste reduction program.
- Hence Health Department should ensure that all HCFs should comply with the BMWM Rules 2016 (PCB will ensure as part of its regulatory check on such facilities)
- Furthermore, since COVID waste from municipal, both domestic and commercial areas would have to go to the new Common Biomedical Waste Treatment Facility(CBWTF), SM should make a good estimate of that too as also the locations from where the COVID waste from municipal sources will be collected from.

2. Identification of suitable location for setting up common facility in the State and undertaking EIA as per Ministry of Environment, Forest & Climate Change (MOEF&CC) norms

Based on careful study of current situation of BMWM in the State, the number of HCFs that need to be served and approximate quantity of waste to be handled, SM should ascertain land requirement for a common biomedical waste treatment. Its location should preferably be at least 150 km away from the existing IMAGE facility and it could serve a majority of HCFs that are currently not covered by IMAGE. As soon as land is identified, EIA needs to be undertaken and EIA clearance need to be obtained. The flow chart gives the various procedures and processes to be followed for the establishment of the CBWTF.

3. Identification of suitable technology for the common facility

Based on quantities and type of waste to be handled, appropriate technologies shall be determined by SM. Advanced technologies are being introduced progressively and waste minimisation & recycling is being promoted.

Based on BMWM Rules and guidelines from CPCB from time to time, the technologies for BMWM should be carefully selected based on quantities and type of waste to be treated. The availability of suitable technology from among the ones suggested in schedule 4. The selected technology should be able to meet the specifications mentioned in the schedule and also air quality, water quality and other microbiological standards. Technology would drive the procurement process, it is presumed. SM shall determine the procurement model based on efficiencies and cost benefit.

4. Guidelines for Vehicles and Equipment

SM shall ensure that the transport vehicles to be used for biomedical waste shall be specially fabricated for biomedical waste. The vehicles should be retrofitted with the ionizer – filter system to check escape of micro-organisms to the surroundings. The number of vehicles shall be determined based on no of units to be served and quantity of waste to be transported

• On site cold storage facility

- Treatment facilities like 1) Incinerator, 2) Autoclave/hybroclave /microwave, 3) Metal Sharps destroyer/Manager and 4)ETP (effluent treatment plant)of the waste
- Ash storage area.
- Deep burial complying to standards either as stand by to incinerator during maintenance or for some specific reasons like burial of still births etc.
- For landfilling anything like hazardous chemicals/ radioactive waste, incinerator ash etc., the waste should go to regional TSDFs with monitoring from the state pollution control board or on payment.
- Eco friendly technique solar water heater supplementing the system.
- Effluent treatment plant

Besides deciding on selection of facilities at the common facility, following activities may be initiated:

1. Tendering and Contracting for Selection of Operator of the Facility

A bid document should be prepared showing the roles and responsibilities of the operator, the type of plants, equipment to be procured for treatment and disposal of waste, manpower to be deployed and quality of service to be provided etc. Bids may be invited from qualified and experienced operators and selection should be done through a transparent bid process.

Activities to be undertaken soon after appointment of operator of the facility.

2. Motivation and Orientation programs

Orientation & motivation program may be undertaken as part of IEC initiatives to encourage active participation of the stakeholders and their compliance with BMWM rules 2016.

- 3. **Signing of MoU** between operator of the facility and the individual HCFs to ensure their participation and timely payment for the service rendered.
- 4. **Development of Training Material etc.:** Suchitwa Mission²² shall ensure that the operator shall be responsible for:

Development of the training material, identification of master trainers, training to master trainers to impart training to staff and other stakeholders at the individual health care facilities on segregation of waste in colour coded bags and management of BMW at HCF level till it is handed over to the operator of the common facility.

The staff of HCF and common BMWM facility need to be trained in proper segregation and storage of waste in colour coded bags and handling the waste till it is finally disposed of at the common facility. It must be ensured that biomedical waste and general hospital wastes are stored separately and only infectious waste which is classified as biomedical waste only is stored in colour coded bags.

Training and awareness should focus on effective waste minimization and segregation for healthcare staff, as well as improving health and safety, and hygiene practices (in the

²²For healthcare waste, Suchitwa Mission will be interacting with health department and KSPCB. So, there can be a committee to look at this progress

handling, segregation, storage, transport and treatment of the waste) for both healthcare providers

The training should specifically focus on the segregation of waste as per colour code given in schedule I of Biomedical Waste Management Rules, 2016 which is shown in Annexure A.

During the training to staff, they may also be made aware of ill effects of managing BMW ineffectively such as:

- Health-care waste in some circumstances is incinerated and dioxins and furans and other toxic air pollutants may be produced as emissions.
- Exposure to dioxins and furans may lead to the impairment of the immune system, the impairment of the development of the nervous system, the endocrine system and the reproductive functions. WHO has established a Provisional Tolerable Monthly Intake for dioxins, furans, and polychlorinated biphenyls
- The unsafe disposal of health-care waste (for example, contaminated syringes and needles) poses public health risks.
- 5. Procurement of plants, equipment & installation and commissioning of the facility, trial run of the facility
- 6. Routing plan for the collection of the waste

7. Inauguration and the commissioning and operation of the plant

i) Treatment of BMW at Common Treatment Facility (CTF)

Treatment at the CTF site to be done as per the Schedule 1 and 2 of Biomedical Waste (Management and Handling) Rules, 2016. The various treatment technologies to be adopted at the CTF are:

- Incinerator (2 in number -one for door to door operation and one as stand by) of the required capacity for treatment of waste under categories* marked Incinerable or Yellow category
- Autoclaves/hydroclave/microwave as per quantity of waste for treatment of waste under categories* Autoclavable or Red category
- Metal Sharps destroyers, Managers of capacity 10 kg/hr. for treatment for metal sharps. All the HCFs are provided with puncture proof boxes which have keyhole arrangements that separates the needles from syringes. A protected opening for dropping the blades, canula needles and disposable scalpel blades is also present in the box

The boxes are brought from the HCFs to the site; the metal sharps from the metal boxes are then treated by Dry Heat Technology as recommended in the BMWM Rules 2016

- Chemical disinfection for glass sharps and metal implants marked as Blue category
- Land filling for rejects and hazardous chemicals categories preferably in regional TSDF especially if there is mercury containing waste, proper storage facility such as constructed concrete pits for incinerator ash

- $\circ~$ Deep Burial as a stand-by option in case of breakdown or maintenance of incinerator at the site
- ETP for the liquid waste generated at the site including the wash water from various equipment chambers and quenching water of the incinerator

ii) Onsite Cold Storage Facility

The CTF may have on site cold storage facility where the biomedical waste after collection and transportation from the HCFs is kept till the time of treatment to reduce the possibility of microorganisms multiplying in hot and humid weather.

7.5.4. Brief Description of Technologies to Be Adopted at Common Facility

$\circ\quad$ Incineration at the CTF

- The burning of wastes at high temperatures, under controlled conditions, is called incineration and this is carried out in a double-chambered device known as an incinerator
- Waste is burnt in the primary chamber at 800-850°C and volatile gases emitted are again burnt in the secondary chamber at 1050 -1100°C (residence time at least 2 sec). It should be capable of going up to 1200 degrees Celsius in case cytotoxic are incinerated
- The incinerator at the CTF need to be retrofitted with the High Pressure Venturi Scrubber, as air pollution control device, droplet separator, quenching device, rubberized stack of 40 m height. The equipment must have the facility of computer recording for CO, CO₂ and O₂ in gaseous emission of critical parameters and for measurement of dioxins and furans as per schedule 4.
- The cycle time for the entire operation should be about 1 hour. The volume will significantly reduce with assured sterilization and destruction.
- The equipment must follow all the latest specifications and guidelines specified by the CPCB in January 2020 for the Common Facility Incinerators
- The incinerator is to be used for the treatment of waste falling under Yellow or Incinerable Category which consists of anatomical, pathological, cytotoxic and some waste like blood bags after pre-treatment

• Autoclaving

- Steam is applied inside a double-walled jacket under pressure.
- Waste is fed into the chamber where it gets hydrated, agitated & sterilized.
- The waste is internally fragmented to attain a high level of sterilization.
- Steam sterilization followed by dehydration, results in dry waste, greatly reduced in weight and volume
- The sterilized waste is then shredded in the shredding assembly fitted below the autoclave system.
- Along with the shredding, hot water washing also takes place in the shredder, making the sterilized and shredded waste suitable for recycling

- Modified autoclave system can be used having solar water heater which supplies hot water for steam and ensures energy efficiency and reduces the cost of operation by reducing diesel / electrical consumption for producing steam
- Autoclaving is used to treat waste falling under the Red category comprising one time use equipment mostly made of plastics which are sterilizable by autoclaving, shredding and recycling

• Pre-treatment

• Microbiology & Biotechnology waste

Blood bags with discarded blood, wastes from laboratory cultures, stocks or specimens of micro-organisms live or attenuated vaccines, human and animal cell cultures used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins, dishes and devices used for transfer of cultures have to be pre-treated at the HCF by sterilization to achieve at least 4 log₁₀ reduction before being given to CBWTF.

• Treatment of waste sharps

- The waste metals sharps are treated in the Metal Sharps Manager at the site.
- All the HCFs must be provided with **puncture proof boxes** which have keyhole arrangements that separate the needles from syringes. A protected opening for dropping the blades, canula needles and scalpels is also present in the box
- The boxes are brought from the HCFs to the site; the metal sharps from the boxes are then transferred to the metal sharps manager, present at the site, which functions on dry heat sterilization principle as per the BMWM Rules 2016 schedule 4
- Waste belonging to metal sharps or White category (needles, syringes, disposable scalpels, blades, sutures, etc.) are treated in the equipment

• Discarded Medicines, Cytotoxic Drugs and Incineration Ash

- Wastes comprising of outdated, contaminated and discarded medicines may be incinerated if found in small amounts.
- Waste comprising incineration ash and non-incinerable chemical wastes such as radioactive waste would have to be stored in concrete pits with lids and then sent to regional TSDF at an appropriate time.

• ETP

- The liquid effluent from the washing of the transport vehicles, from Incinerator quenching device, from autoclave room which includes water used for washing shredded plastic waste is treated in the ETP
- The treated water is to be used for plantation at the site.

Knowledge survey of health care facilities

- A 'Knowledge, Attitude and Practice (KAP)' survey in all HCFs may be carried out prior to implementation and subsequently at intervals after facility becomes operational for ascertaining the level of awareness and compliance to BMWM Rules and prescribed procedures
- The survey is used to measure whether the HCFs still lag behind in the implementation of various recommended BMWM procedures (specifically those which have cost implications) and has there been improvement in awareness amongst the healthcare workers especially after implementation of the new project.
- In addition, a profile survey of different HCFs is done to make sure whether the required standards of segregation, storage and pre-treatment is being achieved.

Special measures to minimize ill effects of BMWM

The state agencies may take following measures for minimising the ill effects of biomedical waste in the society:

- Effective, scaled-up promotion of non-incineration technologies for the final disposal of health-care waste to prevent the disease burden from: (a) unsafe health-care waste management; and (b) exposure to dioxins and furans; (c) mercury containing waste
- Development and implementation of a national plan, policies and legislation on healthcare waste;
- Promotion of the principles of environmentally sound management of health-care waste as set out in the Basel convention; and
- Support to allocate human and financial resources to safely manage health-care waste.

7.6. Technical Guidelines for Dumpsite Remediation Projects

The main problem faced by the ULB's today is availability of land. This has become a very important issue in light of the NIMBY syndrome. As such, the ULB's are forced to look at using the existing land parcel more effectively. In light of the above situation, the National Green Tribunal (NGT) has also come out with orders to biomine the dumpsites and reuse the place for SWM activities. It must be noted that to make a biomining project successful, it is necessary that all the fractions separated from the biomining process need to be recycled. Proper forward linkages must be in place to take away the various fractions even before the project is started. Biomining as remediation option should be considered only if the biomined soil (major fraction) has contamination of heavy metals, chemicals or other toxic substances within permissible limits and if the land can be reclaimed to a substantial area, which is justified. This can be ascertained by analyzing soil samples for heavy metals etc.

Biomining as remediation option will be considered only if (a) the soil is free of any contamination (devoid of heavy metals, chemicals or other toxic substances) (pre-identified number of lab tests will have to continue to take place throughout the process) (b) there is substantial land reclamation potential through biomining, that will be used for the establishment of waste management facilities (c) there are adequate downstream linkages for the management/disposal waste being bio-mined.

Once the technical solution for the remediation is selected, SM will undertake (a) detailed technical investigations, technical and financial feasibility analysis (b) preliminary engineering design and (c) Environmental and Social Impact assessment to prepare the sub-projects and then, undertake the implementation.

The guidelines that need to be followed/referred are a) SWM Rules 2016, b) Disposal of Legacy Waste by CPCB- Feb 2019 c) SBM Advisory on Landfill Reclamation – June 2020 and directions issued by National Green Tribunal (NGT) from time to time.

7.6.1. Technical Guidelines for Bioremediation

The Government of India has notified in the SWM Rules, 2016 for proper and effective management of MSW. Under the SWM Rules, 2016, following provisions have been made to manage old dumps of MSW.

Rule 15 - Duties and responsibilities of local authorities and village Panchayats of census towns and urban agglomerations. The local authorities and Panchayats shall-

(zj) investigate and analyze all old open dumpsites and existing operational dumpsites for their potential of bio-mining and bioremediation and wheresoever feasible, take necessary actions to bio-mine or bio-remediate the sites.

(**zk**) in absence of the potential of bio-mining and bioremediation of dumpsite, it shall be scientifically capped as per landfill capping norms to prevent further damage to the environment. The by-laws shall apply to every urban local body, outgrowths in urban agglomerations, Cantonment boards, Panchayat, Industrial and Institutional Townships, railways and defense establishments.

Further, provisions under Schedule I (j) are given below:

Schedule-I (j) - Closure and Rehabilitation of Old Dumps- Solid waste dumps which have reached their full capacity or those which will not receive additional waste after setting up of new and properly designed landfills should be closed and rehabilitated by examining the following options:

- (i) Reduction of waste by bio-mining and waste processing followed by placement of residues in new landfills or capping as in (ii) below
- (ii) Capping with solid waste cover or solid waste cover enhanced with geomembrane to enable collection and flaring / utilisation of greenhouse gases
- (iii) Capping as in (ii) above with additional measures (in alluvial and other coarse-grained soils) such as cut-off walls and extraction wells for pumping and treating contaminated ground water
- (iv) Any other method suitable for reducing environmental impact to acceptable level

The closure provisions under schedule - I (C) of the SWM Rules 2016 states:

After completion of landfill or a closure of dumpsite, a final cover shall be designed to minimise infiltration and erosion. The final cover shall meet the following specifications, namely:

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

The waste rejects have to be transported to form a shape that is as per the design. The idea is to reduce the waste footprint to is minimum and make the area available for SWM activities. The waste has to be compacted to get a minimum density of 0.85 T/M3. The compaction is done in layers of 1m height. Compaction test must be carried out at regular intervals. The slope of the final closure must be stable. The slope must ideally have 1V:4H slope. The maximum allowed may be 1V:3H after proper design check for stability. If the height is more benches may be provided at every 5m vertical height. The benches help increase the stability. Once the shape has been attained as the design, all the geosynthetic materials will be laid to complete the closure as per the norms given in SWM 2016 Rules.

The treatment & disposal of Legacy MSW can be done by Bioremediation and Bio-mining. A total station survey or drone mapping of any landfill/dumping site must be done prior to start of the project. Hence, it is suggested to study the history of the site and compositional analysis of waste. Site environment parameters such as baseline study of heavy metals in surface and subsurface soils and water, rainfall, soil type, surface hydrology, topography, wind direction etc. shall be studied before and after bio-mining. Periodic study should also to be carried out after completion of biomining to check for any adverse effects in the surrounding area

There are 3 execution methods for bioremediation of the dump sites:

- a) Capping Model without Land Recovery
- b) Bioremediation and reclamation of part of land by utilizing part of retrieved fractions and the leftovers heaped in stable profile and capped appropriately
- c) Reclamation with complete Land Recovery

Similarly, there are 3 working models in which the dumpsite remediation can be done:

- a) 100% work to outsourced to selected private contractor
- b) 100% by ULB with rented equipment and manpower
- c) Part by private operator (processing only) and rest by ULB (utilization, transportation and disposal)

A decision has to be taken by the authorities based on the data collected from site as to which execution method and working model is more appropriate for each site.

A typical approach adopted in biomining of the site is shown below:



Figure 7-21: Typical Approach to biomining of site Source: Guidelines for Disposal of Legacy Waste – CPCB-Feb 2019

Biomining refers to the excavation of old dumped waste to make windrow of legacy waste. This is followed by stabilization of the waste by exposure of all the waste to air along with use of composting bio-cultures. This waste is then screened to recover all valuable resources (like organic fines, bricks, stones, plastics, metals, clothes, rags etc.) followed by its sustainable management through recycling, co-processing, road making etc. A diagrammatic presentation is shown below:



Figure 7-22: Overview of Bioremediation and Bio-mining of Legacy Waste Source: Guidelines for Disposal of Legacy Waste – CPCB-Feb 2019

- 1. Before a site is bio mined; it should be provided with cut off drain so that leachate doesn't ooze out and go into nearby areas. A leachate treatment plant will have to be provided to treat the leachate collected. Kindly refer to the EMF-ESMP & ECOP of the World Bank.
- 2. The first step is excavation of legacy waste with tractor-tiller/ earth mover to loosen it and make windrows so that the leachate can be dried through solar exposure and all the entrapped methane is removed from the heap. The heaps should be about 2 m height to get maximum surface area to volume. Repeated turning is necessary to ensure that the innermost waste in windrows also gets exposed to air. Usually 3-4 turnings every 5 days of legacy waste are necessary to stabilize it. Big rags are hand-picked. For excavation, a top to bottom approach is better. It is important to have slopes which are stable, else the vertical face could collapse.
- 3. Most high heaps of legacy waste are water-logged with leachate, even near the topmost layers and all the way to the bottom, like a sponge. This is due to the rainwater and the decomposing of waste. This leachate needs to be collected and treated before being discharged in the environment.
- 4. Spray bio-cultures on the windrows to degrade all biodegradable waste, like discarded food, fruit, flower and garden waste during turning of waste. Use an earthmover to lift legacy waste off the top of a heap and drop it from a height to aerate and loosen the waste and then form 2-3 m high cones. Turning of the waste will give the necessary air to decompose it in an odorless way without producing leachate. This also reduces the biodegradable volume by 35-40% due to loss of moisture. This is called bioremediation and makes the waste dry enough for screening. Waste is called stabilized when there is no more generation of heat or landfill gas or leachate. 2 windrows may be joined together in a windrow if the volumes reduce drastically.
- 5. After 2-3 weeks when the heaps are free flowing enough for screening, move the material to multi-deck vibrating screens or to trommels (rotating cylinders with different size perforations) to get fractions of different size and weight. This stabilised waste is excavated with the help of Poclain and earthmover and transported by trucks for screening.
- Screens are used in a series. Sizes commonly used are: 150 mm, 80 to 100 mm, 24 to 50mm, 12-16 mm and 4-6mm. This results in various fractions at each stage. (see picture below)
- 7. The finest fraction is called bio-earth or good earth. It contains a mixture of humus-rich organics which improve soil fertility along with a high proportion of soil or sand, which is why it may not meet FCO standards for compost. It is essential to check the heavy metal contents in the bio-earth/soil.
- 8. The coarsest fraction contains bricks, stones, coconut shells, footwear, cloth and larger plastics.
- 9. Density separation helps recover combustibles which can be used (usually up to 5-10%) as fuel replacement in cement kilns. The lighter mid-fractions are mostly plastics and can be shredded as per industry requirement for use in bitumen hot-mix plants to make so-

called Plastic Roads or as refuse derived fuel for co-processing in cement kilns. The size of the RDF will be dependent on the requirement at the cement kiln. It must be remembered that these fractions may not fetch a price. Their transportation cost needs to be added to the expenses.

- 10. The heavier mid-fractions are mostly stony inert which can be used in the lowest layers of roadmaking or plinth-filling or in low-lying areas.
- 11. About 10-15% of the original waste remains as totally unusable residual rejects and may remain onsite. This waste will have to be put in a Landfill or will have to be capped as per the SWM 2016 norms.
- 12. The cleared land should be used more effectively for SWM activities. It is important to note that all the waste fractions recovered must be moved away from the site. The forward linkages must be in place before the start of the project. The cleared land shall meet the site location checklist for the intended purpose (like MRF, Processing or SLF) as mentioned in the respective sections.
- 13. The dumpsites may be smoldering from hidden fires. This is due to the formation of methane which catches fire quickly and along with combustible plastics, cloth and oily rags it could spread fast. When excavating, these fires could erupt. A fire control plan must be in place before starting of the work. Adding wet soil cover to smother the flames is also a good solution.
- 14. It is important to do the risk assessment and an onsite emergency plan should be kept handy prior to commencement of dumpsite bioremediation& bio-mining.



15. Smoking in the dumpsite must be strictly prohibited.

Source: Guidelines for Disposal of Legacy Waste – CPCB-Feb 2019

7.6.2. Equipment to be Used for Bioremediation

The bioremediation work needs a material handling approach. It is clear from the above process that steps need to be taken up which are inter-dependent. The equipment that would come in use would fall under the following heads of processes like excavation, shredding, screening, air classification and ferrous separation. As per suitability and requirement, the appropriate choices should be made.

- 1. Tractor-tiller most easily available and can be used effectively in small biomining projects
- 2. Earth mover &/ or Poclain used when the quantity of waste is high.
- 3. Screening& Conveyors The separation is done with the help of series of trommels with conveyors or a vibrating screen with multiple layers. The main objective is to separate the various fractions.
- 4. Loaders/ trucks These are basically used to transport the waste from the dump to the screening trommels and then transporting the separated fractions to its final destination for usage.
- 5. Shredders They may be used in case the RDF needs to be brought to a size of 30-35 mm.

7.6.3. Closure & rehabilitation of dumpsites

Schedule-I (j) of SWM Rules 2016 gives directions as under on Closure and Rehabilitation of Old Dumps-

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

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

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

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

Any other method suitable for reducing environmental impact to acceptable level

Schedule - I (C) of the SWM Rules 2016 further directs that after completion of landfill or a closure of dumpsite, a final cover shall be designed to minimise infiltration and erosion. The final cover shall meet the following specifications, namely:

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

Closure of rejects:

The waste rejects need to be transported and deposited in a manner to form a shape as per the design given by the consultant It is aimed to reduce the waste footprint and make the maximum possible land available for SWM activities. The waste has to be compacted to get a minimum density of 0.85 T/M3. The compaction is done in layers of 1m height. Compaction test must be carried out at regular intervals. The slope of the final closure must be stable. The slope must ideally have 1V:4H slope. The maximum allowed may be 1V:3H after proper design check for stability. If the height is more benches may be provided at every 5m vertical height. The benches help increase the stability. Once the shape has been attained as the design, all the geosynthetic materials will be laid to complete the closure as per the norms given in SWM 2016 Rules.

7.7. Environment and Social Management Framework

The ESMF framework (available as a document in 2 volumes) applicable to sub projects under KSWMP may be separately referred to. In addition, social management for regional landfills and ULB level investments are given in Table 7-21 and Table 7-22 respectively.

		REGIONAL LANDFILLS (NEW): SOCIAL MANAGEMENT SCHEME CYCLE				
S.No	Output	Social Management Activity	Timelines	Data Source	Responsibility	
А		Planning Phase	3 months			
1.	Communication campaign initiated	 (i) Identify host settlements along the sub- project (ii) Identify ULBs utilising the sub-project (iii) Information dissemination on regional land fill, the agreements, technical information, source of waste generated for the destination, roles and responsibilities, duties and 	01 month	Upload report from secondary data and reports from workshops	SPMU – Communication Specialist (CS), Social Development Specialist (SDS) and Technical	
	Selection of site	obligations, grievance management- use electronic and print media, workshops. (i) Apply the screening criteria to exclude	By end of 30	Upload reports through	experts SMPU - SDS	
	finalised	areas near tribal habitations; (ii) Minimize adverse impacts	days of month 3	MIS.		
2	Initiated Step one for partnership development with host community	 (i) Disseminate information on the technical design of the regional landfill through models, electronic media (iii) Focus group discussion at host settlement to identify resistance and cause of resistance to the regional landfill. (iv) Preliminary need assessment of host population 	By end of 60 days of month 3	Upload reports through MIS. Mobile App - Record key feedback. Photo, numbers of participants, disaggregated data on social profile and women. Upload minutes of each FGD through MIS	SPMU – CS and SDS	
3		(i) Assess utilization and ownership of land identified for regional landfill	0-2 months	Report to upload through MIS system	SPMU – SDS	
4	Land requirement finalised	(i) Identification of private land parcels for acquisition under Right to fair compensation and land acquisition and resettlement and rehabilitation Act 2013 (RFCTLARR Act)	0-3 months	Report to upload through MIS system	SPMU – SDS	

Table 7-22: Kerala Solid Waste Management Project – Social management for Regional Landfills

		REGIONAL LANDFILLS (NEW): SOCIAL MANAGEMENT SCHEME CYCLE				
S.No	Output	Social Management Activity	Timelines	Data Source	Responsibility	
5		(i) Submit proposal for Land acquisition	By end of month 3	Upload the proposal through MIS system	SPMU – SDS	
		Design Phase –	7 months			
1	Assessed adverse impact	 (i) Identity any HH dependent on government land identified for land fill (ii) Identify all HH lose livelihood 	By end of 30 days of month 6	Mobile App – record baseline; photographs of affected HH and upload report through MIS	SPMU – SDS	
2	Land Acquisition initiated	(i) Coordinate with Revenue Department to complete the acquisition of land.(ii) Review the SIA report.	By end of 6 month	Upload data on the RFCTLAR&R e-Tool	SPMU – SDS	
3	Actions on Land Transfer finalised	(i) Coordinate with relevant line department to transfer the land	By end of 6 month	Upload monthly progress report	SPMU – SDS	
4	Encumbrance free land provided	(i) Submit the details of encumbrance free land to the technical design team	By end of 7 month	Upload the report through MIS	SPMU – SDS	
5	Step two for partnership development with host community	 (i) Information dissemination on the final design of the Land fill – electronic and print media, (ii) FGDs with host community, brochures. (iii) Meeting once in two months in host settlement (iv) Finalise investment plans 	By end of 150 days of month 7	Upload reports of campaign Mobile App – record consultation; photographs participants with disaggregated data on social profile and women and upload report through MIS	SMPU – CS and SDS	
6	Labour Influx management plan prepared	 (i) Assess the source of labour and number of labour to be employed (ii) Assess the likely impact on host community (iii) Develop an indictive labour influx management plan 	By end of 140 days of month 7	Upload reports	SPMU - SDS	

		REGIONAL LANDFILLS (NEW): SOCIAL MANAGEMENT SCHEME CYCLE				
S.No	Output	Social Management Activity	Timelines	Data Source	Responsibility	
		Implementation Phase – 5				
1.	Livelihood restoration of affected people initiated	Coordinate with TSC to implement the livelihood restoration program for the project affected people	On-going	Upload report on livelihood restoration program	SPMU - SDS	
2.	Last step of partnership development with host community	 (i) Display information on progress of works at each host village (ii) Monthly meeting with host population (iii) Implementation and monitoring of report 	On-going	Upload report on livelihood restoration program	SPMU – SDS and CS	
3.	Capacity building on labour management completed	Training of Contractors on Labour laws	Within one month of mobilisation of contractor	Upload report through MIS	SPMU – SDS	
4.	Progress reported on implementation of Labour influx management plan	Monitor implementation of labour influx management plan	For the entire contract period	Upload reports through MIS	SPMU – SDS	

Table 7-23: ULB level - Scheme Cycle for Preparation of SWMP; sub-project preparation, implementation and exit program: Social Management Actions – Cumulative duration 17 months

Output	Social Management Activities	Duration	Implementation	Data Source for the Project website
		and	Responsibility	
		Timeline		
UPDATED TDF	(i) Organise Free Prior Informed consultation	With 30 day	rs of TSC	Mobile App – baseline, Record key
- SMF and RPF	in tribal habitations	mobilization	n	feedback. Photo, numbers of
	(ii) Organise stakeholder workshop and			participants, disaggregated data on
	collect, analyse and incorporate the feedback			social profile and women.
	from key stakeholders in TDF-SMF and RPF			Upload minutes of each FGD and
	(iii) Conduct KIIs for building a baseline of			Consultation through MIS
	generators and service providers in the			

	Output	Social Management Activities	Duration and	Implementation Responsibility	Data Source for the Project website
			Timeline		
		sampled ULBs. (iii) Build a gender baseline of female workers in solid waste management in the ULBs; (iv) Update the TDF-SMF and RPF for re- disclosure			
Α	5 year Solid Was	te Management Plan Preparation	3 months		
1	Interdisciplinary Cohesive team	 (i) Workshop on orientation on broad contours of the project, implementation mechanism, roles and responsibilities, gender sensitization, for TSC and PMC. (ii) Workshop on Tribal Development Framework -Social Management Framework and Resettlement Policy Framework for TSC and PMC (iii) Skills on participatory planning 	Within 15 days	SPMU –SDS, GS and CS	Upload Proceedings with photographs on the two workshops
2	Awareness generated	 (i) State-wide information dissemination on objectives and scope of the project – Electronic and print media and social media platforms Launch Broadcast Hoardings, Website, banners. (ii)ULB-wide information dissemination on objectives and scope of the project – Workshops (iii) Develop Brochure on FAQs on broad features of project, rules of engagement, roles and responsibilities of implementing partners, Grievance Management Mechanism, helpline services on GBV and distribute in workshops (demystification and 	By end of 30 days	SMPU – CS and Public Information Centre	Upload FAQ brochure, reports with photographs, number of participants and disaggregated data on social profile and women on each event

	Output	Social Management Activities	Duration and Timeline	Implementation Responsibility	Data Source for the Project website
		clarifications)			
3	Orientation program conducted	 (i) Information dissemination on meetings: location, time, contact persons – electronic and print media. (ii) FGD at ULB to follow-up on information about the project, roles and responsibilities of implementing partners, duties and responsibilities of ULB members and beneficiaries; Grievance management Mechanism and GBV helpline services 	By end of 45 days	SPMU – SDS, GS and CS TSC –CS and SDS	Upload all forms of announcement through MIS Mobile App -Record key feedback. Photo, numbers of participants, disaggregated data on social profile and women. Upload minutes of each FGD through MIS
4	Developed partnership with ULBs and citizens	 (i) Workshop to disseminate information on Service benchmarks (ii) Workshop to educate benefits on source segregation plan (iii) Workshop to build awareness on proposed facilities (iv) Workshop to build awareness on development of disposal cells as interim disposal facilities 	By end of 60 days	TSC –CS and SDS	Mobile App -Record key feedback. Photo, numbers of participants, disaggregated data on social profile and women. Upload minutes of each FGD through MIS
5		 (i) FGDs with citizens to inform and prepare them on technology based systems of solid waste management (ii) FGDs with citizens to inform and prepare them of rules of engagement on S/W management and punitive measures 	By end of 60 days	SPMU – SDS, GS, and CS TSC – CS and SDS	Mobile App -Record key feedback. Photo, numbers of participants, disaggregated data on social profile and women. Upload minutes of each FGD through MIS
6	ULB indicates commitment	(i) Sign the by-laws and MoU	By end of 15 days	SPMU – SDS and Technical team	Upload the final document through MIS on Suchitwa Mission Website and

	Output	Social Management Activities	Duration and	Implementation Responsibility	Data Source for the Project website
			Timeline		
-					ULB's website
7	ULB level Solid	(i) Number of councilors and women and	By end of	SPMU – SDS, GS,	Upload the final document through
	waste	scheduled caste, tribe and religion	30 days	TSC – SDS and GS	MIS on Suchitwa Mission Website and
	Management	representation			ULB's website
	Committee	(ii) Workshop on orientation on roles and			
-	formed	responsibilities			
8	Assessment of	(i) FGD with ULB members and Committee to	By end of	SPMU – SDS, GS,	Mobile App -Record key feedback.
	current	collate information on source segregation	45 days	TSC – SDS and GS	Photo, numbers of participants,
	practices of	practices, number and nature of facilities,		and Labour	disaggregated data on social profile
	management of	land available at each facility, number of		welfare officer	and women.
	S/W	labour employed directly or through Haritha			Upload minutes of each FGD and
		Karma Sena/Kudumbasree/contractor			report through MIS
-		(disaggregated data)			
9	Prepared Draft	(1) Workshop to share the report on current	By end of	TSC – technical	Mobile App -Record key feedback.
	Plan	practices with ULB members; identification	60 days	and multi-	Photo, numbers of participants,
		and location of sub-projects; fand estimate for		disciplinary team	and women
		(ii) Draft Dan disclosed on III P web site for			and women.
		feedback to be submitted within 15 days of			report through MIS
		disclosure			report through Mis
		(iii) Workshops organized for III B committee			
		members disseminate information on draft			
		Plan in their respective wards for feedback			
10	Finalised Plan	(i) Address the feedback to the extent feasible	By end of	TSC – Technical	Upload the final 5 year SWMP Plan on
		and finalize the plan and redisclose	85 days	team	ULB websites
11	Capacity	(i) Training Need Assessment and	By end of	SPMU – SDS, GS,	Upload the report and training
	Building of	(ii) Training Calendar on TDF-SMF and RPF	45 days	and CS	Calendar through MIS
	Interdisciplinary	for implementing partners	-		
	project team				
	and ULB				

	Output	Social Management Activities	Duration and Timeline	Implementation Responsibility	Data Source for the Project website
	members.				
12	GRM system implemented	(i) Set up the GRM system – toll-free number with detailed backend system and augment the web-based system	By end of 75 days	SPMU - SDS	MIS to integrate system for data collated at one source.
14	Systematizing ann Annual exercise	nual cleanliness surveys and disclosing the result	s publicly –	SPMU – technical team	Upload annual report through the MIS.
В	Pre-Planning Pha	ase: Prioritization of Sub-Projects	1 Month		
1	Information disseminated of sub-projects included in the 5 Year SWM Plan	 (i) Awareness generation on project's goal, (ii) Awareness building of roles and responsibilities of implementing partners and obligation of the community. (iii)Awareness on GRM (iv) Free Prior Informed Consultation with Tribal on project. (v) Distribute pamphlets on the list of sub- projects included in SMM Plan, roles and responsibilities and GRM systems. (vi) Focus Group discussion carried out with different social groups of generators on awareness to select sub-projects; inform about the exclusion criteria; 	15 days	TSC – Social Development Specialist (SDS) and CS	Mobile App - Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each FGD through MIS
2	Prioritized Sub- Projects	 (i) Apply screening criteria to sub-projects (Social and Tribal Screening Format: data on vulnerable groups including women, informal workers and tribal communities) (ii) Collect data on status of land – use and 	Second quarter	TSC – SDS with field facilitator	Upload the screening report and data on land through MIS Mobile App - Record key feedback. Photo, numbers of participants disaggregated data. Mobile App – upload photographs of the prioritized sub-projects.

	Output	Social Management Activities	Duration	Implementation	Data Source for the Project website
			and	Responsibility	
			Timeline		
		ownership – identified for prioritized sub-			
		projects			
		(iii)Map stakeholders – generators and			
		service providers			
		(iv) FGDs with social groups to inform			
		stakeholders on prioritized list.			
		(v) Display the list of prioritized sub-projects			
		in ULB offices, GRM system and helpline			
		for GBV			
3	Required action	(i) FGD on orientation on participatory	Second	TSC – multi-	Upload report through MIS
	plans identified	planning	quarter	disciplinary team	
		(ii) Tribal Development Plan		SDS, Gender	
		(iii) Livelihood Action Plan for adversely		Specialist (GS),	
		affected people and business development		Livelihood	
		plan for service providers		Specialist (LS),	
		(iv) Labour influx Management Plan		and Labour	
		(v) Preventive gender based violence		welfare	
		(vi) Host community management Plan		specialist.	
2	Behaviour	(i) FGDs to identify waste generators – low,	By end of	TSC –CS	Record key feedback. Photo, numbers
	Change	medium, high	the month		of participants disaggregated data.
	programs	(ii) FGD to identify good practices of waste			Upload report on categorization of
	initiated	management at source			waste generators through MIS
		(iii) FGD to identify culturally compatible			
		tools of communication			
		(IV) Categorise waste generators as low,			
0.1		medium, high			
C 1	Planning for price	oritized sub-projects – develop action plans	3 Months		
	to include in DPR				

	Output	Social Management Activities	Duration and Timeline	Implementation Responsibility	Data Source for the Project website
1.1	Baseline Surveys completed	 (i) Baseline²³ survey of beneficiaries (generator and service provider) of the selected sub-project (ii) Baseline²⁴ survey of host population at the location of sub-project (iii) Baseline of labour for each sub-project 	By end of 30 days	TSC – SDS,GS and LS	Mobile App – upload survey data and photograph
1.2	Consultation with target groups initiated	 (i) Training on plan preparation (ii) FGD with target group to develop identified action plans (iii) Reinforce information about the goal of the project and GRM system and help line services for GBV 	By end of 40 days	TSC – SD, GS; LS and Labour welfare specialist	Mobile App – Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each FGD through MIS
1.3	Training plans prepared	 (i) TNA - Finalise training plan for skill development, gender sensitization, behavior change for management of waste, technical training for management of waste, labour management, (ii) Finalise resource people to deliver training (iii) Social management Training Calendar Uploaded in CB module 	By end of 40 days	TSC - GS; SDS, Labour welfare specialist, CS; LS;	Upload report through MIS
1.4	Prepared Draft Action Plan including budget for	 (i) tribal development action plan (ii) Livelihood Action Plan for adversely affected people and Business development plan for service providers for performance 	By end of 60 days	TSC – SDS, GS, LS and Labour welfare specialist	Upload draft report through MIS

²³Socio-Economic; skill mapping and livelihood mapping of including of service provider - Rag pickers, Kudumbasree Workers, Women Workers. Socio-economic of generators of HH and Institutions.

²⁴Social profile of host population

	Output	Social Management Activities	Duration and Timeline	Implementation Responsibility	Data Source for the Project website
	identified actions	based contracts. (iii) Labour Influx management Plan ²⁵ (iv) Preventive gender- based violence hotspots, resource group to address GBV			
1.5	Consultation on draft action plan undertaken	 (i) Provide information on draft action plan to the target group (ii) FGD with each target group on action plan 	By end of 75 days	TSC – SDS, GS; LS and Labour welfare specialist	Mobile App – Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each FGD through MIS
1.6	Finalised draft Action Plan and budget included in DPR	 (i) Provide information on draft action plan to the target group (ii) FGD with each target group on action plan, endorsement of plans and service provider to sign performance based contracts and (iii) Reinforce information on GRM and GBV helpline service and service providers. 	By end of 85 days	TSC – SDS, GS, LS and Labour welfare specialist	Mobile App – Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each FGD through MIS. Upload final action plans
C2	Planning for Beh	aviour Communication and change			
2.1	Action plan including budget for BCC	 (i) Identify and list motivational activities for high and moderate waste generators. (ii) List medium of communication for different social group 	End of 30 days	TSC – CS	Upload the plan through MIS
2.2	at HH level included in DPR	(i) Plan for exposure visit to good practices	End of 45 days	TSC – CS	Upload the plan through MIS
2.3		(i) FGDs to map motivators from community	End of 60 days	TSC – SDS	Mobile App – Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each FGD through MIS.
3.4		(i) Finalise action plan and submit to Agency	End of 80	TSC – CS SDS, GS	Upload the plan through MIS

²⁵ Collect data on host community where more than 10 labours are employed for sub-project and prepare a plan (refer tool)

	Output	Social Management Activities	Duration and	Implementation Responsibility	Data Source for the Project website
		to prepare communication material for BCC	davs		
D	Imp	lementation phase: Action Plans	6 Months		
1	Livelihood for affected people and Entrepreneurial activities for service provider initiated	 (i) Organize Skill upgradation training (ii) Disburse entitlements as per plan (ii) Establish credit linkage (iii) Establish market linkages (iv) Establish linkages with Government Programs (v) Reinforce information on the GRM and GBV 	By end of 30 days	TSC – LS and GS	Mobile app – record all types of skill development training, photographs, key feedback and upload feedback report from participants through MIS. Upload report on credit secured with documents through MIS Upload report on trading or sale of products through MIS
2		(i) Assess the maturity of the activity	By end of 120 days	TSC – LS and GS	Upload assessment report
3.		(i) develop action plan for sustainability of activity(ii) Implement sustainability plan	By end of 170 days month 6	TSC – LS and GS	Upload sustainability report
4	Activities of Tribal Development Plan initiated	 (i) FGD to inform tribal about the time line to implement the plan (ii) Support implementation of activities approved by tribal community 	Throughout the six month period	TSC – SDS, CS, LS, GS	Mobile App – Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each FGD through MIS. Upload monthly progress report through MIS
5	Preventive Gender BV Action Plan implemented	 (i) Gender sensitization program with all implementing partners and beneficiaries (ii) Display information on Internal Complaint Committee in ULB (iii) Distribute Brochures on ICC, service providers, and helpline service 	By end 60 days	TSC – GS and SDS	Mobile App - Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each program through MIS. Upload pictures of displayed information
6	Labour Influx management Plan	(i) Orientation program on code of conductfor labour(ii) Disseminate information to host	Throughout the six month	TSC – labour welfare officer and SDS	Mobile App - Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of

	Output	Social Management Activities	Duration and	Implementation Responsibility	Data Source for the Project website
		nonulation on labour	Timeline		each program through MIS
		(iii) Implement mitigation measures	periou		each program through Mis.
		(iv) Disseminate information on GRM to			
		labour			
7	Host	(i) FGDs with host community to inform them	Throughout	TSC – SDS, GS	Mobile App - Record key feedback.
	Community	on the nature of activity, duration of activity,	the six		Photo, numbers of participants
	Plan	(ii) Provide brochures on GRM, service	neriod		each program through MIS.
	implemented	provider for GBV.	periou		
	-	(iv) Orientation program on gender			
		sensitization			
		(v) Any other infrastructure/ facilities/			
		utilities for host communities			
8	Behavior	(i) Coordinate technical skill on waste	Throughout	TSC –CS	Mobile App - Record key feedback.
	Communication	management at source.	the 6		Photo, numbers of participants
	Change	(ii) Organize street programs to facilitate	month		disaggregated data. Upload minutes of
		(iii) Organise events to facilitate those	period		each prògram through Mis.
		adopted good practice to management of			
		waste at source every month			
		(iv) Organise refresher training every two			
		months			
9	Exit Strategy	(1) Develop a draft strategy to inform the	By end of	TSC - SDS	Upload the draft strategy through MIS
	Iomanseu	host and labour)	120 uays		
		(ii) FGDs with beneficiaries for feedback on			
		each sub-project and action plan to finalize			
		the exit strategy			

	Output	Social Management Activities	Duration and	Implementation Responsibility	Data Source for the Project website
			Timeline		
10	Social Audit conducted	 (i) Select and commission a Social Audit Agency (ii)Organise Ward level Meetings and FGDs to implement the social audit tool (ii) Analyse inclusion across social profile, gender – voice, agency, resource, participation, transparency, accountability, effectiveness of grievance management, livelihood management, partnership with host population (iii) Organise meetings with ULBs and implementing partners to share findings. (iv) Organise workshop to agree on agreed action. (v) Disclose Social Audit Findings on ULB website 	By end of 150 days	Third party	Mobile App Record key feedback. Photo, numbers of participants disaggregated data. Upload minutes of each program through MIS
Е	Post In	plementation Monitoring and Exit	4 Months		
1	Implementation of social audit agreed action	(i) Review the progress of implementation of agreed action	By end of 60 days	Third party	Internal Monitoring report to be uploaded through MIS
2	Display progress of implementation of action plans	 (ii) Display score card on a scale of 1-10 of the performance of action plans on ULB website and public domain (iii) Disseminate information of good practices through street programs 	By end of 80 days	TSC – CS and SDS	Mobile App – photographs of events, numbers of participants with disaggregated data. Upload reports on the program through MIS
3	Social Audit	 (i) Follow-up on the action plan (ii) Organise workshop on findings from the social audit (iii) final report uploaded on ULB's website 	By end of 100 days	Third party	Uploads reports through MIS.

	Output	Social Management Activities	Duration	Implementation	Data Source for the Project website
			and	Responsibility	
			Timeline		
4	Implement the	(i) Distribute brochure on exit strategy;	By end of	TSC – Multi-	Mobile App – photographs of events,
	exit strategy	(ii) FGDs to inform the community using	100 days	disciplinary team	numbers of participants with
		different media tools on date of withdrawal			disaggregated data. Upload reports on
		from the project area			the program through MIS

Chapter 8. Operational framework for ULB level investments

8.1. Preparation of Solid Waste Management Plan

8.1.1. Introduction

A plan provides comprehensive detailed course of action directed at achieving a specified end result. The Solid Waste Management Plan should be a long-term plan at least for 25 years to set a path to achieve waste minimization, treatment, processing and disposal targets through short- and long-term interventions designed to progressively achieve the goal & targets. The plan has to be well integrated with health and environment aspects and should be within the legal & regulatory framework. Generally, the goals of SWM are:

- i. To protect environmental health;
- ii. To promote quality of urban life:
- iii. To support efficiency and productivity of economy
- iv. To generate employment

All ULBs shall prepare SWM Plan for improving their existing facilities/services, providing new facilities/services and to plan facilities/services to fill the gaps in SWM. There shall be a long-term plan considering regional linkages with other Local Bodies and agencies for cluster facilities. Cluster based activities may be required in Kerala as 95% of ULBs are small/ medium, generating 10- 100 tpd of waste quantities where independent landfill or WtE are not viable. Overall priorities should be indicated in the plan which will be further detailed in the five-year plans. The plan shall present the suggestions as a 5-year investment plan for proposed improvements over the project period. Figure 8-1 shows the suggested process from Plan to Projects.



Figure 8-1: Suggested process from Plan to Projects

The Plan should define the goals and objectives of municipal solid waste management to be achieved over specific planning horizons and which gives details of specific actions that need to be implemented to meet these objectives.

8.1.2. Legal and regulatory framework

While Solid Waste Management Rules 2016 form the legal basis for upgrading SWM, National Manual on Solid Waste management - 2016 provides component wise norms, standards and guidelines for the preparation of SWM plan.

Rule 15(a) of Solid Waste Management Rules, 2016 mandates all local authorities to prepare Solid Waste Management Plan for the city/town as per State Policy & Strategy on solid waste management within 6 months from the date of notification of State Policy/Strategy. The plan should also comply with other relevant rules and guidelines of Govt agencies such as:

- 1. The Environment Protection (Act) 1986 and The Environmental Protection Rules
- 2. Environmental Impact Assessment Notification, 2006
- 3. The Coastal Regulation Zone Notification, 2011, 2019
- 4. The Wetlands (Conservation and Management) Rules, 2017
- 5. C&D waste Management Rules 2016
- 6. Plastic waste Management Rules 2016
- 7. Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016
- 8. E-Waste (Management) Rules, 2016
- 9. Bio-medical Waste Management Rules, 2016
- 10. Plastic Waste Management (Amendment) Rules, 2018
- 11. Batteries (Management and Handling) Amendment Rules, 2010
- 12. Kerala Municipality Act, 1994 & Rules

Central Govt. agencies have issued a number of guidelines for various aspects of SWM and they include:

- i. Advisory on On-Site and Decentralized Composting of Municipal Organic Waste, (CPHEEO), June 2018
- ii. Technical EIA Guidance Manual for Common Municipal Solid Waste Management Facilities -MoEF
- Guidelines on the provision of the buffer zone around waste processing and disposal facilities, April 2017; amended in March 2019 -CPCB

The State of Kerala has prepared a State Policy on SWM²⁶ and Integrated Solid waste Management Strategy²⁷ to ensure implementation of Solid Waste Management Rules, 2016 in the state. The salient features are presented in table below:

²⁶http://sanitation.kerala.gov.in/wp-content/uploads/2018/09/go-65.2018-13.09.18-_-State-policy-on-SWM.pdf

²⁷http://sanitation.kerala.gov.in/wp-content/uploads/2019/11/combinepdf.pdf

SWM Policy-2018 **Integrated SWM Strategy-2020 Develop SLF** by the local self-• Generate awareness about the responsibility governments if they can safely and of citizen, institutions, and community to adequately meet the regulatory manage the waste generated by them requirements and develop a disposal facility within their jurisdiction, provided Bring about and sustain behavioral change to they have adequate and appropriate land segregate waste at source based on its If the local self-governments do not have characteristics adequate and appropriate land, they shall approach The State Government. who Create awareness about the linkage of waste shall lead the efforts to develop **a** management with public health and regional or cluster landfill environmental cleanliness • The **sorted recyclable waste** shall be stored and sold to empaneled Promote the adoption of appropriate and recyclers/waste pickers or sent for state of the art technologies and practices for further recycling at RRFs. The nonprocessing and managing putrescible waste recyclable waste shall be disposed as RDF at source and non-putrescible waste centrally or disposed at the local or regional landfills Ensure provision of community waste **Source level treatment** to cover at least • management facilities for those households 20% of the generators (in next three and institutions having space, time and vears) through various schemes. financial constraints to have individual programs and IEC activities facilities The residual biodegradable waste treatment Maximize the possibility of reduction, reuse shall be collected and treated at the local selfand recycling the garbage generated government level or regional level processing facility based on the system that has been Encourage promotion of entrepreneurship in built under the larger waste management various aspects linked to waste management plan for the local self-government and the region Mainstream 'Planning and implementing measures related to waste management in all Transfer stations/secondary segregation sectors as a cross-cutting issue locations shall have adequate space based on the incoming waste quantities and shall be Strengthen the urban and rural local equipped with necessary equipment or governments as well as public and private machineries. The local self-governments institutions and community to accord should ensure that such transfer stations are priority to waste management actions located away from residential areas without including planning, implementation, and causing any public nuisance operation & maintenance management of waste management installations Daily collection can be undertaken as an outsourced service through a service Ensure environmental, social, and safety provider or community enterprise, like the linked safeguards for those involved in waste Haritha Karma Sena. The collected handling. biodegradable waste should be strictly

Table 8-1:SWM Policy & Strategy of Kerala

SWM Policy-2018	Integrated SWM Strategy-2020		
Eacilitate the development and appropriate	transported in closed vehicles to avoid		
deployment of human resources	spread of bad odour and accidental spilling of waste.		
	NBDW (other than plastic) that are flammable may be disposed as RDF and sold to cement plants or other industries for heat recovery. The approach for the same needs to be considered by the LSGs as part of their SWM plan and shall mirror the same in contractual arrangements to be entered into by the LSGs for this purpose		

It may be noted that the ULBs not having adequate and appropriate land for developing treatment& disposal may approach GoK for regional/cluster facilities.

State strategy has set a target of 20% for source level treatment in three years. The targets for other components may be as per the benchmarking done by Ministry of Urban Development, Government of India (MoUD) – shown in Table 8-2 below.

Table 8-2: Proposed Level of SWM Service

Important functional Elements of SWM	Benchmark Level a/
Household level coverage of solid waste management services	100%
Extent of segregation of municipal solid waste	100%
Efficiency of collection of municipal solid waste	100%
Extent of municipal solid waste recovered	80%
Extent of scientific disposal of municipal solid waste	100%
Efficiency in redressal of customer complaints	80%
Extent of cost recovery in SWM services	100%
Efficiency in collection of SWM charges	90%

a/ Handbook of service level Benchmarking, MoUD, GoI.

The Plan may propose the timeline and measures to achieve the above targets.

8.1.3. Focus areas for SWM plan

It is mandatory for all municipal authorities in the State to provide Solid Waste Management services in terms of SWM Rules, 2016 to keep the cities & towns clean & livable. ULBs need to focus on mandates such as:

- 1. waste minimization at source adopting the concept of reduce, reuse, recycle and recover (RRRR) involving community, informal rag pickers & recyclers
- 2. segregation of waste at source in three main components namely Biodegradable waste, non-biodegradable waste and domestic hazardous wastes and their storage in three separate domestic/commercial/institutional bins by all waste generators
- 3. processing of biodegradable waste at source by waste generators to the extent possible,

- 4. construction, operation and maintenance of community level and/or city level BDW treatment facilities
- 5. door to door collection, transportation of residual biodegradable waste
- 6. 100% treatment of BDW so collected
- 7. collection of non-biodegradable waste from the doorsteps
- 8. setting up material recovery facilities for segregation of various component of reusable, recyclables, non-recyclable but combustible wastes and their feeding to the value chain,
- 9. setting up sanitary landfill for safe disposal of residual Municipal Solid Waste in an environmentally acceptable manner
- 10. Bioremediation /closure of existing dumpsites.

8.1.4. Preparation of SWM plan

It is the mandatory obligation for the ULBs to prepare Solid Waste Management Plan complying to the SWM Rules 2016. It should be done through a participatory approach in coordination with the public, and other concerned stakeholders

The specific objectives of preparing the SWM plan are:

- To identify the existing practices and issues of solid waste management in the ULB
- To identify the appropriate approach and technology for effective and sustainable SWM specific to the ULB
- To establish a sound institutional framework, implement, operate and supervise the solid waste management program
- To plan continuous education and awareness campaigns for sustainable SWM

8.1.5. Guidance provided in the National Manual on Solid Waste management, 2016 for preparation of SWM plan.

The Manual on SWM provides stepwise guidance for preparation of Municipal Solid Waste Management Plan. It recommends 7 steps to be taken by the Municipal Authority to formulate Solid Waste Management Plan of the city (see page 3-122 of the Manual - Volume II). The guidelines in subsequent sections are in line with manual.



Figure 8-2: Steps to formulate Solid Waste Management Plan of the city

8.1.5.1. Step 1: Composition of team

The ULB – PIU shall set up a core team of subject matter experts within its organization in environment, public health and engineering to drive the preparation of the SWM plan. The process shall include the following:

- a. Review of the National & State Laws, Rules, State Policy, Strategy, programs and standing orders relating to Solid Waste Management (ref: section on legal & regulatory framework)
- b. Study the provisions of SWM Rules 2016 in conjunction with State Municipality Act, State Policy & Strategy on SWM, guidelines/mandates by KSPCB and various other rules/regulations/guidelines and list out the mandates/ directions that the municipal authority is obliged to comply.

This list will form the basis for further planning of activities to ensure compliance to the Rules, Policies & Strategies.

Suchitwa Mission, through TSCs and the PMC shall provide necessary technical and managerial support (including consultations with stakeholder agencies) to the Local Self Governments of the State in preparation of the SWM plan.

8.1.5.2. Step 2 – As-is Assessment and gap analysis

This ULB shall undertake and current status assessment to bring out the deficiencies that need to be bridged to meet the obligations as identified in Step 1.

The assessment should comprise of:

- i. An assessment of the quantity and characteristics of the solid waste generated. Rational decisions on municipal solid wastes system are possible only if reliable data of composition and quantity of solid waste are available. The method and capacity of storage, the correct type of collection vehicle, the optimum size of crew and the frequency of collection depend mainly on volume and density of wastes. Existing waste generation rates, waste quantification & characterization and waste density should be carried out through a sample survey as provided in the manual part II page 42 to 50.Comparison of this data may be made with past data if available to facilitate future projections.
- ii. an analysis of the current situation (by collecting the information as per proforma) and identification of the existing gaps (with respect to Service level benchmarks (SLBs) for SWM service delivery. For this purpose, the targets identified as part of KSWMP shall govern this gap assessment relevant to the project period. For aspects beyond the project period, the same shall be governed by the SWM strategy adopted by GoK and MoHUA Guidelines.

The analysis should focus on:

1) extent of segregation of waste at source into 3 principal categories namely biodegradable, non-biodegradable & domestic hazardous waste and their storage in separate bins at source.

- 2) extent of involvement of rag pickers and informal recyclers in collection of recyclable/reusable material from source of its generation
- 3) extent of processing of biodegradable waste at source by waste generators in terms of Rule 4 (5,6 & 7) of SWM Rules, 2016 as well as State policy on treatment of biodegradable waste at household and/or at community level.
- 4) extent and frequency of primary collection of biodegradable & non-biodegradable waste from source by HKS /agency of municipal authority.
- 5) extent of waste generators depositing their biodegradable waste at community level waste processing facilities such as aero-bins, bio-bins etc. and level of efficiency of this service
- 6) extent of non-biodegradable waste passed on by the waste generators to rag pickers/recyclers at source and the non-biodegradable waste handed over to the municipal agency such as HKS, SHGs, Kudumbashree workers for deposition at MCF/RRF facilities for further segregation & utilization
- 7) adequacy of MCF /RRF to cover segregation of all nonbiodegradable waste & their efficiency and backward /forward linkages with market
- 8) extent of biodegradable waste passed on by the waste generators for centralized waste processing to the municipal waste collector or its authorized agency
- 9) availability/adequacy of BDW treatment facility to treat BDW collected from the city.
- 10) extent of waste disposed of in open spaces, water bodies, waste burnt or buried in absence of adequate facility of waste collection.
- 11) availability and adequacy of sanitary landfill for safe disposal of residual waste
- 12) status of dumpsite and its management
- 13) The current situation assessment may also cover all aspects relating to institutional, managerial, financial, social and environmental aspects as per MoHUA SWM manual.

8.1.5.3. Step 3 – Stakeholders' consultations

The ULBs shall carry out stakeholder and community level consultations to ascertain:

- 1. their views about bridging the gaps observed,
- 2. understand their aspirations about the level of service they desire from the ULB,
- 3. their willingness to participate ULB level SWM plans and programs,
- 4. their willingness to pay for the SWM services etc.

The following representations should be considered while carrying out such consultations.

- i. Community leaders
- ii. NGOs,
- iii. Representatives of various categories of waste generators such as households, shops, hotels, restaurants, educational, medical & social institutions, offices, markets etc.
- iv. Representatives of SHGs, HKS, Kudumbashree, rag pickers, recyclers, formal workforce,
- v. Supervisory staff, related department officers,
- vi. Private sector involved in SWM etc.

The opinions/suggestions arising out of the consultations shall be considered while planning for waste management in the city. ULBS shall note to record the stakeholders' consultations and include the same as a reference to the SWM plan document.

8.1.5.4. Step 4 - Preparation of Municipal Solid Waste Management Plan

The plan shall contain the following:

- 1) The current & future population, waste generation rates, waste composition and projections for the next 30years
- 2) Socio economic status, lifestyle of the community to be served and level of community awareness
- 3) the types and number of waste generators in the city
- 4) The mandates of Laws &Rules, State Policy &Strategy, ongoing programs, State support available/promised.
- 5) The current deficiencies identified in the system that need to be bridged in a given time frame.
- 6) the aspirations of the community and their level of willingness to participate.
- 7) Institutional structure of ULB and its in house capabilities.
- technical considerations in segregated storage at source, source treatment, community level treatment, collection and transportation, centralized treatment & disposal
- 9) the financial strength of the local body, the extent of cost recovery for SWM service through levy of user charges, taxes, fees etc.
- 10) Availability of land for setting up processing and disposal facilities and required remediation
- 11) Best suited technologies for handling waste generated in the ULB, based on the ISWM (Integrated Solid Waste Management) hierarchy integrating existing workers, rag pickers, private sector players etc.
- 12) IEC activity to create awareness on segregation and storage of waste at source; need of funds to hire expertise to prepare IEC material and for dissemination.
- 13) ULB specific training and capacity building plans
- 14) No. of waste generators who can treat BDW within their premises as per Rule 4(5, 6,7) and additionally those who can, as per State Policy, treat biodegradable waste at source. The quantum of waste expected to be treated at source and the quantity that may have to be collected for centralized treatment should be brought out.
- 15) Indicate the funds required for grant /subsidy for promoting source treatment as per prevailing State policy.
- 16) Scope of integrating informal waste pickers(involving ragpickers /recyclers) to collect recyclables from source. Consult and engage with their community/association leaders/NGOs to facilitate their involvement.
- 17) The current and future needs for HKS/SHGs for assisting the community in processing of BDW at source and collecting BDW/NBW from source, taking NBDW to MCF/RRF, processing of collected BDW.
- 18) training to collection and transportation workers to undertake the task efficiently and safely.
- 19) The need to set up community level BDW treatment facilities and of the required manpower and resources for managing such facilities. The need of MCF/MRF facilities and manpower & resource required to set up additional MCF/MRF to meet the requirement of segregation of NBDW that may get collected from the city. Consider the percentage of NBDW vis a vis total waste and percentage of recyclables
given away from source to recyclers by waste generators while assessing the need of MCF /MRF. Arrange for backward and forward linkages of the value chain.

- 20) The need for vehicles, equipment and manpower for door to door collection and transportation of residual BDW from waste generators, as per the waste volumes and logistics plan with due consideration to the national manual on SWM. The requirement of city level BDW treatment facility considering current and projected requirement of 25 years and plans for setting up such facility based on availability of land. Plans for setting up sanitary landfill with a cell that may last for 3 to 5 years if land is available and initiate plan for a regional facility under the aegis of SM.
- 21) Need for bioremediation, biomining and closure of existing dump sites.
- 22) The requirement of funds for all the activities and variation in capital and O&M cost if PPP mode of service delivery is adopted in lieu of providing services departmentally and doing construction on EPC basis
- 23) Institutional strengthening required as per norms prescribed in SWM manual chapter 1.4.5.4page 58-61 part II,
- 24) The plan shall include a detailed financial model including the project cost, O&M cost, means of finance, revenue sources through sale of material and user fee. This model shall include financial, economic viability and Value for Money Analysis.

The elements of the plan shall meet the Bank's ESMF requirements.

8.1.5.5. Step 5 -Schedule for implementation

The ULB shall prepare the schedule by ensuring that the timelines for each of the initiatives align completely with the KSWMP targets as indicated in the Project Appraisal Document.

8.1.5.6. Step 6-validation of plan by stakeholders

The ULB shall present the plan to the stakeholders who were earlier consulted and shall solicit suggestions for improvements. Acceptance of such improvements / modifications shall be within the framework that is determined by the targets identified under KSWMP.

8.1.5.7. Step 7 – Approval of plan and its implementation framework by the Municipal Council

The ULB shall submit the plan for approval by the Municipal council together with the implementation plan, milestones and compliance requirements under the KSWMP.

8.1.5.8. Design Period and time frame

The time horizon for the plan depends on a number of factors. To reflect this, the plan may consist of two parts: Part 1- short term plans, and part 2- long-term plans.

Governed by the CPHEEO Manual, the long-term planning horizon of 25 years shall be adopted. It could be further divided into short term plan periods of five years. The first such plan period with annual targets shall align with the objectives and targets of KSWMP. The annual targets and final target are stipulated in chapter 10 of this document. Subsequently, each five-year plan shall include a mid-term review after 2 or 3 years.

The plan shall also include interim arrangements for storage, treatment and disposal while the development of facilities aligning with the larger scheme of the plan would take a while to materialize.

The ULB shall consider the following as probable inclusions as part of interim arrangement

- i. Tufts of land used for secondary storage may be considered for MCF if bin-less system is opted
- ii. Development of MRF
- iii. Improving existing facilities

Upgrading collection and transportation system in a phased manner in line with the available capacities of treatment and disposal arrangements Contents of the Solid Waste Management Plan

The SWM plan of the cities should cover various specified aspects under the sections indicated below.

Sl. No	Description of	Desired content	
	section		
1.	Profile of the city	 area, physiographic and climatic characteristics, land use, socioeconomic characteristics, slum population, growth trends the administrative structure of the local body 	
2.	Legal and regulatory aspects	• SWM Rules, 2016 and other applicable rules, policy, strategy guidance. NGT directions	
3.	As – is situation	 Waste generation- generator wise waste quantities - and projections for next 30 years, composition/characteristics of the waste Waste minimisation practices of reduce/recycle /reuse including informal sector activities, waste segregation, storage at source, street sweeping, drain cleaning primary collection, transportation, secondary collection and transport, treatment, and disposal facilities doorstep collection coverage, frequencies, HKS, Kudumbasree and others engaged in doorstep collection, monitoring mechanism Equipment and vehicles, infrastructure MCF.MRF vehicle depots and maintenance facilities, land availability for treatment/disposal facilities and its present condition Institutional and financial aspects of waste management including current operating costs (Salaries, Collection cost per ton per day, treatment/disposal costs), cost recovery, MIS, 	

Table 8-3: Summary of aspects to be covered under SWM plan of a city

Sl. No	Description of	Desired content	
	section		
		monitoring, redressal of complaints,	
		Community/NGO involvement	
4.	Gaps deficiencies	• Deficiencies or gaps that need to be bridged to meet	
	and challenges	legal obligations and environmental requirements	
		• Gaps with respect to human resources, institutional	
		capacity, vehicle and equipment, infrastructure	
		availability, financial resources, inclusiveness in	
		service provision, conducive regulatory framework,	
		availability of essential data, land availability and	
		suitability,	
		• stakeholder willingness, awareness levels, as well as	
		IEC needs	
		• Strategies and targets:	
		Set strategies and targets based on the state	
5	Solid Wasta	Pased on identified gang future population	
5.	Management Plan	Based on identified gaps, future population projections and waste generation rates current and	
	(short term and long	future quality and quantity of waste inputs from	
	term)	stakeholders and technological options for treatment	
		and disposal based on the geographical location	
		climatic conditions, hydro geological conditions, and	
		environmental, social, and economic considerations	
		• improvement in the institutional setup and / or	
		support required for implementation and operations,	
		considering the technical capabilities of the ULB.	
		Measures to achieve the targets progressively should	
		be detailed out.	
		Land Constraints for treatment /processing and	
		disposal and proposals to address the same	
		Disaster Management Plan shall be developed, and intermetion of the situation (fe silities with mexicone)	
		facilities shall be detailed out	
		Paquiroments for aquinment vehicles staffing land	
		• Requirements for equipment, vencies, staring, rand,	
		street cleaning, secondary storage, transnortation	
		processing (centralized/decentralized facilities with	
		the percentage of the population to be covered	
		through each), and final disposal of waste should be	
		outlined.	
		• Plan for waste minimization or reduction, waste	
		reuse, and recycling (3Rs) and for an effective IEC	
		campaign to promote the concept of 3Rs	

Sl. No	Description of	Desired content	
	section		
		 The institutional framework for providing SWM services and its monitoring and supervision through ULB departments and/or PPP needs to be planned. Duties of the responsible staff should be detailed out. Capacity building needs of staff and the need for management information system. Cost recovery& reduction: Taxes, user fees, Private – public partnership, cluster facilities 	
6.	Implementation plan	 Sub plans and targets (technical, financial, institutional incl. capacity building, monitoring) for every five years Allocation of resources and specifying timelines (for every 5 years) institutional strengthening; proposal by ULBs raising financial resources through rationalizing taxes and supported by user fees as per the requirement; and obtaining government grants The institutional and financial operating plan should be an integral part of the SWM plan. PPP for infrastructure development and service delivery may be fully explored during this exercise. 	
7.	ESIA of the SWM Plan	Shall be as per the Bank's ESMF requirements and the scheme Cycle included in Chapter 7	

8.2. Guidelines for preparation of Feasibility Report

8.2.1. Introduction

As the name implies, a feasibility report is used to determine the viability of a project in terms of legal, environmental, social, financial and technical aspects relating to the project. The feasibility report or DPR as applicable shall align with the environmental and social aspects of the project study with the Bank's ESMF document.

The projects identified as part of the SWM plan need deeper investigation and study from a technoeconomic viability perspective. It is expected that the projects would be legally tenable, and the environmental and social requirements (including provision of adequate considerations for the prevailing NIMBY syndrome that impacts SWM projects) shall be aligned to the Bank's ESMF requirements. The ULBs shall be responsible for the same.

8.2.2. Legal & Regulatory Aspects

While Solid Waste Management Rules 2016 form the legal basis for upgrading SWM, National Manual on Solid Waste management - 2016 provides component wise norms, standards and guidelines for the preparation of SWM plan.

Central Govt. agencies have issued a number of guidelines for various aspects of SWM and they include:

Advisory on On-Site and Decentralized Composting of Municipal Organic Waste, (CPHEEO), June 2018

- 1. Technical EIA Guidance Manual for Common Municipal Solid Waste Management Facilities – MoEF
- 2. Guidelines on the provision of the buffer zone around waste processing and disposal facilities, April 2017; amended in March 2019 CPCB

In addition to the above, the projects shall be prepared in alignment with the GoK policy on SWM and Integrated Solid waste Management Strategy. The options identified as optimal for Kerala are:

- 1. Developing ULB level SLF or opting for Regional level
- 2. Establishing RRF/MRF for secondary segregation of recyclables and non-recyclables, selling Recyclables and making RDF for cement/WtE plants
- 3. Source level treatment of 20% the Wet waste Composting & Biogas
- 4. ULB level ASP/in vessel composting, ULB level & cluster level Bio-methanation

8.2.3. Steps for Preparation of Feasibility Report

The sequential steps to be followed for preparation of feasibility report are detailed below:

- 1. Data Collection
- 2. Legal, Policy and strategy review and implications on SWM for the city/region under study.
- 3. Review the SWM plan of the city with special focus on relevant aspects to be considered for the feasibility analysis and build on the relevant aspects with necessary detailing.
- 4. Should include specific primary survey for project specific inputs for the project operating period containing aspects such as waste quantity, characterisation. This is to make necessary update to the information available in SWM Plan.
- 5. City profile including demographic, physiographic, climatic, land use and socioeconomic characteristics. Specific challenges to developing SWM components like MCF/MRF, treatment/ landfill should be discussed.
- 6. Include assessment and recommendation on waste segregation, collection, transportation, processing /treatment and disposal, including addressing NIMBY syndrome, locations analysis for treatment and disposal. Also include if necessary, the ULB participation in a regional facility for treatment and/or disposal. The recommendations shall correspond to this regional context wherever appropriate.
- 7. Following the waste hierarchy, discuss potential market for waste and its challenges for sale and use of end products.

- 8. Technical options to be considered, with detailed cost estimates, and O&M requirements
- 9. Carry out an Environmental and Social Assessment (SA) of the proposals to identify its environmental and social risks, impacts and benefits and to structure the project as per the ESMF requirements for KSWMP.
 - a. Brief summary of various options analyzed
 - b. Options Risk Assessment
 - c. Approx. capital and O&M cost of works for each feasible option, with quantitative illustrations (not subjective opinions)
 - d. Life Cycle Cost (LCC) for various combinations, including regional project
 - e. Environmental and social safeguards screening of various explored options: Carry out an Environmental and Social Assessment of the proposals to identify its environmental and social risks, impacts and benefits and to structure the project as per the ESMF requirements for KSWMP
- 10. Recommended option:
 - a. Justification for recommendation (considering environmental and social safeguards screening and LCC/IRR with supporting quantitative figures)
 - b. Recommended Project Structure and risk mitigation/management
 - *c.* Institutional structure for the recommended project structure *Key* stakeholders in the proposed project and their roles & responsibilities in preparation, procurement, construction, operation and monitoring
 - d. Detailed estimation and description of equipment, man-power requirement and works proposed, including design approach, phased construction program, strategy for ensuring compliance to SLBs, General Abstract of Cost (Comprehensive)
 - e. Project Financial Analysis
 - i. Assumptions
 - ii. Cost Model Assumptions and component wise results summary (with details in annexure)
 - iii. Revenue Model Assumptions and component wise results summary (with details in annexure)
 - iv. O&M Cost Model Assumptions and component wise results summary (with details in annexure)
 - v. Tariff model
 - vi. LCC, IRR (Internal Rate of Return)
 - f. Economic Analysis
 - i. Assumptions
 - ii. Economic Costs
 - 1. Tradable components (Civil & Equipment)
 - 2. Non- Tradable components (Unskilled Labor cost, taxes, etc.)
 - iii. Economic Benefits
 - 1. Number of citizens benefited
 - 2. Women and Marginalized Groups Beneficiaries
 - 3. Employment Generation

- 4. Contribution to local economy
- 5. Health benefits (Savings in earnings loss during sick days)
- 6. %age or absolute improvement in service provisioning to citizens
- 7. Resource Saving (land value increases in areas close to dumping sites)
- iv. Economic Analysis Economic Internal Rate of Return (EIRR), Benefit Cost Ratio (BCR) and Switching Value
- g. Financial Sustainability of Municipality
 - i. Operating ratio
 - ii. DSCR
- h. Sensitivity Analysis on key impacting variables
- 11. Applicable clearances for project's implementation.
- 12. The institutional arrangements shall take into account those mentioned in chapter 3 of this document.
- 13. Implementation modality and the potential for private sector participation in the SWM value chain elements in line with the options suggested in the Project Appraisal Matrix included in Chapter 3 of this document.
- 14. Explore the potential for private sector participation the SWM value chain elements in line with the options suggested in the Project Appraisal Matrix included in Chapter 3 of this document.
- 15. Timeline of the implementation of the project (including major elements of implementation) for each potential scenario, schedule & mechanism of implementation.

8.2.4. Guidelines for preparation of Detailed Project Report

Based on the feasibility studies carried out, the intended project structure shall be decided by the ULB. Wherever, the design responsibility is not with the contractor, the ULB shall undertake preparation of the DPR. In this project, ULB should select/rank solid waste management options and decide on various equipment, vehicle, infrastructure and other improvements for subsequent implementation of the project.

The detailed project report should focus on:

- collection and transportation (C&T) Plan that minimizes exposure of waste and avoids multiple and/or manual handling of waste;
- Treatment of organic fraction of waste: a combination of decentralized /centralized operation
- Processing of dry waste: Recycling, use of non-recyclable combustibles as refuse derived fuel
- A scientific waste disposal facility for inert waste

DPR is to be prepared (for the preferred option identified from the ones suggested in the feasibility report) based on the following:

- identified gaps,
- future population and waste projections,

• seasonality and variations in waste,

Requirements for equipment, vehicles, staffing, land, revenues, etc., for providing door-todoor collection, street cleaning, secondary storage, transportation, processing (centralized/decentralized facilities and final disposal of waste should be outlined. Waste minimization or reduction, waste reuse, and waste recycling practices (3Rs) have a significant impact on the waste composition and quantities of waste to be handled and disposed-off. ULBs should, therefore, have a plan for an effective IEC campaign to promote the concept of 3Rs to minimize waste generation.

The major sections that are to be covered in a DPR are detailed below:

8.2.4.1. ULB Profile

The profile of the ULB shall include the following:

Physical and Geographic Features, Climate and Weather		
Socio-Economic Profile -City's Significance		
Demographic Characteristics -current and projected population for next 30 years.		
Floating population		
Economy and Growth Trends, Land use.		

8.2.4.2. Legal & Regulatory framework

The preparation process should start with the study of the existing reports/studies on SWM such as SWM Plan, Feasibility Reports etc. The legal and regulatory aspects should be closely analysed, especially those listed under 8.1.2. The CPCB Guidelines for Handling, Treatment and Disposal of Waste Generated during Treatment/Diagnosis/ Quarantine of COVID-19 (Revision 4 dated 21st July 2020) shall be incorporated in segregation/collection general & COVID infected waste.

8.2.4.3. Current situation on waste generation and future forecast

This section should detail the following:

- Current source wise rate of generation, waste profile, physical & chemical composition of waste
- Projection of waste generation for next 30 years based on i) population growth ii) changes in lifestyles and economic status impacting waste generation

In the absence of recent study regarding these, a sampling survey need be performed to arrive the numbers. Seasonal variations will have impact on the waste generation, and this needs adequate attention during the assessment.

8.2.4.4. Present Solid Waste Management Practices

This has to be done in detail as it will form the basis for SWM planning. The section should discuss the following:

- Practices/options for segregation, storage at source, primary collection of HH and bulk waste generated, C&D waste collection, street sweeping, drain cleaning & silt removal, secondary collection and transportation, processing, treatment, disposal of waste,
- Institutional arrangements, manpower and staff deployment at various levels of operation and maintenance (including engagement of Haritha Karma Sena, other SHGs, etc.),
- Financial Aspects and Cost Recovery,
- Community & Private participation,
- Waste minimization activities,
- Involvement of informer sector of waste pickers/dealers etc.,
- MIS and monitoring.

Steps for completing the same are listed below:

- Collect component wise information on source treatment, waste collection, storage, transportation, processing and disposal. Information from ULBs and other stakeholders may be collected through structured questionnaire, field inventories and reconnaissance surveys Ref: Annexure A-Data collection Requirements and Table1.4(Matrix for Collection of Baseline Information including statutory requirements as per SWM Rules, 2016) of SWM Manual Part II
- Review and analyse the data to fully define the existing mechanical, institutional and financial system of SWM and adequacies
- Review of allotted or demarcated land by Town Planning Department (if any) and suitability of the land and equipment/vehicles considering the waste quantities, characteristics, climate, and other sensitivities.
- Detail out the following in processing of Processing of Waste: Location and type of processing, quantity, and percentage of waste processed, technology adopted, percentage of residual waste sent to a disposal site.
- The institutional plan and involvement of support agencies in this value chain shall be included.
- Include financial and commercial arrangements for sale of waste and related produce
- Disposal of Waste: Details on sanitary landfill available, designated sites, and capacity of the landfill, the volume of the current cell and expected life, the quantity of waste deposited annually at the landfill (over the life of the landfill); issues with these sites; Land availability for SWM as per city development plan or city master plan, historic struggles, and actions related to SWM.
- Financial Assessment: The budgetary allocations and actual annual expenditure on SWM services in relation to total revenue budget of the municipal authority; Cost per ton of various components of SWM service; Salary of workers/staff, vehicle hire charges in a year, Assessment of tax or user fees levied for providing SWM service (even for special services like collecting from marriage halls, other bulk generators) and extent of cost recovery
- Assess the extent of compliance of SWM Rules and guidelines
- Key Issues, gaps and deficiencies –measures to address these issues & deficiencies

Strategies & targets: In line with the project objectives and ISWM strategy, the ULB shall set

targets aligned to the project objectives. The following are specific documents (1)GoK policies and strategies, and (2) SWM benchmarking (MoUD), ULB should:

- set targets for upgrading the system
- analyze the feasibility and sustainability of options for improvement as provided in Feasibility report
- integrate waste minimization, reduction, reuse, and recycling practices with the SWM Plan
- develop a meaningful partnership with residents' associations, NGO's in waste minimization, reduce, reuse, recycle
- market making for waste
- financial and commercial considerations

8.2.4.5. Guidance on Recommendations

Based on the above assessment, detail the approach for upgrading the solid waste management, considering the technical, economic, environmental, financial and social feasibility of collection, segregation, transportation, treatment and disposal of waste.

The institutional framework for providing SWM services and its monitoring and supervision through ULB departments and/or PPP, needs to be planned. Duties of staff should be detailed out. Capacity building needs of staff and the need for management information system shall be analyzed

Collection & transportation : Segregation & storage at source -three bin system- capacity & specification, primary & secondary collection system – frequency , vehicle routing, Transfer points/ secondary storage /MCF Street sweeping – Schedule to cover all roads, public places – tools and equipment Drain cleaning –Schedule , tools equipment Bulk/garden waste collection system - vehicle .equipment Collection & transportation of C&D waste,

- Prepare a road map for the source segregation, storage and primary collection.
- Assess the need and prepare designs and specifications of tools, equipment, vehicles, machinery and manpower for system improvement.
- Prepare a least cost solution for transporting the waste from transfer point to MRF/treatment/ disposal site. This has to be prepared by considering various alternatives like privatization of vehicles, leasing the maintenance of vehicles, shortest haul routes, etc.
- Maintenance of vehicle and equipment –preventive and regular maintenance
 Workshop & vehicle parking, phasing out plan of existing vehicles & equipment not compatible with proposed system
- Carry out random survey among the public covering both domestic and nondomestic to assess willingness and capacity to pay for the user charges and opting for home level treatment

Market potential for processed waste: Assess the market and value of compost/biogas /RDF / recyclables and identify the potential market to sell/utilize the compost/biogas/recyclables. A marketing plan may be prepared and a clear-cut action plan for dealing of recyclables

Processing & disposal: ULBs should take into account of economy of scale aspect while planning treatment/landfill. Short term option for interim facility and long-term plan for cluster facilities may be considered.

- The land requirements for MCF/MRF / treatment is to be estimated based on the current and future waste generation
- Land availability for SWM as per city development plan or city master plan
- Facilities must be optimally sized and designed.
- Assess the Geological characteristics of the waste disposal area: carry out on-site geological mapping of all the disposal sites existing, identified and investigate the topography, geomorphology, hydrogeology, stratigraphy and other geological characteristics like the porosity, permeability etc. which will have significant influence on the design criteria for various facilities
- Design and Specifications of Landfill and Composting/bio-methanation Develop the design, construction and operation specifications for the Facility and landfill in accordance with the MoEF criteria
- preparation of the environment and social management plans such as ESMP-TDP and RAP, as required.

8.2.4.6. Institutional strengthening, capacity building, IEC activities

- Requirement of staff, workers, supervisory staff separately for each component should be worked out as per the guidelines in SWM Manual Part II
- Suggest institutional strengthening measures for ULBs through training, capacity building and induction of professionals for system improvement.
- Prepare a detailed plan and road map for IEC activities for creating awareness among people regarding source segregation, decentralized treatment and estimate capital and recurring cost for the same

Management Information System & Monitoring: Developing an information system for recording all relevant information of the SWM & monitoring of SWM services with timely redressal of complaints

- Option for GIS based information system.
- Enforcement of regulations and levy of penalties

Bill of quantities and cost Estimates. Summary of resource requirements – land, machinery, and Capital & Operating requirements

- Prepare detailed/itemized cost of all components separately landfill facility and compost yard. The cost estimates shall include capital cost; operation and maintenance cost; and post closure cost. The estimate should also include the cost of IEC, capacity building
- Provide costs for operation & maintenance and develops total annual costs for investment and O&M to assess the affordability of the proposed plan

8.2.4.7. Financial aspects: The financial appraisal shall include the following:

• Capital and Operating Costs

- Revenue Model and cost recovery including user fee and sale of material
- financial structuring;
- Financial viability assessment
- Economic viability assessment (where not possible, can include qualitative benefits)
- Value for money analysis

Project Tendering and Implementation shall include the following:

- Project phasing &Implementation plan
- Procurement strategy and procedures for goods, works and services shall be aligned to Volume 2 of this PIM (Procurement Manual)
- Preparation of Bid documents and Bid process management (in line with section 8.4 of this document and Volume 2 of the PIM (Procurement Manual)).

8.2.4.8. Other supporting documents of the DPR

The SWM DPR should be supported by:

- data that formed the basis for the preparation of the SWM Plan.
- drawings for all the components of Collection and Transportation, Waste Processing and Land filling. Rate Analysis, designs specifications, Bill of Quantities and Cost Estimates of all the items recommended in SWM Plan

Additional details can be incorporated as per the requirements of the ULBs. An indicative checklist for DPRs is listed in SWM Manual 2016 Part II

8.3. Guidelines on preparation of Engineering Design

This subsection briefly presents the broad design requirements/specification of C&T equipment/ vehicles and MSW treatment systems. This section supplements the design aspects in Chapter 7. The specifications shown are indicative intended to guide the ULB/PIU. It may be noted that each manufacturer will have their own design /specifications .ULB/PIU shall confirm that those are in line with general requirements.

Storage collection & Transportation

There are mainly two types of storage bins/containers: those which require to be lifted manually & those which can be lifted mechanically.

Table 8-4: Storage bins

A. Prim	A. Primacy storage bins		
i.	Manual loading/unloading -Households & Small generators		
	Plastic HDPE/LDPE: Material should be UV stabilized grade of polyethylene, virgin grade.		
	Rubber/Galvanized iron/SS.		
	A light weight design with no sharp edges		
ii.	Mechanical loading - Medium/Large generators All bins are to be designed as per DIN 840 Standards .Smaller sizes shall be with two wheels and larger		

	with four wheels		
	For storage of waste/ at premises and transfer of the waste to compactors with		
	bin lifting facility. The bins will also have forklift pockets for transferring with		
	fork lift		
iii.	60 lit capacity Bins with l	lid	
	Material should be UV stat	pilized	С
	grade of polyethylene, vir	gin grade	
			LLUSTRATIVE
	A – 658 mm B- 465 mm	u C – 534 mm	
	D -593 mm E- 200mm	Weight – 8 kg	
iv.	120 lit capacity DIN stan	dard Bins with lid:	
	F	В	
		711	
	ILLUSTRATIVE	A	
		E	
	C H	D	
	A – 930 mm	B- 560 mm	C – 480 mm
	D -405 mm	E- 870 mm	F -440 mm
	G – 980 mm	Weight – 12 kg	
	240 lit capacity DIN stand	lard Bins with lid:	
	A – 1070 mm	B- 740 mm	C –570 mm
	D -535 mm	E- 995 mm	F-550 mm
	G-1140 mm	Weight –Min 15.5 kg	
	The bins should be of HDP	E (UV stabilized, Virgin gra	de) body with top lid with
	heavy duty wheels (200mm) confirming to EN 840-2 standard (European		
	standard)		
v	1100 lit DIN Std Four whe	eeled Galvanized bins	
	1100 lit capacity with lid suitable for lifting and unloading contents to Refuse		

a) Fabricated in 2mm thick steel plate which hot dip galvanized painted for extra strength and protection. b) Size: Dimensions in mm - Height (A)- 1370, Width (B)- 1250, Length (C)-980 - Dimensions may vary, but bin has to be compactable with Refuse compactor. (c) Heavy duty 200 mm castor wheels, four with solid rubber tyres for longer life and quieter operation, Enlarged base plate for wheels. 1250 ILLUSTRATIVE ILLUSTRATIVE vi. Secondary storage - Dumper placer (skip loader) containers 2.5 3.5, 4.5, 6.00 cum containers -Container height less than 1.00 m to • handle a weight of not less than 600 kg/cum, made of reinforced steel frame and cladded with sheets. The sheet thickness : 3 mm on sides & 4mm at bottom, The lifting hooks would be integrated into the frame and be capable of taking the loads specified. The loading height should be less than 1.00 m; the material for the container would be steel conforming to IS 2062. The top flap type closure, for the whole width of the container excluding end supports Tail gate with hinges at top to open when tipped. with locking arrangement to lock while on move/loading Lifting hooks : integral part of container strong enough to take the design load Metal containers - sand blasted prior to coating/painting. The inside of the containers to be coated with two-coat fibre reinforced plastic resin or equivalent polyurethane resin. The outside shall be painted with 2 coats of anti-corrosive paint (approved colors)

Table 8-5: Primary and	l secondary collection	vehicles and	equipment
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В	Primary Collection
i	Containerized Hand Cart with Pneumatic Wheels for door to door collection -0.24 cum capacity



iv.	Side loading LCV truck for door to door collection, transportation to treatment site within 3-8 km 3.00 cum capacity mini tipper with side opening for manual loaning – transferring the waste from 40-60 lit bins manually -loading height – 1.2-1.3 mand tipping height<1.2 m for direct transfer to RC hopper/Dumper container Shall be designed in two apartments – one for organic waste and other for inorganic with separate loading/ tipping doors
С	Secondary collection & transportation
i.	Refuse Compactor Vehicle for collection from bulk generators, transfer from Primary collection vehicle and transportation
	(design to carry weight of 700 kg/cum)
	 All should be designed with low loading hopper with height of 1.20 m and with universal bin loading system 6&12 cum – with DIN bin lifting arm 14.8.10 cum – with DIN bin lifting 8 container lifting arm
	 14 & 18 cum - with DIN bin lifting & container lifting arm Main Body or the container: high tensile steel 'one piece' rolled side sheets and braced by front and rear hoops, with pressed integral channels and 'keel' type floor Hopper Sides and floor manufactured from high tensile abrasion resistant steel (Hardox 400 or equivalent), full width Packing Mechanism
	Refuse Ejection Barrier
	 Hydraulic Operating system Electrical System
	• Compaction mechanism control station at the rear of the vehicle
	 External discharge control station at the front of the body. Bin /container lifter
	 10. Safety Features
	Vehicle:Configuration - GVW, Pay load and HP requirements , PTO –to suit the design requirements
	O HILUSTRATIVE
ii.	Twin bin Dumper placer /Skip loader for collection from bulk generators,
	markets (container exchange system) and transportation
	Ontione dual leader (single leader
	options : dual loader / single loader

Dual loader: design for lifting two nos of 3.5 cum skip /Dumper mounted on HCV with two lifting arms Single loader: Lifts one 4.5. 6.cum mounted on LCV/HCV Vehicle top plat form - M.S plate (not less than 3mm thick) on which the containers to be placed. Hydraulic lifting arm with lifting mechanism (hydraulically actuated cyclones operating the taking power from PTO) should be designed to carry the load of waste + container. ILLUSTRATIVE iii **Bulk Transportation - long distance haul** Roll on roll roff truck for collection from tranfer stations and for long distance transportation The carrier equipment mounted ILLUSTRATIVE on an HCV truck chassis capable of lifting, loading, transporting open and closed containers of 20 -30 cum capacities and discharging the contents (solid waste materials like MSW, garden waste, debris and other like refuse materials). The hydraulically operated truck is capable of loading / unloading steel container on / from chassis, by hooking and rolling on / off principle. The container shall be fabricated complying to BIS 2062, BIS 1079. The container shall have steel roller on either side, below the rear door, facilitating the rolling movement of the container, while loading and unloading by the truck D Drain cleaning - Fliter baskets & mini truck mounted grab/hooking attachment

	Waste filter baskets
	Image: A state of the state of th
	Gopalakrishnan The filter basket shall be designed with steel vertical frames and SS mesh and with hooks on four sides for manually lifting small baskets/ mechanical lifting of larger ones
	For mechanical lifting arm mounted on LCV will be used. The vehicle shall have two attachments :1) grab to clean debris and silt from drain , 2) to hook attachment to lift filter baskets
Е	Material collection facility
	 Civil structure of MCF shall be designed as per guidelines in the sub section on centralised facilities taking care of : design for floor area of 1-2 tpd capacity, light roof structure with parapet wall, PVC mesh covering up to roof level, paved flooring, toilet & hand wash facility, stuffiest eves projections to minimize rain water entry during winds Yard & green belt -yard paving, drainage, swale Board exhibiting the type waste permitted in drop off bins Fire & safety equipment
F	Design of Secondary collection /transfer point
	 Area requirement: calculated on the basis of quantity of waste arriving/day +100 % spare capacity space for placing separate containers (color coded) for each category of waste arriving vehicle maneuvering area provide screen chamber to arrest debris moving to municipal drain design peripheral swale for ground recharge Signage
	Design options:
	 parallel to road or perpendicular to road hard paved , non-slippery area sloping towards the municipal drain
	Transfer Point
	The design aspects are same as for secondary collection point, but the area required is for the Primary collection vehicles for emptying waste directly to the transportation

vehicle – Mannering space and space for aligning back to back. Area is also required for temporary parking primary & secondary collection vehicles



Figure 8-3:Typical layout of MCF and Secondary collection/transfer point

Kerala may go for a functional and aesthetic design adopting common color scheme for all MCF in the state

Transfer Stations

Transfer stations may be designed as a simple split level transfer station or as station with compactor system. A simple system will have a 1 in 12 slope reaching to an unloading quay with open containers kept at lower level to which the waste emptied .In a station provided with compactor waste is fed through a hopper to a compacting system which compacts the waste in to container.



Figure 8-4: Simple Split level transfer station

The unloading platform and loading area have to be with roof to prevent the waste getting exposed to rain.





Treatment & Processing

Bio -Methanation -Decentralized options

Portable bio-gas units (Floating Dome with or without water jacket) and fixed dome type are the common options for decentralized systems



Design Specification

- Pre-processing room to accommodate pulverizing machine and an inlet mixing chamber to mix the pulverized waste.
- A platform outside with extended roof to receive the waste.
- Inlet mixing cum feeding tank constructed near to the digester,
- Digester with reinforced cement concrete , brick masonry lining with corrosion resistant leak proof plastering on both sides and having the following;



- Bottom slope of digester shall be 1 in 8 for easy withdrawal of sludge.
- Outlet opening with 200 to 300 mm diameter.
- Outlet (balancing) tank with cement concrete/brick masonry lining on both sides having a free board of 30 cm
- Pumps of screw type or submersible type or external chemical process type for pumping water, slurry and sludge.
- Pre-digester tank for increasing the efficiency of main digester/digesting of slow
- digesting items in plants of capacity 1 ton and above
- A Pulverizing machine /Shredder for reducing the size of items of bigger size into uniform size and mixing the same with water inside the mixing tank (No1)provided in the pre-processing room
- Pre-filter tank with four number of chambers in series with baffle walls in between to reduce the load on the septic tank .
- Septic Tank soak pit system for treatment and disposal of effluent from biogas plants.
- Rubber hose for conveying gas 20 mm dia min 40 meters long, moisture trap, H2S, pressure blower, fire arrestor, regulator and a gas stove to spend the gas. scrubber
- Control panel for monitoring/operation

Centralized Treatment Systems

There are civil structures, mechanical, electrical, safety equipment, firefighting systems coming under the design.

- All waste storage /processing facilities should have 100% roof coverage as waste cannot be exposed to rain especially the heavy and prolonged monsoons of Kerala
- All civil structures require soil investigation and design of foundation as per investigation study. This is crucial in coastal area where soil is poor showing very low 'N' values
- Basement of buildings should be designed with dam proof course so as to minimize the floor getting damp
- Eves or sunshades should prevent rain water entering during windy storms
- Columns should be minimum for free movement of vehicles /equipment
- Building should be high enough to facilitate movement of loaders.
- Underground structures like Sump wells for water/leachate /digestate should be designed preferable in RCC with leak proof treatment
- Water supply (drinking and for other requirements)

Broad design guidelines for mechanical, electrical safety equipment, firefighting systems are provided in the subsequent sub- sections

In-vessel composting - Rotary drum

This system uses rotary drum mounted at an inclination with mechanism to turn the drum slowly. The waste moves from feeding end (upper end) to the retrieving end (lower end). Blower blows air from lower end. Rotation enables mixing, aeration and movement of the material through the drum.





Figure 8-6: Flow diagram of Rotary drum composting

Figure 8-7:Photograph of the rotary drum operating Source: HotRot Composting Systems- Website

Aerated Static Pile Composting.

In the case of ASP, composting is done by the use of aeration systems to push or pull air through the piles (by applying a positive or negative pressure). This enhances the aerobic decomposition process. Static compost piles on impervious surface provided with aeration pipes and with leachate collection drains.



Odor control : Bio-filter :

• The contaminated air is sucked and passed through bio-filter for eliminating bad odor



Figure 8-9: Bio-filter

Table 8-6: Design r	requirements of	Rotary & ASP	Composting
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Component	Rotary Drum	Aerated static Pile	
Site development	Site drainage , cut off drains around the periphery, Internal roads , drains including roof drains Rain water harvesting		
	primary treatment before discharging to public drain Peripheral green belt –minimum of 3.00 m – planting plan		
Civil works – Plant building	vil works – ant buildingFoundation & basement as per soil parameters - flooring to take 20- 30 t /sqm loadFoundation & basement as per soil investigation flooring to take 20- to take 20- flooring to take 20- flooring to take		
	Leachate drains in the tipping area	Perforated aeration pipe in the center and running in the longitudinal direction of each	

Component	Rotary Drum	Aerated static Pile
	Super structure -framed structure , column spacing considering vehicle movement , roof height required to operate waste handling vehicles , roofing material light weight powder coated	windrow keeping slightly raised so as to prevent leachate getting in leachate collection drains at floor level in the tipping/windrow area Super structure -framed structure , column spacing considering vehicle movement , roof height required to operate waste handling vehicles , roofing material light weight powder coated
Waste reception & storage area	Space to receive the daily arrival + 1	00 % spare capacity
Pre-processing section	Trommel and conveyors, choice of chain/roller driven conveyors, size, material, drive motors and gear chopper for size reduction	Trommel and conveyors – choice of chain/roller driven conveyors, size, material, drive motors and gear chopper for size reduction
Processing Section	Rotary drum composters - SS lined drum, variable speed) drive mechanism, Erected with slight inclination so that waste loaded from upper end travels down to discharge end while getting decomposed. A 2.5 tpd module require 3.00 m diameter drum , 12.5 m long with 14 day duration	Windrow area –the floor with aeration pipes , leachate collection channel Widow area is calculated based on input waste Size of windrows e.g. 2.5 m high , 5.00 wide, 10 m long – 3-4 tpd of waste
Blower with timer	Air is bowed in from the discharge end . 20-30 m ^{3/} /hr.	Blower capacity depends on the height and length of the pile. Designed for air flow rates for a 3 meter high pile should be 35-40 m ³ /hr./m ² of floor area Pipes of dia. 100mm to 200mm perforated – less perforation close to the blower with number increasing to facilitate even flow of air.
Coarse segregation section	16 mm trommel , conveyors and storage for maturity, while the reject	feeder, hopper, screened product is temporary storage
Refinement section	4mm vibro screen with gravity screening cured material & rejects material will be sent to the storage/b	separator, aspiration system for s, glass, metal, inert. The screened bagging area.
Electrical system	Electric drive and electrical control	l panels, operation & control of all

Component	Rotary Drum	Aerated static Pile		
to drive all	equipment			
components				
Waste /product handling	oader for feeding the material to the act section.			
Vehicles.				
Odor control	Feed stock amendment to reduce moisture content	Provision of compost cover over the windrow & Bio-filter		
Leachate control	Collection sump, recirculation /trea	tment		
ASP can be designed either for positive pressure – blowing air to the pile or for sucking				
through the pile .Th	e former is more effective for proper a	aeration but can result in some odor		
issue .The designer should consider both options.				

Bio-methanation Plant

This section describes the design considerations for a bio-methanation plant. The SM/ULB shall ensure that the design requirements take into account these considerations during project preparation.

A biogas plant consists of a variety of elements. The layout depends to a large extent on the types and amounts of feedstock supplied. As there are many different feedstock types suitable for digestion in biogas plants, there are, correspondingly, various techniques for treating these feedstock types and different digester constructions and systems of operation. Furthermore, depending on the type, size and operational conditions of each biogas plant, various technologies for conditioning, storage and utilisation of biogas are possible to implement. As for storage and utilisation of digestate, this is primarily oriented towards its utilization as fertilizer and the necessary environmental protection measures related to it.

The anaerobic digestion can be accomplished in Complete mix or Completely stirred tank reactor (CSTR), Plug-flow Up-flow Anaerobic Sludge Blanket (UASB), Fixed film reactor, Floating films reactors, and Dry AD systems. It can be a single-stage biogas facility or 'two-stage biogas facility'. The two-stage facility has shorter retention time as each stage digestion is optimized. The general design requirements for wet fermentation presented in Table 8-6.



Figure 8-10: Conceptual design of Bio-methanation plant

Basic Components of biogas plant

The operation and physical facilities for anaerobic digestion in single-stage digester (standard rate and high rate) and two-stage digester. Digesters operate in a mesophilic/ thermophilic range,

Waste reception	Roofed area with hard paved flooring, with facility to collect
&preliminary storage	leachate generated while storing
Feedstock preparation, sorting size reduction and cleaning	 Pulverizing machine /grinder mixer for reducing the size of waste larger than 20mm to mix the same with equal volume of water and putting it into inlet mixing tank inside the pre-processing room. Shumu numping
Digoston	Shuffy pumping The retention time in days and the volume of directorate (day
Digester	 Digesters are designed as underground tanks – circular tanks in reinforced concrete for bottom and sides –double layer reinforcement (to with stand soil pressure while empty & liquid
	 pressure while full) .Design the RCC bottom on proper foundation as par Soil investigation parameters Peripheral pipe heating system may be designed for optimum result – may not be required in Kerala climate
	Design of stirring system
	• Steel tanks are also in use for larger plants .Corrosion resistant interior coating and heat resistant exterior coating required
	Stirring system – Proper stirring of the substrate is crucial
Gas Storage-gas holder	Two design options –storage dome on the top of digester /separate storage facility.
	 a capacity of one or two days gas production All biogas storage facilities must be gas tight and pressure- resistant, and in case of storage Facilities which are not protected by buildings, they must be UV- , temperature- and weather Proof. The biogas storage facilities can be operated at low, medium or high pressure.
Gas cleaning system	Designing of appropriate cleaning system
/further cleaning of Gas & CBG Unit	 The cleaning system for upgrading gas for electricity production require removal of moisture and H₂S through filters and absorption beds For CNG production a cleaning system is to be designed to make methane 95% pure
Safety Equipment	Gas storage facility must be equipped with:
(pressure relief devices, safety Valves, gas flares etc.)	 safety valves (under-pressure and over-pressure) explosion protection and an emergency flare system- designed

Table 8-7: Bio-methanation - General design requirements

	to flare excess bio-gas to eliminate any safety risks and to protect the environment
equipment necessary to handle the biogas	• Pipes, Flow meters, Condensate traps and flare control system.
Digestate storage & Digestate Upgrade	 Design of filter press, composting facility waste water treatment Separating digestate into a solid fraction (about 45 %) for land application (or composted down to35%) and a liquid fraction (almost 50%) to be returned the sanitary sewage or directly back to nature. after treatment .Part of it can be circulated back for feed stock preparation
Water supply system for feed stock preparation and fresh water requirement	 Design bore wells and fresh water /waste water storage tanks and pipe lines Storage of fresh water & recycled water from the waste water portion of the digestate. The designer should explore the possibility of using ground water – bore wells /nearby surface water source. Fresh & waste water storage tanks to be designed and built at site.
Power supply & automation	Control panels, sensors, PLCs and Actuators
Eine Quesfater erstand	

Processing of Dry waste

MRF Facilities

Typical MRF should be in a warehouse-type building with concrete flooring and enclosed by a perimeter fence for security. The warehouse design will minimize the placement of columns that could interfere with the efficient movement of materials and equipment. The area requirements are given under Chapter 7 on Technical guidelines.

Site development & Ground improvements

- Raising the ground if required to keep the area 2.00 m above water table
- Cut-off drains to prevent storm water entry from outside and internal drains to discharge runoff to nearby primary drainage source
- Internal roads
- Parking area
- Green belt and peripheral swale

Building: Foundation as per soil investigation parameters, design of superstructure taking wind load, warehouse type design with minimum no. of columns, high roof for easy movement of waste handling vehicles. Super structure with parapet wall, PVC coated mesh covering and, roofing martial of light weight sheet with anticorrosive coating.

- Hard paved flooring designed for loads of 20-30 T/sqm
- Rainwater harvesting recharging
- Signages

- Fire & safety equipment : Shall be done asper guidelines of Fire & Safety Dept
- Water supply, sanitation facilities /Septic tank

Sorting system

Options are:

- Manual with sorting table, a shredder (designed for less than 2tpd)
- Semi-automated: with sorting conveyor ,small pay loader, shredder & a small baler (designed for 2 to 20 TPD)
- Automated. : Sorting line with conveyor , hopper , trommel, pay loader , shredder , and medium capacity baler –above 20 TPD may be designed for more than one processing line if higher quantities to be handled. Forklift may be required for handling baled waste.

Processing Equipment

Commonly used equipment are shredders and balers Following are the points to be noted before selecting shredding/baling equipment

- the properties of materials before and after shredding
- method of feeding shredders, provision of adequate shredder hood capacity
- energy requirements,
- routine and specialized maintenance requirement,
- simplicity of operation, reliability, noise output, and air and water pollution control requirement
- site consideration, including space and height, access, noise and related environmental limitations

Plastic Shredder: Specification: 7.5 to 15 hp shredder 50 to 100 kg /hr. with 4 nos of rotary blade and 2 nos of stationery blade and 2 hp Blade sharpening machine & tools

Baling Machine: Balers are typically used to compact similar types of waste, such as office paper, corrugated fiberboard, plastic, foil and cans, for sale to recycling companies. These balers are made of steel with a hydraulic ram to compress the material loaded. Suggested specification :

- Capacity 50Kg to 2Tonne
- Chamber size 900 x 450 x 450 mm
- Bale size 450 x 450 x 450 mm
- Bale weight 50-75 kg Motor Power 7.5 kg
- Number of cylinder Single Pressing time stroke 12 strokes per hour

Accessories:

Weighing Machine and tool kits



Figure Typical layouts of MRF

Refuse Derived Fuel

The raw material for RDF is non-recyclable, combustible fraction of MSW – plastic, paper, wood, leather. Rubber rags etc. Compost rejects is also used. The Calorific Value should be around 1200 -1500kcal/kg. RDF production facilities make RDF in various forms through material separation, size reduction and pelletizing. RDF production plants characteristically have an indoor tipping floor. The waste in an RDF plant is typically fed onto a conveyor, which is either below grade or hopper fed. In some plants, the loader doing the feeding will separate corrugated and bulky items like carpets. On the conveyor, the waste travels through a number of processing stages, usually beginning with magnetic separation. The processing stages, using trommel or vibrating screens, shredding or hammer milling of waste with additional screening steps, pelletizing or baling of burnable wastes and depending on the local recycling markets and the design of the facility, a manual separation line.



Figure 8-11: RDF Plant

There are two primary types of systems in operation, and they are:

i. Shred-and-burn systems: Shred-and-burn systems are the simplest form of RDF production. The process typically consists of shredding the MSW to the desired particle size that allows effective feeding to the combustor and magnetic removal of ferrous metal, with the remaining portion delivered to the combustor. There is no attempt to remove other non- combustible materials in the MSW before combustion. This, in essence, is a system with minimal processing and removal of non-combustibles.

ii. Simplified process systems: This is a system that removes a significant portion of the noncombustibles. A simplified process system involves processing the MSW to produce an RDF with a significant portion of the non-combustibles removed before combustion. The MSW process removes more than 85% of the ferrous metals, a significant percentage of the remaining non-combustible (i.e., glass, nonferrous metals, dirt, sand, etc.) and shreds the material to a nominal particle top size of 10 to 15 cm to allow effective firing in the combustion unit.

Depending on the type of combustor to be used, a significant degree of separation can be achieved to produce a high-quality RDF (i.e., low ash), which typically results in the loss of a higher percentage of combustibles when compared to systems that can produce a low-quality fuel (i.e., slightly higher ash content) for firing in a specially designed combustor. These types of systems recover over 95% of the combustibles in the fuel fraction.

Installation of RDF system requires:

- Air classifier to remove stones and heavy items from rejects
- Dryer to remove excess moisture in rejects. (hot air generator & dryer required)
- Trommel
- Shredder/ hammer mill to reduce the particle size of dried RDF.

8.4. Guidelines on Preparation of bid documents and bid process management

As mentioned in chapter 3, the project procurement and contract management wing will be responsible for the procurement of projects listed under component 1, 2 and 3. The project procurement will be carried out in accordance with the guidelines of the World Bank's "Procurement Regulations for IPF Borrowers for Procurement in Investment Project Financing - Goods, Works, Non-Consulting Services and Consulting Services", dated July 2016 revised November 2017 and August 2018 ("Procurement Regulations") and the additional provisions stipulated in the Legal Agreement.

The contracting authority may consider the following list of indicative schedules while preparing the bid documents for different type of projects listed under component 2 and 3.

		Type of Projects				
SL. No	Description of Schedules	C&T Contracts	Construction / Installation/ Closure/ Bioremediation	O&M Projects	Integrated Construction + O&M	Integrated Construction + 0&M + C&T Contracts
1	Details of project sites/collection areas etc.	\checkmark	\checkmark	~	\checkmark	\checkmark
2	Construction requirement	-	\checkmark	-	\checkmark	\checkmark

Table 8-8: Indicative schedules for preparing bid documents

		Type of Projects				
SL. No	Description of Schedules	C&T Contracts	Construction / Installation/ Closure/ Bioremediation	0&M Projects	Integrated Construction + O&M	Integrated Construction + O&M + C&T Contracts
	for waste processing facilities					
3	Fees (format)	~	-	✓	~	~
4	Land license agreement (format)	-	~	-	~	~
5	Authorisation	✓	✓	✓	✓	✓
6	Scope of work of monitoring authority	~	~	~	~	~
7	Format for performance bank guarantee	-	~	-	~	~
8	Technical scheme for MSWM facility	-	~	~	~	~
9	Approach and methodology for construction of MSWM facility	-	\checkmark	-	~	~
10	Service level condition and penalties	~	\checkmark	~	\checkmark	\checkmark
11	Operation & maintenance for MSWM facility	-	-	~	~	~
12	BoQ	✓	✓	✓	✓	\checkmark
13	Breakdown of contract price	✓	~	✓	~	~
14	Reporting requirements	✓	~	✓	~	~
15	Services and facilities to be provided by the ULB/contracting authority	~	\checkmark	~	\checkmark	\checkmark
16	Operation timings/ Holidays	✓	-	✓	✓	✓
17	Format for daily weight sheet	~	-	~	~	~
18	User fee collection and status	~	-	-	-	-
19	Health & Safety practices	✓	✓	✓	✓	✓
20	Applicable labour Laws and labour influx management plan	~	-	~	~	\checkmark
21	Waste Inspection, acceptance and rejection	-	-	~	~	~
22	Procedure for payment of tipping fees	-	-	~	~	~
23	Environmental Requirements for the plant/transfer station etc.	-	~	~	~	~
24	Noise control	-	-	✓	✓	✓
25	Odour control	-		 ✓ 	✓	✓
26	Leachate control/treatment	-	-	✓	✓	✓

		Type of Projects					
SL. No	Description of Schedules	C&T Contracts	Construction / Installation/ Closure/ Bioremediation	O&M Projects	Integrated Construction + O&M	Integrated Construction + O&M + C&T Contracts	
27	Facilities maintenance	-	-	\checkmark	\checkmark	\checkmark	
28	Maintenance of vehicles	✓	-	-	-	✓	
29	Customer service and complaint handling	\checkmark	-	-	-	\checkmark	

Source: SWM Manual 2016, CPHEEO

As per the project requirements, the above list of indicative schedules may be modified based on the recommendations of TSCs. On a project-to-projects basis, this shall also be aligned to the project requirements and bank's ESMF requirements.

The mapping of technical documents and the relevant procurement modality for each of the subprojects of component 2 is provided below.

Table 8-9: Mapping of technical documents and the relevant procurement modalities

SI. No	List of Component – 2 projects as per section 3.7 of chapter 3	Preparation of Technical	Project Procurement Modality
i.	Household level interventions for all ULBs	FR (feasibility reports) /DPR	Item Rate Contract
ii.	Collection & Transportation vehicles/ equipment etc. for Municipalities	FR	EPC
iii.	Collection & Transportation vehicles/ equipment etc. for Municipal Corporations	FR	EPC + Performance based service contract for O&M
iv.	Community level facilities (BDW, MCF, RRF etc.) for ULBs	FR & DPR	Performance -based EPC + management contracts (or) DBOTs in case of FR.
v.	Centralized treatment facilities • Centralized bio-facilities under 30 TPD planned capacity • MRF under 20 TPD planned capacity	FR	DBOT
vi.	Centralized treatment facilities above a certain threshold capacity • Centralized bio-facilities above 30 TPD planned capacity • MRF above 20 TPD planned capacity	FR	DBOT
vii.	Dumpsite rehabilitation/ biomining/ closure of all types/ sizes	FR	DBOT
viii.	Sanitary Landfills of all sizes	FR	DBOT
ix.	Routine public space cleaning/sanitization and other waste management activities related to COVID19 like procurement of protective gears and equipment for sanitation workers.	FR/ Procurement Note	Item Rate Contract

Sl. No	List of Component – 2 projects as per section 3.7 of chapter 3	Preparation of Technical Documents	Project Procurement Modality
x.	Financial support to existing women self-help	FR/	
	groups engaged in ongoing waste collection	Procurement	Lumpsum contract
	services	Note	

FR – Feasibility Report; DPR – Detailed Project Report; EPC – Engineering Procurement Construction; DBOT – Design Build Operate and Transfer

The nature of procurement options that shall be employed for projects proposed under component 2 is presented below.

Table 8-10: Procurement Options for projects under component 2

SI.	List of Component – 2 projects as per section 3.7 of chapter		Procurement Options			
NO	3	RFQ	RFP	RFB	DS	
i.	Household level interventions for all ULBs	-	\checkmark	-	-	
ii.	Collection & Transportation vehicles/ equipment etc. for Municipalities	-	-	~	-	
iii.	Collection & Transportation vehicles/ equipment etc. for Municipal Corporations	-	~	-	-	
iv.	Community level facilities (BDW, MCF, RRF etc.) for ULBs	-	\checkmark	-	-	
v.	Centralized treatment facilities • Centralized bio-facilities under 30 TPD planned capacity • MRF under 20 TPD planned capacity	-	~	-	-	
vi.	Centralized treatment facilities above a certain threshold capacity • Centralized bio-facilities above 30 TPD planned capacity • MRF above 20 TPD planned capacity	-	~	-	-	
vii.	Dumpsite rehabilitation/ biomining/ closure of all types/ sizes	-	✓	-	-	
viii.	Sanitary Landfills of all sizes	-	✓	-	-	
ix.	Routine public space cleaning/sanitization and other waste management activities related to COVID19 like procurement of protective gears and equipment for sanitation workers.	~	-	-	~	
x.	Financial support to existing women self-help groups engaged in ongoing waste collection services	-	-	-	~	

✓ indicates procurement option available

8.4.1. Procurement of Goods, Works and Non-Consultancy Services - Component 2

As mentioned in section 3.4.3. of chapter 3, the ULB-PIUs will be responsible to undertake component-2 project procurement activities with the support of TSCs established at ULB level. The DPMU will oversight all the component-2 sub projects procurement activities which are undertaken at ULB level.

Before the commencement of procurement process, the ULB-PIU shall ensure the following indicative list of documents as part of feasibility report for procurement of expenditure items in component 2. The checklist shall also be applicable for projects listed under component 3.

- SWM Plan
- Cluster of ULB's formed

- Secondary and tertiary transportation plan from all ULB's to the regional site
- Estimate the land requirement for Regional Sanitary Landfill (RSLF) for 25 years
- Suitability of site as per CPHEEO criteria
- Clear title and clean possession of the land in the name of the Authority.
- Map of the land parcel from municipal records
- Contour survey of the land
- Expected quantity of waste from cluster of cities per day basis
- Ground water analysis
- Hydrogeological data
 - Soil strata and soil analysis
 - o Land Use Plans
 - \circ Water sources in the periphery of 200 m
 - o Flood Plain Maps
 - o Aerial Photographs/ Satellite Imagery/ Google maps
 - o Rainfall Data
 - Wind Map
 - Seismic Data
 - Road Maps
- Clearance of public hearing for the site
- Declaration of suitable buffer zone by the concerned authority
- Environmental and social check list
- Estimation of volume and area requirement
- Prepare sanitary Landfill layout
- Technical Design requirements
 - \circ Base sealing system
 - Landfill phasing
 - Leachate management collection and treatment
- Cost estimates for all components of the project

1. Request for Quotations (RFQ) method: An RFQ method shall be used for procuring limited quantities of readily available off-the-shelf goods by comparing price quotations solicited from various bidders. This method shall be used only when there is an urgent requirements for procurement of limited quantity of goods and commodities with contract value less than equivalent to USD 100,000.

Step-by-Step guidance on preparation of bid documents and tendering process:

As per section 12.3.3 and section 12.7 of chapter 12, the ULB-PIU shall undertake drafting of bid documents and tendering process with the support of TSCs for procurement of goods, works and non-consultancy services as per the applicable procurement procedures laid down in the world bank procurement guidelines.

1.Preparation of RFQ document: The ULB-PIU shall prepare an RFQ document consisting of project or item description, number of items to be supplied, technical specifications, drawings, warranty requirements, price schedule, method of evaluation and tentative timeline of the bidding schedule. If the quotations are called for more than one item, the ULB-PIU shall indicate in the RFQ whether the evaluation would be for each item separately or as a package of all items together. The TSCs employed at ULB level would

provide necessary assistance for the preparation of bid documents which contains EMPs and other E&S requirements in consultation with the ULB-Engineering department and PWD.

- 2.Seeking Bank's no-objection for ESMF requirement: The ULB-PIU shall ensure an appropriate environmental and social safeguards by seeking necessary no-objections in accordance with the Bank's ESMF requirements.
- 3.Approval of Bid documents: The ULB-PIU shall submit the final bid documents to SPMU for approval. The SPMU shall conduct a review and provide clearance for bid documents as per the service standards for prior review timelines mentioned in the section 12.3.1 of chapter 12.
- 4.Bank clearance through STEP system: The SPMU shall prepare and submit the project procurement plan & bid documents in STEP system and obtain necessary clearance from bank. The ULB-PIU shall extend necessary support for submitting the procurement activity in STEP system.
- 5.Launching of RFQ: The ULB-PIU shall publish the RFQ document in e-tender portal, official website and national daily newspaper to invite participation from potential bidders. The RFQ will contain approved EMPs and other E&S requirements in world bank procurement document format. The ULB-PIU shall provide time period of 7 to 15 days for bidders to submit the quotations. Further, the bidders are expected to submit the quote in Indian Rupees and the rate of quote will be fixed for the entire duration of the contract.
- 6.Receipt of quotation: In order to ensure competition, the ULB-PIU shall obtain minimum three quotations from bidders. Further, the quotations shall remain valid for a period as specified in the RFQ document.
- 7.Opening of quotations and evaluation: The opening and evaluation of quotations shall be conducted as per the terms and conditions specified in the RFQ. The ULB-PIU shall prepare a quote comparative statement and ensure that all requirements are provided by the bidders at the time of bid evaluation.
- 8. Selection of bidder: The bidder will be selected on the basis of lowest price offering for the goods and services specified while complying all the selection criteria requirements. The ULB-PIU shall issue purchase order to the successful bidder.
- 9. Investment update in PPSD as per Chapter 12.4.2: The SPMU shall update the PPSD once the specific investments are identified for particular project with the support of PMC.

2. Request for Proposals (RFP) method: An RFP method shall be used to procure customized goods and solutions from the prospective bidders through multi-stage bid process.

Step-by-Step guidance on preparation of bid documents and tendering process:

As per section 12.3.3 of chapter 12, the ULB-PIU will undertake drafting of bid documents and tendering process with the support of TSCs for procurement of goods, works and non-consultancy services as per the applicable procurement procedures laid down in the world bank procurement guidelines.

- 1.Preparation of RFP: The ULB-PIU shall prepare an RFP document indicating the instruction to bidders, bid data sheet, scope of work, project requirements, mandatory technical & performance specifications, minimum qualification criteria, method of evaluation, payment terms, tentative timeline of the bidding schedule, EMPs and other E&S requirements and concession agreement including provisions to mitigate ESHS risk as necessary.
- 2.Seeking Bank's no-objection for ESMF requirement: The ULB-PIU shall ensure an appropriate environmental and social safeguards by seeking necessary no-objections in accordance with the Bank's ESMF requirements.
- 3.Approval of Bid documents: The ULB-PIU shall submit the final bid documents to SPMU for approval. The SPMU shall conduct a review and provide clearance for bid documents as per the service standards for prior review timelines mentioned in the section 12.3.1 of chapter 12.
- 4. Launching of RFP: The ULB-PIU shall publish the RFP in e-tender portal, official website and national daily newspaper to invite participation from potential bidders. The RFP will contain approved EMPs and other E&S requirements in world bank procurement document format.
- 5. Pre-bid meeting and issuing corrigendum/addendums: The ULB-PIU shall invite bidders for participation in pre-bid meeting to understand the concerns and other key issues on the proposed scope of work. Based on discussion with the bidders during the pre-bid meeting, the ULB-PIU shall prepare the minute of pre-bid meeting and publish response to pre-bid queries with the support of TSC. Further, the RFP documents may be revised by issuing corrigendum with the required amendments and the time period of bid submission may also be extended accordingly.
- 6. Receipt of bids and Evaluation of proposal: On receipt of the bids, the ULB-PIU shall open and evaluate the technical proposals received from the bidders. The ULB-PIU shall assess the proposals for completeness and eligibility of the bidders as per conditions specified in the RFP with the support of TSC. As per SWM Manual 2016 issued by CPHEEO, the following criteria may be considered for evaluation and final selection of potential bidders.
 - i. Relevant qualification and experience of the bidder
 - ii. Expertise of the bidding team
 - iii. Financial capability of the bidder
 - iv. Approach and methodology suggested
 - v. Reliability of the bidder (based on previous conduct)
 - vi. Proposed pricing structures and cost to the ULB-PIU
- vii. Environmental and social safeguards provided or ensured
- viii. Assumption of risk liability and proposed mitigation measures

The ULB-PIU shall prepare the technical evaluation report in the bank prescribed format to identify the preferred and the second ranked technical bidder. On completion of technical evaluation, the financial proposals of all technically disqualified bidders shall be returned unopened. The financial proposals of technically qualified bidders will be opened at a designated date and time in presence of ULB-PIU officials and representatives of bidders.
- 7.Selection of bidder: The ULB-PIU shall select the most preferred bidder based on quality and cost evaluation. The bidders securing the highest marks will be given an award of work and invited for negotiations as per terms and conditions of the RFP document.
- 8.Negotiation: The ULB-PIU shall conduct a negotiation with the selected bidder on the ToR, methodology, timelines for completion, experts staffing and special conditions of contract. This negotiation will not alter the original ToR and terms & conditions of the contract.
- 9.Letter of Award and Signing of concession agreement: The ULB-PIU shall issue an LoA to the selected bidder. As per SWM Manual 2016, CPHEEO, the concession agreement is to be signed within 30 days of issue of LoA unless specifically extended on mutual consent for valid reason. The notice of contract award will be published in the official website.
- 10. Investment update in PPSD as per Chapter 12.4.2: The SPMU shall update the PPSD once the specific investments are identified for particular project with the support of PMC and ULB-PIU.

Bank clearance through STEP system:

The SPMU shall prepare and submit the procurement plan, bid documents including response to pre-bid queries and corrigendum to the Bank for review and obtain no-objection through STEP System with the support of ULB-PIU & TSC. Further, if there is any activity which could lead to change in the content of the bid document and so the contract to be signed with the bidders in the form of response to pre-bid queries and corrigendum etc., the same shall also be submitted to bank for approval.

3. Request for Bids (RFB) method: An RFB method shall be used to procure goods by specifying detailed project requirements and minimum qualification criteria to which bidders respond in offering bids.

Step-by-Step guidance on preparation of bid documents and tendering process:

As per section 12.3.3 and section 12.6.1 of chapter 12, the ULB-PIU shall undertake the following activities for the procurement of goods, works and non-consultancy services as per the applicable procurement process laid down in the World Bank Procurement Guidelines.

- 1.Preparation of RFB: The ULB-PIU shall prepare an RFB document including scope of work, technical specifications, bill of quantities, drawings, type and size of contracts, payment terms, market approach, EMPs and other E&S requirements. The model bidding documents issued by bank shall be used for preparation of RFB document.
- 2.Seeking Bank's no-objection for ESMF requirement: The ULB-PIU shall ensure an appropriate environmental and social safeguards by seeking necessary no-objections in accordance with the Bank's ESMF requirements.
- 3.Approval of Bid documents: The ULB-PIU shall submit the final bid documents to SPMU for approval. The SPMU shall conduct a review and provide clearance for bid documents as per

the service standards for prior review timelines mentioned in the section 12.3.1 of chapter 12.

- 4.Launching of RFB: The ULB-PIU shall publish the RFB in e-tender portal, official website and national daily newspaper to invite participation from potential bidders. The RFB document will contain approved EMPs and other E&S requirements in world bank procurement document format.
- 5.Pre-bid meeting and issuing corrigendum/addendums: The ULB-PIU shall conduct pre-bid meeting to understand the key issues and other requirements that the bidders may have on the proposed scope of work. Based on the discussions and queries raised by the bidders, the ULB-PIU shall prepare the minutes of pre-bid meeting and publish response to pre-bid queries with the support of TSC. Further, the RFB documents may be revised by issuing corrigendum with the required amendments and the time period of bid submission may also be extended accordingly.
- 6.Receipt of bids and evaluation: On receipt of the bids, the ULB-PIU shall open and evaluate the bids as per the conditions specified in the RFB. The ULB-PIU shall prepare the bid evaluation report as per the world bank format and the contract award will be issued to the most advantageous bid with the necessary approval from the competent authority.
- 7. Issue of notification of award and signing the contract agreement: The ULB-PIU shall issue a work order to the selected bidder and obtain performance security. And the contract agreement will be signed within 30 days of issue of work order unless specifically extended on mutual consent for valid reason. The ULB-PIU shall also publish the details of contract award on the official project website.
- 8. Investment update in PPSD as per Chapter 12.4.2: The SPMU shall update the PPSD once the specific investments are identified for particular project with the support of PMC and ULB-PIU.
- 9.Contract oversight & monitoring: The ULB-PIU shall oversight the contract work as per the conditions of contract and make payments accordingly. Further, the ULB-PIU shall return the performance security to the bidder upon delivery of goods and completion of project scope of work as per the terms of contract.

Bank clearance through STEP system:

The SPMU shall prepare and submit the procurement plan, bid documents including response to pre-bid queries and corrigendum to the Bank for review and obtain no-objection through STEP System with the support of ULB-PIU & TSC. Further, if there is any activity which could lead to change in the content of the bid document and so the contract to be signed with the bidders in the form of response to pre-bid queries and corrigendum etc., the same shall also be submitted to bank for approval.

4. Direct Selection method: Thismethod shall be used to procure goods from only one suitable/preferred firm, when there is a proportional, fir-for-purpose and Value for Money (VfM) requirements are considered.

Step-by-Step guidance on preparation of bid documents and tendering process:

As per section 12.3.3 and 12.8 of chapter 12,the ULB-PIU²⁸ shall assess the following circumstances for the procurement of goods, works and non-consultancy services under Direct Selection method as per the applicable procurement process laid down in the World Bank Procurement Guidelines.

- ULB-PIU shall assess the proper justification such as extending the existing contract executed in accordance with procedures acceptable to the bank for procurement of additional goods and works from a single firm. The ULB-PIU shall also analyze the aspects related to disadvantages of procurement through competitive bidding and price advantages of direct contracting to single firm.
- ULB-PIU shall assess the performance of firm in previous contract, procurement of low value & low risk as agreed in the procurement plan and other exceptional cases such as responding to emergency situations.
- ULB-PIU shall assess whether the procurement of particular equipment and goods from particular firm would achieve the required performance & functional guarantee of an equipment, plant and facility.
- ULB-PIU shall analyze the exceptional benefits, advantages and disadvantages of purchasing equipment and goods from a single firm.
- ULB-PIU shall assess the benefits of direct selection of UN agencies for procurement of goods.

Preparation of contract: Once the ULB-PIU ensures fairness and satisfaction in the aforementioned instances, it will prepare a contract agreement with necessary schedules including EMPs and other E&S requirements for procurement of goods and works from a single firm. The ULB-PIU shall also ensure that the prices are reasonable with the market rates and the required scope of work is not split into smaller-sized procurements to avoid competition.

Seeking Bank's no-objection for ESMF requirement: The ULB-PIU shall ensure an appropriate environmental and social safeguards by seeking necessary no-objections in accordance with the Bank's ESMF requirements.

Approval of contract document: The ULB-PIU shall submit the contract agreements to SPMU for approval. The SPMU shall conduct a review and provide clearance for bid documents as per the service standards for prior review timelines mentioned in the section 12.3.1 of chapter 12.

Bank clearance through STEP system: The SPMU shall prepare and submit the project procurement plan & contract document in STEP system and obtain necessary clearance from bank. The ULB-PIU shall extend necessary support for submitting the procurement activity in STEP system.

Investment update in PPSD as per Chapter 12.4.2: The SPMU shall update the PPSD once the specific investments are identified for particular project with the support of PMC and ULB-PIU.

²⁸ The ULB-PIU shall take the support of district level PMC wherever required.

8.5. MIS & Monitoring System For SWM Services

ULBs shall initiate the task of monitoring its SWM services through the use of information and communication technologies (ICT)

Advanced MIS together with GIS, GPS, radio frequency identification (RFID), and general packet radio services (GPRS are some important tools for ULBs to manage MSW efficiently. Daily reports on critical aspects of the MSW need to be compiled in order to take stock of situation and take corrective measures as may be required, such as: (i) number of sanitary workers, drivers and supervisors on duty and substitute arrangement for those off duty; (ii) vehicles and equipment reported on duty and number of vehicles were off the road on account of breakdown, substitute arrangements made for replacement and repairs;(iii) quantity of waste transported, treated at the treatment or processing facilities and disposed off at landfill; etc.

A Real time monitoring system should be in place capable of informing daily the senior management of the Municipality, the performance of SWM. Advanced MIS, e.g.,GIS, GPS, Quick Response Code (QR Code), RFID, and general packet radio services (GPRS) - are important tools for ULBs to manage MSW.

Daily reports on critical aspects of the MSW need to be compiled in order to take stock of situation and take corrective measures as may be required, such as: (i) number of sanitary workers, drivers and supervisors on duty and substitute arrangement for those off duty; (ii) vehicles and equipment reported on duty and number of vehicles were off the road on account of breakdown, substitute arrangements made for replacement and repairs;(iii) quantity of waste transported, treated at the treatment or processing facilities and disposed off at landfill; etc.

Key Performance Improvements expected are:

- To manage routes of vehicles dynamically through an automated Vehicle Tracking System (VTS) system.
- Real time monitoring and prompt management of door to door waste collection
- Real time information of missed garbage collection points.
- Route optimization can be done which will help in reduction of trip time, fuel saving and serving more locations.
- To keep history of vehicle routes, attended sites and other details.
- Reporting of vehicles, garbage collected and other details to higher authorities from any location at any time through BI tools. Making waste collection within city seamless and more efficient (safer, less polluting, economical, better informed travel).
- Improved communication between operations staff and management resulting in coordinated and managed service environment
- Complaint redressal system

Such a system should be in place whether the C&T operations are done directly or through contract ULB shall consider a centralized monitoring system preferably engaging an agency to develop & operate the system.

8.6. Implementation Supervision

Given below are the various aspects for checks during implementation of ULB level projects including QA/QC and HSE. The ULBs shall undertake supervision of projects considering the following aspects.

- 1. Review of contract documents
- 2. Identification of extra items of work and cost implications
- 3. Review of and planning for necessary approvals
- 4. Review of drawings and query clearance
- 5. Review of project timelines and frequent tracking of project progress
- 6. Project cost vs budget comparisons
- 7. Design checks and strict compliance to approved drawings and design parameters. Any variation from the drawings (required as per site conditions) should be notified and approved prior to execution
- 8. Material tests and manufacture certificates to match required material specifications
- 9. Material reconciliations
- 10. Strict adherence to health, safety norms
- 11. Safety checks after installation of machineries
- 12. Adherence to procurement practices for sub-contracting of works
- 13. Engineering tests such as soil investigation, ground water investigations etc.
- 14. Maintain proper documentation and internal approvals
- 15. Preparation and submission of as-built drawings with QA/QC reports
- 16. Checks on monthly bills and its approval
- 17. Identification of delays and its notification
- 18. Project related data update on MIS

Specific aspects for implementation supervision for landfill, dumpsite remediation and dumpsite closure projects are discussed under Chapter 9.

Chapter 9. Operational Proceduresto UndertakeRegional SWMsub-projects

9.1. Guidelines for Planning Waste Shed Areas for Regional Projects

Background

It is mandatory for ULBs to set up sanitary landfill for safe disposal of residual municipal solid waste in accordance with Rule 15(w) of solid waste management Rules, 2016. Rule 22 (Schedule 1) envisages construction of individual or regional landfills for cities with over 5,00,000 population whereas construction of regional landfills for group of cities under 500000 population over a period 3 years. Under the current situation, the Municipal Secretaries of all small and large cities (not having suitable land for setting up sanitary landfill) need to take up this matter of facilitating construction of regional landfill expeditiously and implement the construction of sanitary landfill complying with the provisions of Schedule 1 of the Rules.

Rule 12 of SWM Rules 2016 mandates the District collectors to find suitable land for processing and disposal of waste and allot the same to local authorities, and directs the Secretary in-charge of Urban Development under Rule11 (j) to facilitate establishment of common regional sanitary landfill for a group of cities / towns falling within a distance of 50 km (or more) from the regional facility on a cost sharing basis and ensure professional management of such sanitary landfills.

Rule 22 has laid down the following timelines²⁹:

one year for identification of suitable land for setting up common regional sanitary landfill facilities for suitable clusters of local authorities under 0.5 million population as well as for common regional sanitary landfill facilities or standalone sanitary landfill facilities by all local authorities having a population of 0.5 million or more

3 years for setting up individual, common or regional sanitary landfills by all local bodies

The ULBs shall identify suitable parcel of land if available or collectively, the SM shall procure a suitable parcel of land for setting up a regional facility adopting the process described hereunder.

²⁹The timelines indicated are with reference to the year 2016 in the SWM rules. However, the project under component 3 provides for financing of landfills. The In addition, it also provides for Incentive grants for ULBs where they identify land for safe disposal of waste. This could include landfill cells in the interim.

9.2. Operational procedures for the regional disposal facilities subprojects

Under KSWMP, SM will ensure that the regional disposal facilities are planned and developed on DBOT basis. SM shall have the option of proposing such facilities over a medium term – Interim disposal facility (Concession Period of 5 to 7 years) or over the long term (Concession Period of 15 years) which shall be decided on a case to case basis depending upon the waste volume projections. The planning, design and implementation workflow for establishing a regional disposal facility shall be as follows:

Planning

- Identifying land parcels
- Establishing WSA
- Organizing Inter municipal agreements
- Financial arrangement for OPEX
- Implementation modality for development, O&M

<u>Design</u>

- Techno-commercial feasibility
- Preliminary engineering designs
- ESIA/ESMP/RAP
 Preparaton
- Adherence to MSW rules 2016 & ESMF-TDF-RPF

Implementation

- Final engineering design and procurement
- Landfill construction to be climate smart and disaster resilient
- ESMP-TDP-RAP implementation monitoring

Figure 9-1: Planning, design and implementation workflow for establishing a regional disposal facility

The step by step guidance for each of the above-mentioned activities are as follows:

Activity 1: Planning

Stage 1: Identifying large parcel of land for regional landfills

Under the provisions of MSWM rules 2016, the land for a regional MSW project can be procured through any of the following mechanisms:

- Land owned by the State Government and allotted as per MSW Rules 2016 or provided by one of the authorities participating in the regional MSW project
- acquired by one of the participating authorities and allocated by passing appropriate resolutions, without any state government assistance
- acquired by the state government and vested with a particular municipality or a group of municipalities provided by the private sector participation.

For the purpose of KSWMP, the encumbrance free land for such regional landfills shall be under the control of Government of Kerala. The following steps shall be followed to ensure procurement of land for regional landfills.

Table 9-1: Steps for	r procurement of	^c land for regio	nal landfills and	responsible	institutions
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Step No	Description of Step	Responsible Institution
1.	Identify the sites as per the site selection criteria mentioned in the SWM Rules	SPMU/SM
2.	Identification of potential search areas	SPMU/SM

Step	Description of Step	Responsible
No		Institution
3.	Develop a list of potential sites	SPMU/SM
4.	Data collection for the Potential sites	SPMU/SM
5.	Field visits for local verification of potential sites	SPMU/SM
6.	Selection of best ranked sites	SPMU/SM
7.	Preliminary Impact Screening	SPMU/SM
8.	Discussion with all stakeholders – public participation	SPMU/SM
9.	Public hearing	SPMU/SM
10.	Confirmation of the public acceptance of the site for	SPMU/SM
	SWM activities	
11.	Final Site selection	SPMU /SM
12.	Getting the clear title of the land and encroachment	ULB/SM
	free possession in favour of Government of Kerala	
13.	Payment of appropriate consideration or suitable	SM
	accommodation of the same in the DBOT agreement	
14.	Declaration of a suitable buffer zone – 500 m by Town	ULB/SM
	planning dept	

The above steps have been incorporated in Annexure A9.1.

Stage 2: Demarcation of Waste Shed Area (WSA) for setting up regional landfill

SM shall demarcate the WSA by encompassing land covered within 50 km radius of each land parcel made available for regional landfill through the abovementioned process. The WSA will cover the ULBs and other smaller local governments of the peri-urban areas (subject to the inclusion of such local bodies in project vide Participation Agreement) that come within the stated 50 km radius. For clusters beyond 50 km radius, the secondary transportation of inert waste /waste to be disposed needs to take into consideration appropriate satellite storage facilities to enable the logistical and financial viability of transportation of waste from farther cities. The planning for such regional disposal systems by SM shall include

- a) Maximum design capacity of the regional landfill facility, considering the land availability and design life of the facility.
- b) Projected population of cities and towns included in the cluster and municipal solid waste generation rates.
- c) Quantity of inert/waste to be disposed from each city (participating ULB)
- d) Hauling distances to the regional landfill facility
- e) Frequency of secondary trips.

If the land parcel available is less that the areas required to cover all ULBs and urbanised Panchayats falling in the 50 km radius, Suchitwa Mission shall limit the no of cities and towns to be served by a particular regional facility. The regional landfill facility may be designed to cater to the disposal requirements of the ULBs covered in the WSA for 20 -25 years for the ULBs.

Once the ULBs are identified for inclusion in WSA, SM will facilitate the modalities for managing the facility and prepare regional waste disposal agreement amongst the participating ULBs and other peri-urban LGs. SM will also establish the institutional and

financial mechanism for the development, operations and maintenance and cost-sharing modalities of regional disposal facility. The regional disposal agreement may be based on the model agreement as outlined in the Annexure to the document.

Stage 3: Detailed planning, design and development

For detailed planning, design and development of the regional landfill facility, SM will carry out the required feasibility assessment, preliminary engineering designs and Environmental and Social Impact Assessment (including management plans – ESMP, TDP, RAP as needed) for each of the regional SLFs. These studies will include:

- a) Identifying technical solutions based on necessary field investigations and test results together with the pros and cons of each solution,
- b) technical viability and financial sustainability assessment for the entire WSA and the planned regional waste disposal system,
- c) the institutional framework and implementation modality for the development, operation and management of the landfill facility,
- d) financial arrangements for capital investments and O&M expenses to ensure the sustainability and viability of the system
- e) regional coordination systems within the WSA for storage and secondary transportation of the residual waste to landfill facility.

The SM will simultaneously take the following actions to facilitate setting up Regional Landfill and ensure that these are adequately accommodated in the SWM Plan prepared by the ULBs. SM shall intervene to include other local bodies part of the peri urban areas of the ULBs to ensure optimal coverage of urban populace with due consideration to the steps mentioned in stages 2 and 3 above.

- 1. Direct /advise Municipal Secretaries to review the waste management system adopted in their ULBs as under and furnish the estimates of quantities of waste likely to go to regional landfill. Ascertain the current quantities of waste generated in each participating ULB and projected waste generation over 20-25 years, quantities of biodegradable waste treated at various stages and non-biodegradable waste segregated and passed on in value chain through informal recyclers and MCF/RRF or MRF and work out the estimated quantity of waste that may go to the Landfill. (Generally, 20% of the total waste generated in a ULB may come to landfills in the form of process rejects and inert material if ULBs have set up processing facilities and MRF as per Rules. Quantities of waste going to landfills are likely to increase if adequate treatment facilities and MRF are not provided for as part of the SWM plan. The project plan for this regional facility shall adequately consider such limitations).
- 2. Estimate the land requirement for RSLF for 20 25 years (consistently across planning and implementation).
- 3. Decide if the site is going to be utilized for both processing and landfill or only for landfill and accordingly determine the land requirement for the site.

4. Finalise the cluster of ULBs for inclusion in WSA for the RSLF, based on area of land parcel, quantity of waste, distance of transportation of waste, connectivity, natural conditions, and safety issues.

For viability of regional SLF, the WSA should include ULBs to collectively deliver minimum 100 TPD (ideally 200 TPD) waste to the RSLF.

- 5. Revisit the WSA and rearrange the ULBs contributing to the RSLF based on the area of the site identified and waste likely to be landfilled, (if required).
- 6. Finalise the waste disposal agreement with all the contributing ULBs for establishing institutional and financial arrangements on cost sharing basis and for opening of an escrow account.

Further the following activities will be taken up for construction and O&M of regional landfill:

Table 9-2: Description of activities for construction and O&M of regional landfill

Step No	Description of Step	Responsible Institution
1.	Prepare techno-commercial Feasibility report includes the planning, preliminary design, capex and opex along with ESIA and EMP	SPMU/SM/ supported by TSC
2.	Prepare the ESMP, RAP and TDP	SPMU/SM
3.	Preparation of the bid documents and approval of the same ³⁰	SPMU/SM
4.	Bid process management	SPMU/SM
5.	Appointment of the Contractor for RSLF construction and O & M	ULB (s)/SPMU/SM
6.	Prepare the Design and detailed drawings for RSLF	Contractor
7.	Construction supervision as per the quality control and quality assurance program (refer to CPHEEO Manual Book II page – 387-396)	PIU/DPMU
8.	Landfill O & M (refer to CPHEEO Manual Book II page – 397 - 412)	PIU/DPMU
9.	Landfill monitoring (refer to CPHEEO Manual Book II page – 412)	PIU/DPMU
10.	Landfill Closure and Post Closure (refer to CPHEEO Manual Book II page – 387-396)	PIU/DPMU

Flow chart for regional landfills is provided under Annexure A9.1.

³⁰ Refer Table 8-7 for indicative schedules for preparation of bid documents.

9.2.1. Guidelines for the Feasibility Study for Sanitary Landfill

Introduction

A feasibility report is used to determine the technoeconomic viability of a project which is legally, environmentally and technically feasible. Every Urban Local Body has the obligatory job of MSW collection, transportation, processing and disposal of the rejects in a scientifically engineered landfill so as to eliminate the pollution of the environment. The construction, operation and closure of the landfill may be done on Public-Private partnership (PPP) basis or EPC basis.

Legal & Regulatory Aspects

The Solid Waste Management Rules 2016 forms the legal basis for SWM and the National Manual on Solid Waste management - 2016 provides component wise norms, standards and guidelines for the preparation of engineering design of the landfill.

Chapter 4 of Manual on Solid Waste Management,2016 part II (page 349 to 423) addresses all technical aspects of Municipal sanitary landfills whereas annexure 7 in part III of the manual (page 103 to 108) provides a typical design of sanitary landfill. Municipal authorities shall refer to these provisions of the manual for detailed understanding on the subject.

Steps for Preparation of Feasibility Report

The points that need to be covered are enumerated in the chapter 7 of this Project Implementation Manual. For the purpose of understanding, list of steps are given below:

- 1. Review the applicable legislations, guidelines, policies, strategies in place at National and state level regarding Solid waste for disposal of waste.
- 2. Review the SWM plan with focus on relevant aspect of waste disposal to be considered in the feasibility report.
- 3. Review the data regarding city profile, waste generation and projections provided in the SWM plans of the ULBs in the cluster for assessing the waste to be landfill in the next 25 years
- 4. Prepare the clusters of WSA for the RSLF based on transportation of waste, natural conditions, land use pattern and safety issues. The WSA should have a minimum collection of about 100 TPD (ideally 200 TPD) waste presently to the RSLF
- 5. Estimate the land requirement for RSLF for 25 years.
- 6. Assess probable sanitary sites based on criteria given in Annexure no. A9.3:
 - a. Location criteria
 - b. Identification of potential search areas in consultation with the Town Planning Department
 - c. Development of a list of potential sites
 - d. Data collection for potential sites
 - e. Field visit for local verification and identification of potential sites
 - f. Selection of a few best-ranked sites

- g. Preliminary environmental impact investigation
- h. Final site selection
- 7. After the sites have been identified as to which will be taken for the feasibility stage, the following data will have to be collected from a site:
 - a. Clear land title in the name of government authority in charge of the project.
 - b. Map of the land parcel from municipal records

c.Suitable Buffer zone around the landfill.

- d. Hydrogeological report
- e. Soil Properties permeability etc.

f. Ground water should be 2m below the landfill base

- g. Contour survey shall be conducted
- h. Land Use Plans

i. Ground water analysis – 1 upstream & 2 downstream

j. Water sources in the periphery of 200 m

k. Flood Plain Maps

l. Aerial Photographs/ Satellite Imagery/ Google maps

- m. Rainfall Data
- n. Wind Map
- o. Seismic Data
- p. Road Maps
- q. Environmental and social check list
- r.Depth of the landfill dependent upon the hydrogeological report the height of the landfill should not be more than 20m above bund, the slopes must be stable (generally 1V:4H)
- s.Determination of waste coming to the RSLF based on the WSA
- t. Tentative design of facilities required for the RSLF compound wall, office building along with laboratory, Rest rooms, Access roads, Weighbridge, workshop and garage, monitoring wells, green belt shall be incorporated
- u. Calculation for leachate estimation and collection and treatment
- 8. Design sanitary landfill design based on standards and rules
- 9. Design life by estimation of volume and area requirement
- 10. Prepare sanitary Landfill layout depicting the following:
 - Access roads
 - Equipment shelters
 - Weighbridge
 - Office space

- Waste inspection
- Temporary waste storage and/or disposal sites for special wastes
- Demarcation of the sanitary landfill areas and areas for stockpiling cover material and liner material
- Drainage facilities
- Sanitary landfill gas management facilities
- Leachate treatment facilities
- Monitoring wells
- 11. Tentative technical design requirements
 - a. Base sealing system
 - b. Landfill phasing
 - c. Leachate management collection and treatment
- 12. Secondary/tertiary waste transportation plan
- 13. Cost estimates for all components of the project
- 14. Carry out an Environmental and Social Impact Assessment of the proposal to identify its environmental and social risks, impacts and benefits of the project as per ESMF for KSWMP
- 15. Conclude on the feasibility of the project

While concluding on the feasibility, the limiting of the life of the landfill in line with the land availability and waste volume estimates shall be documented to arrive at the proposed life of the landfill which shall be between 20 and 25 years.

9.2.2. Guidelines for Preparing Detailed Engineering Design

A) Regional Sanitary Landfill

The detailed engineering of the landfill and the closure must be in line with the SWM Rules 2016 and the CPHEEO manual. The following points have been listed below as a checklist while preparing detailed engineering design for a regional Sanitary landfill. This shall apply to both PPP and EPC projects:

- 1. Clear land title in the name of government authority in charge of the project.
- 2. Suitable Buffer zone around the landfill.
- 3. Hydrogeological report
- 4. Soil Properties permeability etc.
- 5. Ground water should be 2m below the landfill base
- 6. Contour survey shall be conducted
- 7. Depth of the landfill dependent upon the hydrogeological report the height of the landfill should not be more than 20m above bund, the slopes must be stable (generally 1V:4H)
- 8. Determination of waste coming to the RSLF based on the WSA

- 9. Design of facilities required for the RSLF compound wall, office building along with laboratory, Rest rooms, Access roads, Weighbridge, workshop and garage, monitoring wells, green belt shall be incorporated
- 10. Gas collection and flaring facility shall be provided for
- 11. Storm water and hydraulic design of the Storm water gutters shall be considered
- 12. Slope stability for bund and waste is imperative
- 13. Slopes used for leachate collection shall be accommodated
- 14. Calculation for leachate estimation and collection and treatment shall be made
- 15. Structural design of all civil structures shall be included
- 16. Use of Geosynthetic material (GCL, HDPE liner, Geotextile, Geonet, HDPE pipes) shall be as per the standards mentioned in the tender document and is from the approved list of manufacturers.
- B) Closure of dumpsite/ Landfill

The following points need to be considered/undertaken during detailed engineering design for a closure of dumpsite /landfill:

- 1. Conduct Contour survey of the waste
- 2. Estimate the quantity of waste at site to be closed/capped.
- 3. Estimate the quantity of waste to be shifted
- 4. Assess compacted waste density
- 5. Assess ad provide for Slope stability of waste and closure system
- 6. Provide for storm water and hydraulic design of the storm water gutters
- 7. Calculation for leachate estimation and plan for collection and treatment
- 8. Gas collection and flaring
- 9. Structural design of all civil structures
- 10. Use of geosynthetic material (GCL, HDPE liner, Geotextile, Geonet, HDPE pipes) to be as per the standards mentioned in the tender and selected from the approved list of manufacturers.

9.3. Operational Procedures for Dumpsite Remediation Subprojects

Within the identified WSAs, all the existing dumpsites may be identified and screened based on the rapid risk assessment criteria which comprise of set of basic technical, environment and social criteria, as detailed out in the at Annexure A.9.2 and Annexure A.9.3 in Volume 3. The selection of the dumpsite remediation will also be contingent on the access to a waste disposal facility for the rejects from the dumpsite– which can either be a disposal cell in the existing dumpsite or a regional sanitary landfill. The SM /SPMU/DPMU may follow the guidelines for assessing the dump sites to determine

Planning	Design	Implementation
 Shortlist of the existing dumpsites in the WSA Rapid risk assessment based on technical, environmental and social criteria Technical investigations, tests and field surveys 	 Selection of dumpsite remediation option Feasibility assessment Engineering Design Financial arrangement for OPEX ESIA/ESMP/RA/TDP preparation 	 Procurement of contractor Site preparation work ESMP/RAP/TDP implementation monitoring

Figure 9-2: Guidelines for assessing the dump sites

whether the dumpsite remediation can be financed under KSWMP Project.

9.3.1. Guidelines to be followed by Suchitwa Mission /SPMU /DPMU for Dumpsite Remediation:

The remediation of dumpsites shall be executed at 2 levels – at the city level and the regional level. The guidelines for remediation are given below and Annexure A9.4 to this report provides the flowchart for city level and regional level dumpsite remediation project respectively.

Step	Description of step	Responsible Institution
no.		
1.	Make a list of all the dumpsites in the ULB/Cluster	ULB/DPMU
2.	Carry out assessment of the dump sites as per the	ULB/DPMU
	format enclosed in at Annexure A9.2 in Volume 3	
3.	Undertake rapid risk assessment based on technical,	ULB/DPMU
	environmental and social criteria may be done based	
	on the dumpsite data collected as per the format in	
	Annexure A9.3 in Volume 3. This will guide the	
	authority to take a proper decision as to which sites	
	can be taken for further investigation	
4.	Carry out field visits to all dumpsites for local	ULB/DPMU
	verification	
5.	Undertake detailed investigation and field surveys of	ULB/DPMU
	dumpsites (found suitable given below)	
6.	If option of dumpsite remediation is considered	DPMU/SPMU
	feasible - go for dumpsite remediation. If it is not	
	found suitable, decide to go for capping (refer to	
	Flow chart D)	
7.	Undertake Feasibility studies of the dumpsite	ULB/DPMU
8.	Prepare the DPR for each dumpsite which includes	DPMU/ SPMU/SM/
	the planning, estimation of waste and operation cost	consultant

Step	Description of step	Responsible Institution
no.		
9.	Carry out the ESIA	SPMU/SM ³¹
10.	Prepare the ESMP, RAP and TDP	SPMU/SM
11.	Preparation of the bid documents and approval of the	SPMU/SM
	same ³²	
12.	Bid management process	SPMU/SM
13.	Appointment of the Contractor for dumpsite	ULB/SPMU/SM
	remediation	
14.	Supervision and monitoring during dumpsite	PIU/DPMU
	remediation	

9.3.1.1. Guidelines for Detailed Technical Investigations

The detailed dumpsite investigation should be performed according to the guidelines. The minimum investigations to be carried out for each dump site are given below:

(Please note that the minimum quantity is listed. Based on the area of the site corresponding samples should be taken)

No.	Description	Qty	Unit
1	Boreholes up to 10m depth (1No./2 Hectare) (as per CPHEEO	3	No.
	Manual)		
2	Permeability test-1No./2 hectares (as per CPHEEO Manual)	9	No.
	standard penetration test SPT and collection of undisturbed		
	samples - Soil Investigation - Classification, gradation,		
	Atterberg's limit, Bulk density, dry density, water content,		
	cohesion, angle of internal friction, Proctor density, Optimum		
	moisture content, coefficient of permeability, strength,		
	compressibility (vertically-3 samples per borehole)		
3	Hydrogeological survey - ground water flow direction,	1	No.
	gradient, bedrock profile, surface water & drainage, Aquifer		
	attributes - depth, range, Average yield, transmissivity, storage		
	coefficient. Geological report- Profile, rock depth, slope,		
	subsidence		
4	Contour survey - by Total Station method or drone method of		Acres
	the full site.		
5	Well Water Samples -1 up gradient, 2 down gradient	3	No.
6	Surface Water Samples	2	No.
7	Leachate Analysis	2	No.
8	Physical Analysis of waste (as per the CPHEEO manual)	5	No.
9	Chemical Analysis of waste/soil for heavy metals	5	No.
		1	1

Reference - Point No. 5,6, 7 and 9 must be as per IS 10500:2012

³¹the activity will be actually done by specialist consultants appointed for the task. However, the responsibility rests with SM.

³² Refer Table 8-7 for indicative schedules for preparation of bid documents.

The detailed investigations of these sites will help prepare the Detailed Project Report for the for bioremediation and biomining activities taken up at the various sites. This work will have to be done in view of the environmental and social considerations as well as SWM Rules 2016, National Manual on SWM and CPCB Guidelines issued from time-to-time. The entire process should be properly documented with photographs and relevant information and submitted for taking appropriate decisions/approvals.

9.3.1.2. Feasibility Studies for Dumpsite Remediation Projects

Following are the minimum inclusions/contents for feasibility study on dumpsite remediation

- 1. Name of the Project:
- 2. Name of the ULB, District, State:
- 3. Brief description of city indicating population, Area, No. of Wards etc.
- 4. Scope of the project
- 5. Testing of the waste at site as mentioned in 9.3.1.1 above to determine the concentration of heavy metals in the soil fraction.
- 6. Supply and installation of necessary machines, equipment, excavating, stabilising (windrows), screening and segregation into different classes and sizes (C & D waste, RDF, Bio-soils and others)
- 7. Detailed description of dumpsite like location, age, area, height, quantity etc. All data to be collected and attached.
- 8. Map showing description of boundaries of the dumpsite all around, such as roads, localities, rivers/canals, hills, nearest habitation along with longitude and latitude.
- 9. Scope of disposal for RDF, bio soils, C & D waste and others as per local demands
- 10. Environmental and Social Impact Assessment of the proposal to identify its environmental and social risks, impacts and benefits of the project as per ESMF for KSWMP.
- 11. Estimated cost
- 12. Estimated duration of the project
- 13. Benefits of the project like area to be reclaimed, estimated value and intended use.
- 14. Source of funds
- 15. List of anticipated hindrances in project implementation and measures for solutions
- 16. Check if the land reclaimed can be used for future operations like landfill, waste treatment etc. The same should be checked as per the site selection criteria for the intended use

9.3.2. Reshaping and Capping of Existing Dumpsite

The capping of an existing dumpsite shall be undertaken only when the option of bioremediation and biomining is ruled out after evaluation. The main aim is to cap/close the dumpsite to reduce the possible environmental impacts on population and the environment. By capping the dumpsite, all the problems related to littering, odour, fires, flies and rodents and formation of fresh leachate are expected to be taken care off. But the land once capped cannot be used for SWM activities. The capped site can be best used as a park for recreation. There has to be continuous monitoring of the closure system for 15 years for the integrity of the closure system, settlement and gas released from the waste.

The thrust is to bio mine the dumpsite and reduce the waste footprint to a minimum and make some land available for SWM activities.

In this process, the waste is cut and transported to form a shape as per the design suggested based on a specific study conducted for this purpose. The waste shall be compacted to get a minimum density of 0.85 T/m3. The compaction is done in layers of 1m height. Compaction test is to be carried out at regular intervals. The slope of the final closure must be stable. The slope must ideally be 1V:4H slope. The maximum allowed may be 1V:3H after proper design check for stability. If the height is more, benches may be provided at every 5m vertical height. The benches help to increase the stability. Once the shape has been attained as per the design, all the geosynthetic materials will be laid to complete the closure as per the norms given in SWM Rules, 2016.

Steps to carry-out closure/ capping of dumpsite:

The closure/ capping of dumpsites will be executed at 2 levels – at the city level and the regional level. Annexure A9.5presents the flowcharts for the city level and regional closure/capping of dumpsites projects respectively.

Step No	Description of step	Responsible Institution
1.	Carry out assessment of the dump sites as per the	ULB/DPMU
	format enclosed in at Annexure A.9.1 in Volume 3	
2.	Undertake rapid risk assessment based on	ULB/DPMU
	technical, environmental and social criteria based	
	on the dumpsite data collected as per the format	
	in the at Annexure A.9.2 in Volume 3. This will	
	guide the ULB's to take a proper decision as to	
	which sites can be taken for further investigation	
3.	Undertake field visits to all dumpsites for local	ULB/DPMU
	verification	
4.	Detailed investigation and field surveys should be	ULB/DPMU
	undertaken for suitable dumpsites (given below)	
5.	If selection of dumpsite remediation option is not	DPMU/SPMU
	found feasible, capping. Option may be preferred.	
	If found feasible, bioremediation of dumpsite may	
	be undertaken	
6.	Undertake feasibility studies of the closure system	ULB/DPMU
7.	Prepare the closure DPR for dumpsite which	SPMU/SM/ consultant
	includes the planning, preliminary design, cost	
	estimation and operation & maintenance cost	
8.	Carry out the ESIA	SPMU/SM ³³
9.	Prepare the ESMP, RAP and TDP	SPMU/SM
10.	Preparation of the bid documents and approval of	SPMU/SM
	the same ³⁴	
11.	Bid management process	SPMU/SM
12.	Finalise the closure system agreement for	SPMU/SM
	institutional and financial arrangements on cost	

³³the activity will be actually done by specialist consultants appointed for the task. However, the responsibility rests with SM.

³⁴ Refer Table 8-7 for indicative schedules for preparation of bid documents.

Step No	Description of step	Responsible Institution
	basis, through an escrow account	
13.	Appointment of the contractor for closure system	DPMU/SPMU
14.	Supervision and monitoring during closure	PIU/DPMU
	system	

9.4. Operational Procedures for Regional Waste Treatment Facilities

The Guidance Note of MoUD - Municipal Solid Waste Management on a Regional Basisprovides guidance and direction in planning, development, implementation and management of regional MSW projects. GoK has incorporated regional treatment facility especially for WtE & Bio-CNG in the Waste Management policy & strategy considering that planning, implementation & operation of such projects at municipal level may not be feasible due to 1) scarcity of suitable land,2) lack of expertise and 3) economies of scale aspects

Operational procedures for developing regional facilities such as Bio-methanation to power, Bio-CNG, plastic to granules, plastic. leather , rubber etc. to blocks/tiles , non-recyclable combustibles to RDF through private entrepreneurs is briefly presented in this section.

Based on the options envisaged in the SWM Plan, ULBs/PIUs shall initiate setting up regional treatment facilities. A group of such ULBs together with SM shall initiate the same.

Operational procedures for the regional facilities subprojects

Under KSWMP, SM will ensure that the regional treatment facilities are planned and developed on DBOT basis. SM shall have the option of proposing such facilities over a medium term (Concession Period of 15 to 20 years) which shall be decided on a case to case basis depending upon the waste volume projections. The planning, design and implementation workflow for establishing a regional facility shall be as follows:

Planning	Techno commecrial feasibility	Implementation
 Identifying land parcels Establish WSA Organize inter ULB agreement Financial arrangement for capex & opex Implementation modality for development , O&M 	 Techno commecrial feasibility Preliminary Engg designs ESA/ESMP/RAP preparation Adherence to MSW Rules 2016& ESMF,TDF,RPF 	 Final Enginnering design Construction Implemetation & Monitoring

Figure 9-3: Planning, designing and implementation workflow for establishing a regional facility

Stage 1: Identifying large parcel of land for regional treatment facilities

The land for a regional MSW project can be procured through any of the following mechanisms:

- land owned by one of the ULBs currently used a SWM facility /proposed for such use
- land owned by GoK /Industries Dept currently earmarked for industrial park etc.have to exclude parks for food and pharmaceutical manufacturing.
- land owned by State Govt, which are part of STP sites
- acquired by the state government and vested with a particular municipality or a group of municipalities provided by the private sector participation.
- Land owned by the State Government and allotted as per MSW Rules 2016 or provided by one of the authorities participating in the regional MSW project.

Priority must be given to sites existing sites as well as those are in industrial parks where there is demand for power, fuel produced from waste . The Treatment facility may also be located along with regional landfill facility.

In cases where the location of the facility is beyond 15 or 20 kms, the ULBs shall identify land for transfer stations considering logistical efficiencies and financial viability considerations. Preferred option will be direct transport – a larger capacity vehicle may be used to collect from a number small ULBs.

For the purpose of KSWMP, the encumbrance free land shall be under the control of Government of Kerala. The following steps shall be followed to ensure procurement of land for regional landfills.

Step No	Description of Step	Responsible Institution
1.	Identify the sites as per the site selection criteria	SPMU/SM
	mentioned in the SWM Rules-2016	
2.	Identification of potential search areas	SPMU/SM
3.	Develop a list of potential sites	SPMU/SM
4.	Data collection for the Potential sites	SPMU/SM
5.	Field visits for local verification of potential sites	SPMU/SM
6.	Selection of best ranked sites	SPMU/SM
7.	Preliminary Environmental impact investigation	SPMU/SM
8.	Discussion with all stakeholders – public participation	SPMU/SM
9.	Public hearing	SPMU/SM
10.	Confirmation of the public acceptance of the site for	SPMU/SM
	SWM activities	
11.	Feasibility and ESIA based on the broad technology to	SPMU/SM ³⁵
	be adopted	
12.	Final Site selection	SPMU /SM
13.	Getting the clear title of the land and encroachment	ULB/SM
	free possession in favour of Government of Kerala	
14.	Payment of appropriate consideration or suitable	SM
	accommodation of the same in the DBOT agreement	
15.	Declaration of a suitable buffer zone by KSPCB	ULB/SM
16.	Contractor updates ESMP based on his final design	Contractor

Table 9-3: Steps for procurement of land for regional landfills and responsible institution

³⁵An agency may be appointed to carry out the study

Step No	Description of Step	Responsible Institution
	after award of work	

SM shall incorporate the recommendations/modifications in the Project Document suggested by WB including the components in Environmental & Social safeguards

Stage 2: Demarcation of the cluster for setting up regional treatment facilities

SM shall demarcate the cluster by encompassing land covered within 25-30 km radius of each land parcel made available for regional facility through the abovementioned process. If possible, the site may be located close to the ULBs generating larger quantity. Since the transportation of organic waste has to be done daily from all participating municipalities, the hauling distance may be kept minimum. The cluster will cover the ULBs and other smaller local governments of the peri-urban areas (subject to the inclusion of such local bodies in project vide Participation Agreement) that come within the stated cluster radius. The planning for such regional systems by SM shall include:

- f) Current and projected Population of ULBs included
- g) Municipal solid waste generation rates current & projected and the estimated organic and dry fraction to be treated/processed
- h) The proposed treatment of organic fraction & dry fraction and the area required
- i) Hauling distance

If the land parcel available is less that the areas required to cover all ULBs and urbanised Panchayats falling in the cluster radius, Suchitwa mission shall limit the number of cities and towns to be served by a particular regional /cluster facility. The facility may be designed to cater to the requirements of the ULBs covered in the cluster for 20 -25 years This planning period of 20-25 years shall be independent of the DBOT project period which shall be determined as per the guidelines provided in the following sub-section presented as Stage 3 titled Detailed Planning, Design and Development.

Once the ULBs are identified for inclusion in the cluster, SM will facilitate the modalities for managing the facility and prepare agreement with the participating ULBs and other periurban LGs. SM will also establish the institutional and financial mechanism for the development, operations and maintenance and cost-sharing modalities of regional facility.

Stage 3: Detailed planning, design and development

For detailed planning, design and development of the facility, SM will carry out the required feasibility assessment, preliminary engineering designs and Environmental and Social Impact Assessment (including management plans – ESMP, TDP, RAP as needed) for each of the regional SLFs. These studies will include:

- a) Identifying technical solutions based on necessary field investigations and test results together with the pros and cons of each solution,
- b) technical viability and financial sustainability assessment for the entire WSA and the planned regional system,

- c) the institutional framework and implementation modality for the development, operation and management of the facility,
- d) financial arrangements for capital investments and O&M expenses to ensure the sustainability and viability of the system
- e) regional coordination systems within the WSA for secondary storage , transfer station if required and transportation of the organic and dry waste

The SM will simultaneously take the following actions to facilitate setting up Regional facility. SM shall intervene to include other local bodies part of the peri urban areas of the ULBs to ensure optimal coverage of urban populace with due consideration to the steps mentioned in stages 2 and 3 above. The actions mentioned below for the ULBs are reflective of the requirements under the SWM plan of the ULBs.

- 1. Each ULB shall basis the long term projections of waste volumes likely to go to the regional facility shall project waste generation over 20-25 years. This shall include quantities of biodegradable waste treated at various stages and non-biodegradable waste segregated and passed on in value chain through informal recyclers and MCF/RRF or MRF and work out the estimated quantity of waste that may go to the facility. Generally, 80% of the total waste generated in a ULB may require treatment. If 20% gets treated/processed locally, the remaining quantity has to be transported to Regional facility Annual increase have to be considered.
- 2. Each ULB shall estimate the land requirement for treatment facility for 20 25 years (consistently across planning and implementation).
- 3. SM shall decide if the site is going to be utilized for both processing and landfill or only for processing and accordingly determine the land requirement for the site.
- 4. SM and ULBs shall finalise the cluster of ULBs for inclusion in waste shed area (WSA), based on area of land parcel, quantity of waste, distance of transportation of waste, connectivity ,natural conditions, and safety issues.
- 5. SM shall Revisit the WSA and rearrange the ULBs contributing to the regional facility based on the area of the site identified
- 6. Finalize the facility agreement with all the contributing ULBs for establishing institutional and financial arrangements on cost sharing basis and for opening of an escrow account.

Step No	Description of Step	Responsible Institution
1.	Prepare techno-commercial Feasibility report	SPMU/SM/ supported by PMC
	which includes the planning, preliminary design,	
	capex and opex	
2.	Carry out the ESIA	SPMU/SM ³⁶
3.	Prepare the ESMP, RAP and TDP	SPMU/SM
4.	Preparation of the bid documents and approval of	ULBs/SPMU/SM
	the same ³⁷	
5.	Bid process management	SPMU/SM

Further the following activities will be taken up for construction and O&M of regional facility:

³⁶the activity will be actually done by specialist consultants appointed for the task. However, the responsibility rests with SM/SPMU

³⁷ Refer Table 8-7 for indicative schedules for preparation of bid documents.

Step No	Description of Step	Responsible Institution
6.	Appointment of the Contractor for Design,	ULB (s)/SPMU/SM
	construction and 0 & M including transportation	
	from transfer station ³⁸	
7.	Prepare the DPR	Contractor
8.	Construction supervision as per the quality control	PIU/ULBs/DPMU
	and quality assurance program	
9.	0 & M	PIU/DPMU
10.	Facility monitoring	PIU/DPMU

9.5. Operational Procedures for Biomedical Waste Management Facility

As in the earlier procedural guidelines for dumpsite remediation, regional waste treatment facilities etc. the operational steps for setting up biomedical waste treatment facility are also categorised into three: planning, design and implementation.



Figure 9-4: operational steps for setting up biomedical waste treatment facility

The operational procedures for setting up CBWTF are described below. The detailed flow chart for the same is provided as Annexure A9.6.

Table 9-4:	Operational	procedures	for setting	up CBWTF
		P	,	

Step No.	Description of step	Responsible institution
1.	Enumeration of HCFs, bed strength, quantum and type of waste generation etc.	SPMU/SPMC
2.	Formation of state level committees for ESIA parameters, technological, financial and monitoring parameters	SPMU/SPMC
3.	Land acquisition and transfer of land to implementation agency	SPMU/SPMC
4.	EIA and public hearing	SPMU/SPMC
5.	Land development, application for KSPCB consent to establish, arranging water supply/ borewell, electric supply/ transformer, fencing/ security	SPMU/SPMC
6.	Preparation of DPR, plan diagram, capacity, placement of equipment and integration	SPMU/SPMC
7.	Preparation of tender documents for procurement of consultants, technologies and contractor	SPMU/SPMC
8.	Set up committees for selection process after appropriate	SPMU/SPMC

³⁸ For the ULBs requiring transfer station facility

Step	Description of step	Responsible
No.		institution
	approval from WB	
9.	Floating of tender, evaluation	SPMU/SPMC
10.	Finalisation of consultants and contractors	DPMU/DPMC
11.	Preparation of action plan	Technical
		Consultants
12.	Implementation & documentation of technical, engineering,	Technical
	financial and administrative components of the project	Consultants
13.	IEC activities	ULB/GP
14.	Establish collection and transportation infrastructure	ULB/GP
15.	Fixation of user fee, guidelines, penalization, etc.	ULB/GP
16.	Application to State Pollution Control Board (SPCB) for operation	ULB/GP
	of plant	
17.	Inauguration and operation of CBWTF	ULB/GP

9.6. Operational Procedures For Regional C&D Waste Management

Background

As per Rule 6(9) of C& D waste Management Rules 2016, ULBs shall device appropriate measures for management of construction and demolition waste generated including processing facility and for using the recycled products in the best possible manner. Rule 9(2) and schedule 1 of the said Rules mandate State Govt. to provide suitable land to local authority for setting up of the storage, processing and recycling facilities for construction and demolition waste. Guidelines on environmental management of C&D wastes ,CPCB -2017 provides detailed guidelines on setting up C&D facility

A facility requires not less than 200 - 300 tpd of waste /day for an economically viable operation. Estimation of land requirement shall cover the area for storage of incoming waste, primary& secondary screening, crushing, washing, dust removal, finished product storage green belt, buffer etc. The processing area shall be large enough to last for 20-25 years. An indicative area required may be taken as 1.00 hectare for 200- 300 tpd. As the ULBs in Kerala are small and medium sized where even the large ULBs producing less than 50 tpd , individual facilities may not be feasible and hence cluster facility should be considered.

9.6.1. Operational procedures for the regional facilities subprojects

The ULBs & SM shall decide on the best suited business and operation model for collection, transportation and processing of C&D waste keeping in view of the Capex and O&M. PPP model [DFBOT (Design Finance Build Operate transfer)] is best suited for the management of the C&D waste. SM shall have the option of proposing such facilities for a reasonable Concession Period of not less than 15-20 years. The planning, design and implementation workflow for establishing a regional facility shall be as follows:

Stage 1: Identifying land for Regional C&D Processing facilities

The land for a regional C&D waste processing project can be procured through any of the following mechanisms:

- land owned by one of the ULBs currently used a SWM facility /proposed for such use
- land owned /acquired by the state government
- Land in industrial parks /clusters

The site may be located close to the regional landfill facility so that a part of C&D waste before or after processing can be used for landfill operations. If the location of the facility requires transportation of more than 15-20 kms, the ULBs/SM shall identify land for transfer stations only if it is absolutely necessary and considering logistical efficiencies and financial viability considerations. Preferred option will be to transport directly from the ULB level collection point without transfer stations.

For the purpose of KSWMP, the encumbrance free land shall be under the control of Government of Kerala. The following steps shall be followed to ensure procurement of land for regional facilitates

Step No	Description of Step	Responsible
		Institution
1.	Identify the sites as per the site selection criteria	SPMU/SM
	mentioned in the C&D Waste Management Rules,	
	National SWM Manual section 3.7.6.2 /Guidelines of	
	State Pollution control board	
2.	Identification of potential search areas	SPMU/SM
3.	Develop a list of potential sites	SPMU/SM
4.	Data collection for the Potential sites	SPMU/SM
5.	Field visits for local verification of potential sites	SPMU/SM
6.	Selection of best ranked sites	SPMU/SM
7.	Preliminary Environmental impact investigation	SPMU/SM
8.	Discussion with all stakeholders – public participation	SPMU/SM
9.	Public hearing	SPMU/SM
10.	Confirmation of the public acceptance of the site for	SPMU/SM
	SWM activities	
11.	Feasibility and ESIA based on the broad technology to be	SPMU/SM
	adopted (ref : Guidelines on environmental management	
	of C&D wastes ,CPCB -2017	
12.	Final Site selection	SPMU /SM
13.	Getting the clear title of the land and encroachment free	ULB/SM
	possession in favour of Government of Kerala	
14.	Payment of appropriate consideration or suitable	SM
	accommodation of the same in the DBOT agreement	
15.	Declaration of a suitable buffer zone as stipulated in	ULB/SM
	C&D waste Management Rules -2016 ³⁹	
16.	Contractor updates ESMP based on his final design after	Contractor
	award of work	

Stage 2: Demarcation of Cluster for setting up regional treatment facilities

SM shall demarcate the cluster by encompassing ULBs covered preferably within 30-50 km radius of each land parcel made available for regional facility through the above mentioned process. The WSA will cover the ULBs and other smaller local governments of the peri-urban areas (subject to the inclusion of such local bodies in project vide Participation Agreement) that come within the stated 30-50 km radius. The planning for such regional systems shall include

³⁹¹A buffer zone of no development shall be maintained around solid waste processing and disposal facility, exceeding 20 tons or more in one day or 300 tons per project in a month of installed capacity. This will be maintained within the total area of the C & D waste processing. *The buffer zone shall be prescribed on case to case basis by the local authority in consultation with concerned State Pollution Control Board*.

¹A 'buffer zone of no development' shall be maintained–20 m for handling less than 500 TPD of C&D waste and 30 m for 500 TPD or more (Refer section 3.7.6.2 of National CWM Manual 2016).

- a) C&D solid waste generation rates current & projected
- b) The proposed processing system & the area required
- c) transfer stations

Stage 3: Detailed planning, design and development

For detailed planning, design and development of the regional facility, SM will carry out the required feasibility assessment, preliminary engineering designs covering:

- a) technical viability and financial sustainability assessment for the entire WSA and the planned regional system,
- b) the institutional framework and implementation modality for the development, operation and management of the facility,
- c) financial arrangements for capital investments and O&M expenses to ensure the sustainability and viability of the system
- d) regional coordination systems within the cluster for ULB level temporary storage , transfer station , and transportation of the C& D waste

Environmental and Social Impact Assessment (including management plans – ESMP, TDP, RAP as needed) for each of the regional facility will be carried out through an expert agency. The SM will simultaneously take the following actions to facilitate setting up Regional Facility. SM shall intervene to include other ULBs in the peri urban areas to ensure optimal coverage and for getting waste quantities reasonable enough for a viable facility. The actions mentioned below for the ULBs are reflective of the requirements under the SWM plan of the ULBs.

- 1. Each ULB shall on the basis the growth potential of the city shall project the of waste volumes likely to go to the regional facility in next 20-25 years.
- 2. SM and ULBs shall finalize the cluster of ULBs for inclusion in WSA, based on area of land parcel, quantity of waste, distance of transportation of waste, connectivity, natural conditions, and safety issues.
- 3. Finalize the facility agreement with all the contributing ULBs for establishing institutional and financial arrangements on cost sharing basis and for opening of an escrow account.

Further the following activities will be taken up for construction and O&M of regional facility.

Step	Description of Step	Responsible Institution
No		
1.	Prepare techno-commercial Feasibility report –	DPMU /TSC
	technology for /processing ,indicative capital,	
	operating costs ,cost recovery (collection of user	
	charges), market potential of end products	
2.	Carry out the ESIA Prepare the ESMP, RAP and TDP	Expert Agency appointed by
		SM

Step	Description of Step	Responsible Institution
No		
3.	Preparation of the bid documents and approval of	ULBs/SPMU/SM
	the same ⁴⁰	
4.	Bid process management	SPMU/SM
5.	Appointment of the Contractor for Design,	ULB (s)/SPMU/SM
	construction and O&M including transportation	
	from transfer station	
6.	Prepare the DPR for which includes the planning,	DBOT/DFBOT Contractor
	Technology description, detailed design, Capex,	
	Opex,revenue analysis, ESMP .	
7.	Construction supervision as per the quality control	PIU/ULBs/DPMU
	and quality assurance program	
8.	0 & M as per National Manual 2016 & C&D waste	PIU/DPMU
	Management Rules -2016, Guidelines on	
	environmental management of C&D wastes CPCB -	
	2017	
9.	Facility monitoring	PIU/DPMU

SM shall incorporate the recommendations/modifications in the Project Document suggested by WB including the components in Environmental & Social Safeguards

The ULBs shall simultaneously take steps to build cost recovery aspects in C&D waste management by :

- Framing by-laws on C&D waste management incorporating appropriate levels of fees and penalties for generators
- Developing construction/demolition permits consolidated into an easily accessible inventory and linking them with project approvals
- Adopting preferential procurement policy to use recycled products made from C&D waste in municipal civil works and encourages other private and public entities to do the same.

9.7. Procurement of Goods, Works and Non-Consultancy Services – Component 3

As mentioned in section 3.2.4 of chapter 3, the SPMU will be responsible to undertake component-3 project procurement activities with the support of state level PMC and DPMU as per the applicable procurement guidelines.

The mapping of technical documents, procurement option and the relevant procurement modality that shall be employed for projects proposed under component 3 is presented below.

⁴⁰ Refer Table 8-7 for indicative schedules for preparation of bid documents.

List of Component – 3 projects as per section 3.7 of chapter 3	Preparation of Technical Documents	Nature of Procurement option	Project Procurement Modality
 All Regional Interventions: Regional Processing Facility Regional - Recycling and Transfer Stations Regional Dumpsite closure and remediation and development of incremental disposal cells as interim Creation of regional sanitary landfill facilities Regional - C&D waste treatment facilities Regional - Biomedical waste treatment facilities 	Feasibility Report	Request for Proposal	DBOT

Table 9-5: Mapping of technical documents, procurement option and the relevant procurement modality

Request for Proposal (RFP) method: An RFP method shall be used to procure customized goods and solutions from the prospective bidders through multi-stage bid process.

Step-by-Step guidance on preparation of bid documents and tendering process:

As per section 12.3.1 of chapter 12, the SPMU shall undertake the following activities for the procurement of goods, works and non-consultancy services as per the applicable procurement process laid down in the World Bank Procurement Guidelines.

- 1.Preparation of Expression of Interest (EoI): The SPMU shall prepare an EoI document consisting of ToR, tentative timeline of the bidding schedule and minimum qualifications required for participation in the tender. The ToR details out the scope of work, tasks to be performed, time schedule for completion of tasks, list of key professional staff required to undertake the assignment and duration of the contract.
- 2.Seeking Bank's no-objection for ESMF requirement: The SPMU shall ensure appropriate environmental and social safeguards by seeking necessary no-objections in accordance with the Bank's ESMF requirements.
- 3.Approval of Bid documents: The Project Director of SPMU shall provide an approval on the tender documents subject to World Bank procurement guidelines.
- 4.Launching of EoI: The SPMU shall publish the EoI in e-tender portal, official website and national daily newspaper to invite participation from potential bidders.
- 5.Shortlisting of bidders: The SPMU shall prepare shortlisting of bidders in response to EoI and invite the shortlisted bidders to participate in the RFP stage.
- 6.Preparation of RFP document: The SPMU shall prepare an RFP document indicating the instruction to bidders, bid data sheet, scope of work, EMPs and other E&S requirements, mandatory technical & performance specifications, minimum qualification criteria, method of evaluation, payment terms, tentative timeline of the bidding schedule and concession agreement including provisions to mitigate ESHS risk as necessary.

- 7.Issuing of RFP: The SPMU shall issue RFP to the shortlisted bidders for participation in bidding stage. The RFP will contain approved EMPs and other E&S requirements in world bank procurement document format.
- 8.Pre-bid meeting and issuing corrigendum/addendums: The SPMU shall invite shortlisted bidders for participation in pre-bid meeting to understand the concerns and other key issues on the proposed scope of work. Based on discussion with the bidders during the pre-bid meeting, the SPMU shall prepare the minute of pre-bid meeting and publish response to pre-bid queries with the support of PMC. Further, the RFP documents may be revised by issuing corrigendum with the required amendments and the time period of bid submission may also be extended accordingly.
- 9. Receipt of bids and Evaluation of proposal: On receipt of the bids, the SPMU shall open and evaluate the technical proposals received from the bidders. The SPMU shall assess the proposals for completeness and eligibility of the bidders as per conditions specified in the RFP with the support of PMC. As per SWM Manual 2016 issued by CPHEEO, the following criteria may be considered for evaluation and final selection of potential bidders.
 - i. Relevant qualification and experience of the bidder
 - ii. Expertise of the bidding team
 - iii. Financial capability of the bidder
 - iv. Approach and methodology suggested
 - v. Reliability of the bidder (based on previous conduct)
 - vi. Proposed pricing structures and cost to the ULB-PIU
- vii. Environmental and social safeguards provided or ensured
- viii. Assumption of risk liability and proposed mitigation measures

The SPMU shall prepare the technical evaluation report in the bank prescribed format to identify the preferred and the second ranked technical bidder. On completion of technical evaluation, the financial proposals of all technically disqualified bidders shall be returned unopened. The financial proposals of technically qualified bidders will be opened at a designated date and time in presence of SPMU officials and representatives of bidders.

- 10. Selection of bidder: The SPMU shall select the most preferred bidder based on quality and cost evaluation. The bidders securing the highest marks will be given an award of work and invited for negotiations as per terms and conditions of the RFP document.
- 11. Negotiation: The Project Director of SPMU shall conduct a negotiation with the selected bidder on the ToR, methodology, timelines for completion, experts staffing and special conditions of contract. This negotiation will not alter the original ToR and terms & conditions of the contract.
- 12. Letter of Award and Signing of concession agreement: The Project Director of SPMU shall issue an LoA to the selected bidder. As per SWM Manual 2016, CPHEEO, the concession agreement is to be signed within 30 days of issue of LoA unless specifically extended on mutual consent for valid reason. The notice of contract award will be published in the official website.

13. Investment update in PPSD as per Chapter 12.4.2: The SPMU shall update the PPSD once the specific investments are identified for particular project with the support of PMC.

Bank clearance through STEP system:

The SPMU shall prepare and submit the procurement plan, bid documents including response to pre-bid queries and corrigendum to the Bank for review and obtain no-objection through STEP System with the support of PMC. Further, if there is any activity which could lead to change in the content of the bid document and so the contract to be signed with the bidders in the form of response to pre-bid queries and corrigendum etc., the same shall also be submitted to bank for approval.

9.8. Implementation Supervision

A. <u>Regional Treatment Facility</u>

This section on the QA/QC of MSW treatment facility gives a brief overview of the quality control requirements for civil and electromechanical works waste treatment facilities like compost and bio-methanation plants.

The task is divided into 2 parts – proof check of the design and QA/QC checks during execution. It is necessary to carry out the design check which will have design drawings, accompanying calculations, specifications and to confirm that they are done in accordance with applicable design criteria, codes, standards, and methodology. Working drawings shall show the details and sequence of works, support structures Any changes if required should be done by the contractor. The work will be commenced only after approval. The contract should be read to check all the requirements to be complied by the contractor like EMP, SHE (Safety Health and Environment) manual etc. Once the work is completed, the "As Built" drawing along with QA/QC reports must be submitted before the final bill is certified.

Civil, electro-mechanical and specialised works related gas pipes lines, control valves, safety equipment, gas flaring, gas cleaning systems works fall under the treatment facilities. All biogas/compost plant components need to undergo a thorough testing/check, and this shall be well-documented

Proof-check of the design of treatment facility (prepared by the Contractor). The following checks shall be done:

- 1. Total estimate of waste quantities and the area requirements for each component of the treatment plant
- 2. Check the list of facilities/equipment and its specifications mentioned
- 3. Land development design drainage system, roads and other infrastructure
- 4. Structural elements such as footings, columns, beams and slabs
- 5. Structural design of UG and OH level water storage tanks, Digestate Collection, storage tanks Leachate drains, collection tanks, water proofing,
- 6. Digestate upgrading filter press, wastewater treatment, recirculation system

- 7. Design & specification of all biogas carrying pipelines, biogas scrubbing vessels, biogas blowers including connection pieces for gas tightness; Inspection of any pipeline liner or cover penetrations for liquid/gas tightness; e) For concrete tanks, checking mixer shafts for liquid/gas tightness; and For heated digesters, checking that the digester heating system, circulation pumps and other relevant equipment are operational.
- 8. Mechanical systems –rotary drums, trommels, screens, conveyor system of compost plants and installation
- 9. All safety requirements specified and adequacy
- 10. Check the bar chart with respect to the timeline for project

QA/QC guidelines and progress of works

Test reports for materials tested at site, such as cement, sand, water, and aggregate; the contractor will perform all tests. Manufacturer's certificates and IS mark for manufactured items as stipulated in the contract shall be verified.

- 1. Read the contract agreement along with the DPR to familiarize the scope of work of the contractor
- 2. Check the contractors EMP and SHE manual
- 3. All construction materials used must be as per the specifications mentioned in the tender/contract
- 4. Test reports for materials tested at site, such as cement, sand, water, and aggregate; the contractor will perform all tests.
- 5. Collection of the manufacturer's certificate/test certificates for the materials, equipment, machinery all pumps, motors, valves, control mechanism, pipes etc. and cross verification with the specification in the design
- 6. Verify the ISI markings of materials as per contract requirement
- 7. Cube test of concrete- Compression tests of concrete cubes
- 8. Checking of all biogas carrying pipelines, biogas scrubbing vessels, biogas blowers including connection pieces for gas tightness; Inspection of any pipeline liner or cover penetrations for liquid/gas tightness; e) For concrete tanks, checking mixer shafts for liquid/gas tightness; and For heated digesters, checking that the digester heating system, circulation pumps and other relevant equipment are operational.
- 9. Mechanical systems –rotary drums, trommels, screens, conveyor system of compost plants and installation
- 10. All safety requirements are called out and are adequate
- 11. Submission of "As Built" drawings along with all QCQA reports.

Variations & deviations in work.

The Kerala PWD manual 2012 and amendments stall be followed for deviation /variation of works In case of a variation in the work due to site circumstances or for technical reasons the following procedure is to be adopted-

- Variation from the quantities in agreement which may result in exceeding the contract value shall be taken up only after the approval of the competent authority
- Extra/substitution of item shall be executed only after the approval of the competent authority.

Any item, excess over estimate quantity if found inevitable and has to be carried out, the authority competent to sanction the excess amount involved shall deal with the case and concurrently report the fact to the Agreement Authority. If excess is due to additional works not contemplated in the estimate, the additional works have to be carried out with the sanction of the authority that sanctioned the estimate. Once it is required that excess quantity in an item shall be carried out, the contractor shall be notified in writing to that effect by the Engineer. In case of DBOT contract. the contractor shall intimate the Authority for that project with the Change of Scope request in line with the provisions of the agreement The change request shall be submitted shall be reviewed by the PMC (or Independent Engineer appointed for this purpose shall review and make recommendations to the PMC and the PMU ((at the ULB/District or State level)) and suitable recommendations on acceptance of the change request shall be made by the PMC to the PMU (at the ULB/District or State level). Basis the recommendations of the PMC, the ULB/SM shall take a decision on the Change of Scope request and communicate the same to the Contractor.

B. Sanitary Landfill/ regional Sanitary landfill

During implementation of the sanitary landfill project there has to be a thorough check on the execution work done by the Contractor. These are divided into 2 parts – proof check of the design of landfill and QA/QC checks during execution. It is necessary to carry out the design check before commencing the work. Any changes if required should be done by the contractor only after which the execution work should start. The detailed engineering drawings must be checked and approved for construction. The contract should be read to check all the requirements to be complied by the contractor like EMP, SHE manual etc. Once the work is completed, the "As Built" drawing along with QA/QC reports must be submitted before the final bill is certified.

Proof-check of the design for landfill (prepared by the Contractor)

- 1. Check the list of facilities and its specifications mentioned in the landfill site
- 2. Check area and volume calculation of the landfill
- 3. Check phasing of the landfills and its interconnection.
- 4. Check the bar chart with respect to the timeline for project
- 5. Check for slope stability for bund and waste and its alignment to applicable standards
- 6. Check for Slopes used for leachate collection and its adherence to applicable standards
- 7. Calculation for leachate estimation and collection
- 8. Check for leachate treatment plant design
- 9. Storm water calculation
- 10. Hydraulic design of the storm water gutters
- 11. Structural design of the storm water gutter and leachate tank and pits
- 12. Check whether the geosynthetic material (GCL, HDPE liner, Geotextile, Geonet, HDPE pipes) is as per the standards mentioned in the tender and is from the approved list of manufacturers.
- 13. Collection of the manufacturer's certificate for the materials.

14. Check all the detailed engineering drawings submitted by the contractor. Raise queries, if any, else approve for construction.

QA/QC guidelines and progress of works:

- 1. Read the contract agreement along with the DPR to familiarise the scope of work of the contractor
- 2. Check the contractors EMP and SHE manual
- 3. Check the quality of soil being excavated
- 4. Check the levels attained after excavation
- 5. Check the quality for the soil being used for bunds and base
- 6. Check compaction of the bund and base as per the IS standards
- 7. All civil materials used must be as per the specifications mentioned in the tender/contract
- 8. Samples of all the geosynthetic materials must be taken at site and sent for third party checking. If the reports meet the specifications, installation work will start. If not, the material is rejected.
- 9. Compacted base and bunds must not have stone protruding more than 8mm before the GCL is spread on the base. Check for proper overlaps of the GCL.
- 10. HDPE liner must be checked for 2 types of test a) Non-destructive Air pressure test and vacuum test b) Destructive test Shear test and peel test of the seams
- 11. Proper documentation must be maintained by the contractor.
- 12. The gravel to be used must be rounded. Check gravel size and permeability.
- 13. The leachate collection layer (drainage layer) must be 300 mm thick
- 14. The leachate collection pipes must be welded properly.
- 15. The HDPE pipes must have the correct holes / slots for leachate collection
- 16. The geotextile must be stitched as per the specifications
- 17. The geonet installed must be properly tied.
- 18. The steel must be checked for all civil structures along with cube tests of concrete
- 19. Submission of "As Built" drawings along with all QCQA reports.
- **C.** Closure/ Capping of landfill or dumpsite

The closure can be carried out for a sanitary landfill on its capacity being fully utilised or for closing an open dumpsite. During implementation of the closure project there has to be a thorough check on the execution work done by the contractor. These are divided into 2 parts – Proof check the design of Closure and QA/QC checks during execution. It is necessary to carry out the design check before commencing the work. Any changes if required should be done by the contractor and then only the execution work should start. The detailed engineering drawings must be checked and approved for construction. The contract should be read to check all the requirements to be complied by the contractor like EMP and SHE manual etc. Once the work is completed, the "As Built" drawing along with QA/QC reports must be submitted before the final billed is certified.

Proof-check the design for closure of landfill or a dumpsite (prepared by the Contractor)

- 1. Check the list of facilities and its specifications mentioned in the closure site tender document.
- 2. Check the volume of waste at site
- 3. Check that the closure capacity should be equal to the waste volume at site.
- 4. Check slope stability for the complete closure
- 5. Check storm water calculation & hydraulic design of the storm water gutters
- 6. Check for Passive gas system or Active gas collection system
- 7. Check the bar chart with respect to the timeline for project
- 8. Check that the geosynthetic material (GCL, HDPE liner, Geotextile, Geonet, HDPE pipes) is as per the standards mentioned in the tender and is from the approved list of manufacturers.
- 9. Collection of the manufacturer's certificate for the materials.
- 10. Check all the detailed engineering drawings submitted by the contractor. Raise queries, if any, else approve for construction.

QA/QC Guidelines and progress of works

- 1. Read the contract agreement along with the DPR to familiarise the scope of work of the contractor
- 2. Check the contractors EMP and SHE manual
- 3. Check the levels of the existing waste and the levels to be attained as per the design
- 4. Check the compaction of the waste in layers by checking density of compacted waste
- 5. Once the final levels are attained, the gas wells must be dug as per the drawing.
- 6. Check the quality of the soil being used for closure layers
- 7. Check compaction of the soil layer
- 8. All civil materials used must be as per the specifications mentioned in the tender/Contract
- 9. Samples of all the geosynthetic materials must be taken at site and sent for third party checking. If the reports meet the specifications, installation work will start. If not, the material is rejected.
- 10. GCL should be laid as per the QC/QA. Check for proper overlaps of the GCL
- 11. HDPE Liner must be checked for 2 types of test a) Non-destructive Air pressure test and vacuum test b) Destructive test Shear test and peel test of the seams
- 12. Proper documentation must be maintained by the contractor.
- 13. The geonet installed must be properly tied.
- 14. The geotextile must be stitched as per the specifications
- 15. The geocoir must be properly tied.
- 16. The steel must be checked for all civil structures along with cube tests of concrete
- 17. Submission of "As Built" drawings along with all QC/QA reports.

D. <u>QA/QC Guidelines and progress of works for dumpsite remediation</u>

A contour survey may be required to ascertain the final waste quantity lying at the site, in case, the waste is deposited at site, after the DPR survey has been done. This is essential to finalise the quantity of waste to be remediated. The contract must be read to ascertain the requirements to be fulfilled by the contractor before starting the remediation work like – equipment, structures, measures taken to limit the dust pollution, littering, emergency plan in case of fire etc. The engineering drawings must be checked and approved for construction. All the records to be maintained to ascertain the work done. All outgoing fractions must be weighed regularly.

- 1. Read the contract agreement along with the DPR to familiarise the scope of work of the contractor
- 2. Carry out a contour survey to ascertain the final waste quantity (in case, the waste is deposited at site after the DPR date)
- 3. Check the contractors ESMP, EMP and SHE manual
- 4. Check the contractors regular and emergency plan against fire, leachate, odour and littering
- 5. Check the forward linkages for uptake of the segregated products like bio-earth, RDF to Cement kilns, heavy fraction, coconut shells etc.
- 6. Check the construction of processing facility and installation of weighbridge
- 7. Check that all the machinery mentioned in the contract/tender are at the site in good working condition before the start.
- 8. Check for dry run of the sieving machinery at site
- 9. Quantify the density of the waste at site at various locations and various depths regularly
- 10. Quantify the density of the waste in the truck
- 11. Check the facility for temporary storage of the various fractions at site
- 12. Check for the regular spraying of the bio-culture on the windrows
- 13. Check for the dust, odour control and littering
- 14. Check for regular collection and treatment of leachate
- 15. Check the quantity of the waste picked up for sieving on daily basis (volumetric basis or weight basis) as per the daily progress report.
- 16. All excavated waste slopes must be stable
- 17. Carry out analysis of the bio-earth especially heavy metals at regular intervals (should be within permissible limits)
- 18. Keep record of all the fractions that leave the site. (weight basis)
- 19. Randomly check whether the materials are being sent to the Linkages as per the Plan.
- 20. Check the quantity of waste going to the landfill or capping (not more than allowed percentage)
- 21. Contour survey at the time of submission of each bill
- 22. Daily progress report must be submitted
- 23. Environmental monitoring must be done at predetermined intervals.
- 24. The reclaimed land must be handed over in a clean and clear fashion.
All the temporary structures constructed by the contractor should be removed before handing over of site.

E. Guidelines on the procedure to be followed in case of variation in work.

In case of a variation in the work due to site circumstances the following procedure is to be adopted.

In case the estimated BOQ does not have an item for execution, it becomes an extra item. For example, say excavation in hard murum was not envisaged based on the investigations, then the excavation of hard murum becomes an extra item. The contractor shall intimate the Government Authority for that project with the Change of Scope request in line with the provisions of DBOT agreement. The change request shall be submitted shall be reviewed by the PMC (or Independent Engineer appointed for this purpose shall review and make recommendations to the PMC and the PMU ((at the ULB/District or State level)) and suitable recommendations on acceptance of the change request shall be made by the PMC to the PMU (at the ULB/District or State level). Basis the recommendations of the PMC, the ULB/SM shall take a decision on the Change of Scope request and communicate the same to the Contractor.

Chapter 10. Monitoring and Evaluation framework

M&E framework provides a detailed structure for program and project reporting and monitoring of results. The M&E team in SPMU will utilize a number of M&E tools (such as datasets, surveys, reports and existing as well as new software programs) throughout the implementation of the project to prepare different types of reports that will facilitate the Bank, Project Director, SPMU and the respective DPMUs, and ULBs to evaluate the progress of the project over time. The progress would be monitored through the various periodic program reports which would comprise of the details of the progress made during the year. Besides, a planned Program mid-term review will be undertaken to ensure more detailed monitoring of the progress achieved as a basis for possible adjustments of the activities and targets. The mid-term review planned to be conducted at the end of the third year of the project to provide the opportunities to adjust the M&E system. This will also provide inputs on considerations for a further plan on programming and refinements of the design.

There are four major components of the M&E framework:

- Results framework: The results framework will include the detailed plan for monitoring indicators.
- Program reporting: This section has detailed out the overall program reporting pattern for monitoring and evaluation of KSWMP
- Real-time monitoring for SWM operation including sub-project investments, grants and operation of SWM interventions
- Monitoring of Environment and social aspects

The M&E framework will be comprehensive and aim to overlook all the project activities, outputs and outcomes as defined by the Results Chain of KSWMP.

ACTIVITIES	OUTPUTS	LOWER OUTCOMES	OUTCOMES	HIGHER OUTCOMES
 TA for institutional reforms, financial delivery improvements both at the state and ULB levels 	 State and ULB policies and guidelines produced and disseminated including climate smart, disaster resilient measures 	State and ULB SW policy and regulatory framework		
 TA for infra assessments and identification of SWM investment needs 	 Comprehensive state-wide SWM assessment on infra and resilience aspects conducted Plans identifying ULB SWM investment needs and targets prepared and prioritized 	Institutional and	State and local SMW	
•TA for strengthening financial and fiscal systems for O&M	 Cost recovery mechanisms identified and in place Website established for public monitoring & Info 	financial systems for SWM strengthened at ULB level	capacity improved	
 TA for COVID readiness and delivery 	 COVID training developed and delivered 			environment
 Training courses and communications campaigns 	 Awareness/Recycling campaigns developed and delivered 	Capacity of ULB SWM		especially for public
 Incentive grants program to support improvement of city level institutional and service delivery systems for SWM) 	 Project Participation Agreements signed by ULBs to access grants program Primary collection & transportation systems established and receiving SW Source segregation, processing, treatment facilities operating Public space and facilities sanitized for COVID control 	disposal facilities that are climate-smart, disaster resilient expanded	Climate smart and disaster	health; improved urban living conditions
Investments for closure of existing dump sites and land reclamation	 Illegal dump sites remediated or closed 	Regional SWM	resilient SWM systems improved	
 Investments for regional SWM facilities that are climate-smart & disaster resilient 	 Regional processing and recycling facilities constructed and operating Transfer stations constructed and processing waste Sanitary landfills constructed 	disposal capacity expanded		

CHALLENGES: i) Weak planning, financial systems, policy environment and inadequate enforcement; ii) inadequate, fragmented SWM systems;

ASSUMPTIONS: i) State and ULBs can enforce regulations and collect fines; ii) cost recovery mechanisms are enforced to provide some sustainable level of financing; iii) public will participate in source segregation and recycling schemes; iv) cities can meet criteria for accessing infra grants and incentives are adequate; and v) private sector will participate in transport and processing of waste; vi) land can be identified, purchased, and cleared for landfill sites in timely manner; and vii) all infra comply with climate smart, disaster guidelines, and are operated appropriately

Figure 10-1: Results Chain of KSWMP

SPMU will have the overall responsibility of results monitoring and evaluation for the project. Reference is also drawn to M&E section of the Annexure A3.2 – "Institutional Responsibility Matrix", that shows activity wise responsibilities of implementing entities and the supporting agencies.

The following sections provide detailed guidance about the M&E arrangements, defined responsibilities, structure and reporting criteria of monitoring through annual program reporting and, monitoring of the achievement of results indicators including templates for periodic reports to be submitted by various entities.

10.1. Results Framework

The results framework elaborates the detailed plan for monitoring indicators. The results matrix includes the program's specific outcomes, outputs, and targets that will be achieved during KSWMP implementation. The following results framework explains the objectives of the program, indicators for each activity and respective evaluation procedure.

10.1.1. Arrangements for Results Monitoring

The results framework includes measuring the performance of KSWMP under two components:

- **Program Development Objectives (PDO):** The objective is to strengthen the institutional and service delivery systems for SWM in Kerala, which would be monitored and evaluated through the PDO Level Indicators. These include: (i) Number of people with access to solid waste collection and disposal services (ii) Solid waste disposed safely in engineered landfills (Tons per year) (iii) Number of ULBs that accessed incentive grants for improving SWM services
- **Intermediate Results (IR):** This includes framework for the monitoring and evaluation of individual indicators for Components 1, 2 and 3 of the Project which would ultimately lead to the achievement of Program Development Objectives.

10.1.2. Table with the PDO and Intermediate Results indicators with year wise targets, description and means of data collection, frequency and responsibility matrix.

Table 10.1 below provides the PDO and Intermediate Results indicators with year wise targets, description and means of data collection, frequency and responsibility matrix.

Table 10-1: PDO Indicators

PDO Level	Description	Unit of	Baseli	Target				Frequen	Data	Methodolo	Responsibil		
Indicators		Measurem	ne					су	Source	gy for Data	ity for Data		
		ent		Voa	Voa	Voa	Voa	Voa	Voa			Conection	Conection
				r1	r2	r3	r4	r5	r6				
1. Number of people with access to improved solid waste management services	Number of people can be calculated by considering an average of 4 people per household. Improved SWM would mean: i) Daily collection of all types of wasteii) Provision of household equipment and necessary training for treatment at source	Number (in millions) (cumulativ e)	0	0.5	1.0	2.0	3.0	4.0	6.0	Annual	MIS – Operational Tool ⁴¹	Progress Reporting by each ULB (periodic)	DPMU (inputs from ULBs)
2. Solid waste disposed safely in engineered landfills	Measures properly disposed amount of solid waste per day (TPD, ton per	Metric tons per year (cumulativ e)	0	-	-	30,0 00	90,0 00	120, 000	146, 000	Annual	MIS- Operational Tool	Progress Reporting by SPMU (Quarterly Progress Report)	DPMU (inputs from ULBs)

⁴¹details of the MIS tools are discussed in Section 10.2.1. of this PIM.

PDO Level Indicators	Description	Unit of Measurem ent	Baseli ne	Target				Frequen cy	Data Source	Methodolo gy for Data Collection	Responsibil ity for Data Collection		
				Yea r1	Yea r2	Yea r3	Yea r4	Yea r5	Yea r6				
	day) and aggregates by year. Solid waste would only mean inert and rejects. Only engineered landfill will be considered. Temporary landfill cell will not be considered under this indicator.												
3. Number of ULBs that accessed incentive grants for improving SWM services	-	Number (cumulativ e)	0	0	0	30	60	60	60	Annual	MIS - Grants Tool	No. of PAs signed Independen t Verification of Eligibility Conditions	SPMU (inputs from DPMU)

Table 10-2: Intermediate Results Indicators

Intermediate results indicators	Description	Unit of Measurem ent	Baseli ne			Tai	rget			Frequenc y	Data Source	Methodolog y for Data Collection	Responsibil ity for Data Collection
				Yea	Yea	Yea	Yea	Yea	Yea				
				r1	r2	r3	r4	r5	r6				
COMPONENT 1: Inst	itutional Strength	ening, Capacit	y Buildin	g and P	roject	Manag	ement	:		1		I	1
i. Number of cities that have issued SWM by-laws	The by-law is to operationalize the 2020 SWM Strategy	Number (cumulative)	0	5	40	60	60	60	60	Annual	Quarterly Consolidate d Progress Report prepared by SPMU	Progress Reporting by each ULB/ district (periodic)	DPMU
ii. Number of participants in SWM training sessions	The underlying assumption is that an average of 100 persons will be trained at each ULB with number of participants to each session being 50.	Number (yearly)	0	2,50 0	6,00 0	10,0 00	12,0 00	14,0 00	16,8 00	Annual	MIS – TCB Tool	Training Records by KILA and other Training Organization s. MIS data from online training platform	Training Organization s and online training platform
iii. Number of cities with city SWM plans	-	Number (cumulative)	0	5	40	60	60	60	60	Annual	Quarterly Consolidate d Progress Report prepared by SPMU	Progress Reporting by each ULB/ district (periodic)	DPMU (inputs from ULBs)
COMPONENT 2: Gran	nt support to ULBs	for SWM	1			1	1			I	1	1	T
iv. Household coverage of door to door	-	Percentage	0	10	15	20	30	50	70	Annual	MIS – Operational Tool	Progress Reporting by each	DPMU (inputs from ULBs)

Intermediate	Description	Unit of	Baseli	Target				Frequenc	Data	Methodolog	Responsibil		
results indicators		Measurem	ne							у	Source	y for Data	ity for Data
		ent			1	1	-	-	1			Collection	Collection
				Yea	Yea	Yea	Yea	Yea	Yea				
segregated municipal waste				11	12	15	14	15				districts (periodic)	
services													
v. Share of plastic waste recycled at the local level	To be measured by adding the capacity of the recycling & processing facilities under the project. The target is 50% of the total plastic waste collected	Percentage	10	10	20	30	40	50	50	Annual	MIS – Operational Tool	Progress Reporting by each ULB/ district (periodic)	DPMU (inputs from ULBs)
vi. Number of ULBs with improved human resource capacity for SWM	To be measured by compliance with eligibility criteria related to hiring SWM staff	Number (cumulative)	0	10	20	40	60	60	60	Annual	MIS- Operational Tool	Progress Reporting by each ULB/ district (periodic)	DPMU (inputs from ULBs)
vii. Number of ULBs that adopted cost recovery system for SWM	This indicator will include both policy development as well as implementation of cost recovery system by the	Number (cumulative)	0	5	20	40	60	60	60	Annual	MIS – Operational Tool	Progress Reporting by each ULB/ district (periodic)	DPMU (inputs from ULBs)

Intermediate results indicators	Description	Unit of Measurem ent	Baseli ne	Target				Frequenc y	Data Source	Methodolog y for Data Collection	Responsibil ity for Data Collection		
				Yea r1	Yea r2	Yea r3	Yea r4	Yea r5	Yea r6				
	ULBs. Cost recovery system will be for collection and transportation service.												
iii. Number of women's groups implementing SWM services financed by the project	-	Number (cumulative)	0	20	30	40	100	150	190	Annual	MIS – Operational Tool	Progress Reporting by each districts (periodic)	DPMU
ix. Share of the complaints registered resolved within 30 days	% of complaints resolved within a 30-day period, for all the complaints made in the period of March to Feb of each year	Percentage	0	50	70	75	80	80	80	Annual	MIS-GRMS (Grievance Redressal Manageme nt System) Tool	Progress Reporting by each districts (periodic)	DPMU (inputs from ULBs)
x. Number of ULBs in which beneficiary satisfaction survey is conducted	Based on Baseline, Mid Term and End Term Survey	Number	0	60	-	60	-	-	60	Three times: baseline, end of 3rd year, and end	Quarterly Consolidate d Progress Report prepared by SPMU	Progress Reporting by each districts (periodic)	DPMU (inputs from ULBs)

Intermediate results indicators	Description	Unit of Measurem ent	Baseli ne			Target				Frequenc y	Data Source	Methodolog y for Data Collection	Responsibil ity for Data Collection
				Yea r1	Yea r2	Yea r3	Yea r4	Yea r5	Yea r6				
										of 6th year			
COMPONENT 3: Development of regional SWM facilities													
xi. Number of dumpsites closed	Dumpsites remediated will be included.	Number (cumulative)	0	0	0	0	1	2	3	Annual	MIS- Operational Tool	Quarterly Progress Report for component 3	PMC (inputs from DPMUs)
xii. Number of landfills constructed and operational	This would not include temporary landfill cell	Number (cumulative)	0	0	0	1	2	3	3	Annual	MIS- Operational Tool	Quarterly Progress Report for component 3	PMC (inputs from DPMUs)
ciii. Number of inter- municipal coordination arrangements in place for regional disposal systems	-	Number (cumulative)	0	1	2	3	3	3	3	Annual	Quarterly Consolidate d Progress Report prepared by PMC	3Copy of Agreements signed by municipal corporations and related documents	PMC (inputs from DPMUs)

Note: It should be noted that the GoK will be undertaking a baseline survey within 6 months of the start of the Project⁴² which would duly cover the information with respect to the above mentioned PDO and Intermediate results indicators. The baseline numbers will be updated after such survey has been completed. Accordingly, the year wise targets may also be updated (if required).

⁴² Baseline survey will be independent of the SWM planning which will be parallelly undertaken up by the ULBs.

10.1.3. Means of verification of PDOs and Intermediate Results

Table 10-3: Means of verification of PDOs and Intermediate results

PDO Level indicators	Data Source	Means of Verification	Description of Methodology
1. Number of people with access to improved solid waste management services	MIS tool for operational monitoring	 Record log with ULBs No. of user registration for SWM services (from property tax information or other relevant sources) Report from real time MIS (Operational Tool) Beneficiary satisfaction surveys and impact assessment survey 	Various agencies/ organizations working towards SWM will also keep a record of the data related to SWM (waste collection, transportation, treatment, recycling, disposal etc.) and provide inputs to ULB. The ULBs will collate the logbook gathered data from various agencies, and update information regarding SWM on the MIS on a periodic basis. Individual report for each ULB and consolidated reports will be downloadable from the MIS for any desired time period and in a standard format. The number can be verified with the number of establishments registered for SWM services, as per the property tax information, any discrepancies. Third party assessments – like beneficiary surveys as well can be a source of verification.
2. Solid waste disposed safely in engineered landfills	MIS tool for operational monitoring	 Record log with ULBs Quarterly Progress Report from DPMU submitted to the PMC Report from real time MIS (Operational Tool) 	Various agencies/ organizations working towards SWM will also keep a record of the data related to SWM (waste collection, transportation, treatment, recycling, disposal, etc.) and provide inputs to ULB. The ULBs will collate the logbook gathered data from various agencies, and update information regarding SWM on the MIS on a periodic basis. Individual report for each ULB and consolidated reports will be downloadable from the MIS for any desired time period and in a standard format.
3. Number of ULBs that accessed	MIS tool for grant	 Quarterly Progress Report from DPMU submitted to the PMC 	DPMU will provide update regarding financial progress along with status of compliance to Annual Triggers for each ULB to

PDO Level indicators	Data Source	Means of Verification	Description of Methodology
indicators incentive grants for improving SWM services	monitoring	 Report from real time MIS (Grants Tool) Grant utilization statements prepared by the ULBs Report from IVA verifying compliance to Eligibility Criteria 	SPMU through Quarterly Progress Report. SPMU will updated the grant utilization status to the MIS (Grants tool). The same can be verified through (i) Grant utilization statements prepared by each ULB in accordance with the steps mentioned in Section 11, and (ii) Report from
		• IFRs prepared by the PMC based on information received from ULBs for component 2	Independent Verification Agency will confirm the ULBs complying to the eligibility criteria and thus with access to incentive grants.

Intermediate Data Source results indicators		Means of Verification	Description of Methodology
COMPONENT 1: Inst	titutional Stren	gthening, Capacity Building and Project Mana	gement
i. Number of cities that have issued SWM by-laws	Quarterly Consolidated Progress Report prepared by SPMU	 Monthly Progress Report from ULB submitted to the DPMU Quarterly Progress Report from DPMU submitted to the SPMU Report from IVA verifying compliance to Eligibility Criteria 	The ULBs will include the status and action plans in the Monthly Progress Report submitted to the DPMUs. The DPMU will present the consolidated figures in Quarterly Progress Report submitted to the SPMU. SPMU will present the final numbers in its Quarterly Consolidated Progress Report.
ii. Number of participants in SWM training sessions	MIS tool for Training and Capacity Building (TCB Tool)	 Record logs maintained by the organizations Report from the Training MIS System (TCB Tool) 	KILA and other organizations engaged in training will update the online and offline training records with details of number of trainings conducted under different heads, no. of participants, feedback of trainers etc. to PMC and DPMUs in MIS on a quarterly basis. The PMC will keep track of the status of no. of trainings imparted in comparison to the Annual Training Plan. The SPMU will flag any discrepancies/ delay to the DPMU and relevant training organisations.
iii. Number of cities with city	Quarterly Consolidated	 Monthly Progress Report from ULB submitted to the DPMU 	The ULBs will include the status and action plans in the Monthly Progress Report submitted to the DPMUs. The

Intermediate results indicators	Data Source	Means of Verification	Description of Methodology
SWM plans	Progress Report prepared by SPMU	Report from IVA verifying compliance to Eligibility Criteria	DPMU will present the consolidated figures in Quarterly Progress Report submitted to the SPMU. SPMU will present the final numbers in its Quarterly Consolidated Progress Report.
iv. Household coverage of	MIS tool for operational	Records of subscribers of SWM servicesBeneficiary satisfaction and impact	Various agencies/ organizations working towards SWM will also keep a record of the data related to SWM (waste
door to door segregated municipal waste collection services	monitoring (Operational Tool)	 Beneficiary satisfaction and impact assessment surveys Report from Real Time MIS Weekly report from organisations working towards SWM 	 and provide inputs to ULB in the form of a logbook in the format provided in Annexure A10.2. The report from the weighing bridge system can be appended to this weekly report. The ULBs will collate the logbook gathered data from various agencies, and update information regarding SWM on the MIS on a periodic basis. Individual report for each ULB and consolidated reports will be downloadable from the MIS for any desired time period and in a standard format. The status can be verified through the Beneficiary
			satisfaction Survey. Also, any Records of subscribers of SWM services (like property tax database) may be used for verification.
v. Share of plastic waste recycled at the local level	MIS tool for operational monitoring (Operational Tool)	 Record log at MCF/ RRF Record log with ULB Report from real time MIS 	Various agencies/ organizations working towards SWM will also keep a record of the data related to SWM (waste collection, transportation, treatment, recycling, disposal etc.) and provide inputs to ULB in the form of a logbook in the format provided in Annexure A10.2. The report from the weighing bridge system can be appended to this weekly report. The ULBs will collate the logbook gathered data from various agencies, and update information regarding SWM on the MIS

Int	ermediate	Data Source	Means of Verification	Description of Methodology
res	ults indicators			
				on a periodic basis. Individual report for each ULB and consolidated reports will be downloadable from the MIS for any desired time period and in a standard format.
vi.	Number of ULBs with improved human resource capacity for SWM	MIS tool for operational monitoring (Operational Tool)	 Staff Record of ULB Monthly Progress Report from ULB submitted to the DPMU Annual Staff Requirement Plan for SWM and Hiring Schedule Independent audits 	Information regarding staff strength available at ULBs will be updated by the ULBs on the MIS on monthly basis. The DPMU will further collate the information regarding no. of ULBs with improved human resource capacity into Quarterly Progress Report to PMC. The adequacy of staff will be verified by DPMU based on the Annual Staff Requirement Plan for SWM and Hiring Schedule prepared by each ULB. The same may also be verified through independent audits.
vii.	Number of ULBs that adopted cost recovery system for SWM	MIS tool for operational monitoring (Operational Tool)	 Records of subscribers of SWM services Monthly Progress Report prepared by ULB for submission to the DPMU Financial Report 	The ULBs will update the status of cost recovery system into the MIS. The detail will also be included in the Monthly Progress Report submitted to the DPMU. The service fees collected can be verified from the annual financial statements of the ULBs, and audit report of financial records.
viii.	Number of women's groups implementing SWM services financed by the project	MIS tool for operational monitoring (Operational Tool)	 Staff Record of ULB Monthly Progress Report prepared by ULB for submission to the DPMU Report from real time MIS 	The ULBs will include the status of women's groups involved in SWM into the MIS on a monthly basis. The DPMU will further collate the information regarding no. of ULBs with improved human resource capacity into Quarterly Progress Report to PMC. The adequacy of staff will be verified by DPMU based on the Annual Staff Requirement Plan for SWM and Hiring Schedule prepared by each ULB.
ix.	Share of the complaints registered	GRMS MIS tool	 Records from complaints received through individual entry at ULB office, telephone/ Grievance Redressal website/email/social 	Information regarding complaints will be updated by the ULBs/ SM on the MIS on a regular basis. Each grievance will be recorded with a unique number into the MIS (refer

Int	termediate	Data Source	Means of Verification	Description of Methodology
re	sults indicators			
	resolved within 30 days		 media pages of ULB or SM/ incident reporting registers, records of ULB or SM. These shall not be deleted from social media pages after resolution Report from GRMS 	Section 3.8.5) and status of resolution will be tracked and monitored by the staff making the entry. Report will be generated from the MIS tool for any desired time period and in a standard format will provide the status of complaints and any required quantitative information.
x.	Number of ULBs in which beneficiary satisfaction survey is conducted	Quarterly Consolidated Progress Report prepared by SPMU	 Beneficiary Satisfaction Survey Report as submitted by the independent agency to the DPMU Quarterly Progress Report prepared by DPMU submitted to the SPMU Quarterly Consolidated Progress Report 	The beneficiary satisfaction survey (along with impact assessment survey) will be undertaken thrice – baseline, mid-term and end term. The survey will be scheduled by DPMU which will appoint an independent agency for the survey. The details and observations of the survey will be included in the Beneficiary Satisfaction Survey Report to be prepared and submitted by the independent agency to the DPMU. DPMU will include the observations, remarks/ action points in the Quarterly Progress Report. SPMU will present the final numbers in its Quarterly Consolidated Progress Report.
CO	MPONENT 3: Dev	elopment of re	egional SWM facilities	
xi.	Number of dumpsites closed	MIS tool for operational monitoring (Operational Tool)	• Quarterly Progress Report for component 3 prepared by PMC	SPMU, with assistance from PMC and DPMC, will identify the dumpsites to be closed. The PMC, with inputs from the DPMCs for the districts involved, will record the status in MIS, with details and observations in the Quarterly Progress Report for Component 3.
xii.	Number of landfills constructed and operational	MIS tool for operational monitoring	 Quarterly Progress Report for component 3 prepared by PMC Weigh bridge data / records from landfills 	SPMU, with assistance from PMC and DPMC, will take constant efforts towards land identification, seeking clear title ownership and permission/environmental clearances to initiate construction as well as technical studies and inter- municipal coordination arrangements. The PMC, with inputs from the DPMUs for the districts involved, will record the status in MIS, with details and observations in the Quarterly

Intermediate results indicators		Data Source	Means of Verification	Description of Methodology
xiii.	Number of inter- municipal coordination	Quarterly Progress Report for component	 Quarterly Progress Report for component 3 prepared by PMC Weigh bridge data / records from landfills 	Progress Report for Component 3. SPMU, with assistance from PMC and DPMC, will take constant efforts towards land identification, seeking clear title ownership and permission/environmental clearances to initiate construction as well as technical studies and inter-
	arrangements in place for regional disposal systems	3 prepared by PMC		from the DPMUs for the districts involved, will record the status in MIS, with details and observations in the Quarterly Progress Report for Component 3.

10.2. Detailed indicators for monitoring the Social development Outcomes.

The indicators will include parameters on social inclusion, citizen engagement, enterprise development, land required, livelihood of the vulnerable, labor compliance, GBV and GRM. Thematic monitoring and social Audit will be carried out.

Table 10-4: Indicators to monitoring TDF-SMF

	Indicators (gender and tribal segregated)					
1.	Overall:					
	Preparation of Baseline All data disaggregated by gender, class, caste, informal					
	workers, etc.					
	Institutional set up for Social management (hiring of specialists and Support					
	organisations)					
	Social management integrated in MIS					
	Review of existing GRM for service delivery, GBV and labor management					
	Number of sub-projects completed without time and cost overruns (Number)					
2.	RPF					
	Adequacy of entitlements (replacement cost, allowances, income generation grant, etc.)					
	(Number as per Act)					
	Time taken for payment of entitlements (Weeks)					
	Time taken for land acquisition (Weeks)					
	Income patterns (of various type of households including women headed households					
	and other vulnerable) (Increase/ decrease in Income against baseline, %)					
	Land holding status (Increase/ decrease in Income against baseline, %)					
	Changes in occupations (Increase/ decrease in Income against baseline, %)					
	Housing status (area, floor, walls, roof, etc.) (Increase/ decrease in Income against					
	baseline, %)					
	Ownership of household assets (Increase/ decrease in Income against baseline, %)					
3.	TDP					
	Tribal Participation (Number)					
	Tribal doing jobs in project (Number)					
	Tribal in various committees (Number)					
	Livelihood assistance to tribal (Number)					
	No. of Tribal-owned enterprises/ No. of tribal-contractors (Number)					
4.	Livelihood assistance to women and other vulnerable					
	Income patterns (of various type of households including women headed households					
	and other vulnerable) (Increase/ decrease in Income against baseline, %)					
	Land holding status (Increase/ decrease in Income against baseline, %)					
	Changes in occupations (Increase/ decrease in Income against baseline, %)					
	Housing status (area, floor, walls, roof, etc.) (Increase/ decrease in Income against					
	baseline, %)					
	Ownership of household assets (Increase/ decrease in Income against baseline, %)					
4.	Citizen Engagement					
	Plans and budgets to be available on Project website, hard copy at ULB offices					
	[Number]					
	Formation or co-option of ward level committees (Number)					
	Vuinerable representation in committees (as per population) (Number)					
	Number of ward level meetings (Number)					

	Prior information of meetings, location of meetings (Number)					
	Attendance of vulnerable groups in meetings (Number)					
	Separate planning or pre-planning meetings with women and different social –					
	economic sub-groups, (youth, tribal) to ensure representation of all interests and					
	needs in the plan (Number)					
	Documentation of meetings, MoM made available (hard copy and website) (Number)					
	Integrated GRM systems developed/augmented (one time activity)					
	GRM includes SWM services, GBV and labor management					
	Number of grievances registered and resolved (Number)					
	Number of court cases (Number)					
	Social Audit Manual and Pilots conducted (Number)					
	Social Audit Rolled out (Number)					
	Findings of Social Audit used for project review (Number)					
	Consumer Surveys conducted (Number)					
	Findings of surveys used to review and improve service delivery (Number)					
5.	SBCC					
	Communication Plan developed for all stages (Number)					
	SBCC and IEC material prepared and archived (Number)					
	Response of communication medium and message reviewed (Number)					
6.	Gender					
	Profiling of SWM workers (Number)					
	Mapping skill building schemes and resources (Number)					
	Number of women received skill upgradation training. (Number)					
	Number of women linked to higher SWM value chain activities and entrepreneurial					
	activities; (Number)					
	% increase in income women SWM workers accessing other SWM verticals (Number)					
	Women Component Plans of ULB: resources leveraged for SWM women workers					
	(increase in budgetary allocation for SWM workers)					
	Internal Complaints Committee: Number of Agency requiring an ICC under the project					
	(Number)					
	Internal Complaints Committee: Number of Agency that have formed ICC (Finalized					
	ToR; List of Members; Orientation Session and First Meeting) (Number)					
	GBV Service provider repository for ULB (Mapping and benchmarking services;					
	Identification of key partners, roles, modalities) (Number)					
	GBV Six monthly report on Dissemination material produces, workshops organized,					
	personnel trained, community members sensitized (Number)					
	Issues raised by women covered in Plans (Number)					
7.	Labour Management					
	Responsibility Matrix for Labor Management (Number)					
	Developing a Code of Conduct(Number)					
	Systematizing the Code of Conduct(Number)					
	Aligning Sub-contracting processes(Number)					
	Transparency in Contract Specific Terms and Conditions(Number)					
	Labor Influx and Construction Labor Management Plan(Number)					
	Adherence to contract conditions and standards (housing, sanitation, crèches, use of					
	local labor , equal wages to men and women, avoidance of child labor, etc.) (Number)					
8.	Capacity Development					
	Training Needs Assessment conducted as per each stakeholder against the scheme					

cycle (One time activity)
Resources prepared for all topics identified for trainings (Number)
Number of trainings conducted (Number)
Number of personnel trained by program (Number)
Achievement of learning objectives - Value and use of trainings (Feedback from
participants) (Number)

Table 10-5: Indicators for monitoring TDF-SMF

Monitoring Indicators (with units of	Frequency	Agency
measurement)		
• Social Indicators; Disaggregated by Gender	• Monthly by	 SPMU guiding
and Tribal	DPMUs through	the collection
	SO	of
Output Indicators	• Annually by	information
• Adequacy of entitlements (replacement cost,	SPMU	on indicators
allowances, income generation grant, etc.) (No. as per	• Half Yearly by	 Independent
Act)	ISA Consultants	Quarterly
• Livelihood assistance to women and other vulnerable	•	Monitoring
(as against identified in RAP)		 Implementing
• Women and other vulnerable in various committees		Agencies/
(Number)		Contractors
 Livelihood assistance to tribal (Number) 		• Independent
• Time taken for payment of entitlements (Weeks)		Safeguards
 Time taken for land acquisition (Weeks) 		Audit
• Number of grievances registered and resolved		Consultants
(Number)		
 Number of court cases (Number) 		
Outcome Indicators		
• Income patterns (of various type of households		
including women headed households and other		
vulnerable) (Increase/ decrease in Income against		
baseline, %)		
• Land holding status (Increase/ decrease in		
landholding against baseline, %)		
• Changes in occupations (Number of persons moving		
upwards against baseline)		
• Housing status (area, floor, walls, roof, etc.)		
(increase/ decrease in area, type, etc. against		
Dasennej		
• Uwitership of nousenoid assets (increase/ decrease		
III assets, number against baseline)		
• women and other vunerable doing jobs (Number		
against Daseillej		
• No. of female owned enterprises/ No. of female		
Tribal doing joba in project (Number contract		
baseline)		
No of Tribal owned enterprises / No of tribal		
contractors (Number against baseline)		

Frequency and responsibility for Monitoring:

- Monthly by DPMUs
- Annually by SPMU
- Half Yearly by ISA Consultants
- SPMU guiding the collection of information on indicators
- Independent Quarterly Monitoring
- Implementing Agencies/ Contractors
- Independent Safeguards Audit Consultants

Independent Safeguards Audits

The SPMU will appoint Independent Safeguards Audit Consultants to conduct half-yearly Social Audit of selected sub-projects for compliance with the SMF/TDF and RPF. This Social Audit will be conducted from the second year of project implementation. The sample will be representative. All sub-projects will be selected for ISA each half-year. Each half-year a minimum of 10% of ongoing sub-projects and 20% new sub-projects will need to be sampled for this audit.

10.3. Program reporting

Periodic reporting of the progress will enable SPMU and DPMUs to:

- keep track of the physical and financial progress and environment and social safeguard including compliance of labour lawsof the sub-projects as per the plans prepared at the beginning of the year
- check the results periodically and evaluate the effectiveness of the sub-projects undertaken for the improvement of SWM service delivery
- take decisions on issues regarding the physical progress of the projects, contribution of undertaken projects towards the achievement of desired results, financial issues, compliance to evaluation criteria and provide suggestions for the improvement of upcoming project plans.
- take further measures to verify the data at the input side

The following sections detail the reports to track the physical and financial progress of the activities undertaken.

10.3.1. MIS framework for data capture, analysis and report generation

The MIS system for data capture, analysis and reporting for M&E, will comprise of the following independent ICT Tools (ICT tools for this purpose would include hardware, software programs, social networking and other system apps) that will draw/provide inputs/outputs to each other and also will get necessary feed from existing programs such as Sankhya and Sulekha and such other systems being currently in use by SM and ULBs. Of the tools identified herein, the SMART Garbage System is currently in advance stage of development and the Labour and Land Management Tools are being provided by the Bank to SM. The SPMU in consultation with the Bank and other stakeholders will develop/procure the other tools and also decide the extent of integration/interface required amongst all the

ICT tools for effective monitoring and evaluation of the functioning and performance of project-related activities including tracking the SWM operations, implementation of the subproject scheme cycle and action plans on real time with geo-referencing, compliances with ESIA framework for sub-projects, and other necessary information with regard to the progress made against the PDO and Intermediate Level Indicators, based on inputs detailed in this section. The information to be captured by these tools and the expected output is detailed in Annexure A.10.1 in Volume 3.

- 1. <u>Training and Capacity building tool</u>: The tool will be required to capture information like training needs assessment, overall training plan and such other details as listedin Annexure A.10.1 in Volume 3. to assess progress against plan and for developing future strategy. This also needs to be linked to the social monitoring tool. (referred to as **TCB Tool** in PIM)
- 2. <u>Grievance Redressal Management System</u>: The GRMS will help in effective consolidation and tracking of the grievances received from various sources including web, mobile app, toll free number, social networking websites/ apps, incident reporting registers for each sub-project and physical registration/ submission of complain any at the ULBs. The system will help in delegation and escalation of the grievances to the concerned departments and will help in timely redressal of the grievances. (referred to as **GRMS Tool** in PIM). The system will be capable of handling grievances and issues related to the Project, ranging from any public grievances related to SWM, labour, proposed SWM projects, environmental and social concerns, incident reports from project sites and grievances related to tribal and other vulnerable groups, social management, resettlement, labour and procurement. This tool will be developed in addition to the existing Chief Minister's Public Grievance Redressal portal discussed in Section 3.8.5 of this document.
- 3. <u>Grant Management System</u>: This system will be used to monitor grant allocation, utilization, expenses against sub-projects, annual triggers and compliance and other information related to grants (referred to as **Grants Tool** in PIM) The reports submitted by IVAs as well as AT compliances reports should be input into this system for a comprehensive monitoring of grants.
- 4. <u>Sub-project investment monitoring</u>: A dashboard is to be developed to enable reporting and decision making related to sub-projects. Since some information may already be captured as part of the Sulekha Software, the tool needs to be integrated with the Sulekha Software and only the additional information may be captured by this tool. This tool will also include Environment and Social Monitoring and hence needs to be linked with the environment and social management tool. (referred to as **IM Tool** in PIM)
- 5. **Operational Monitoring**: Information for the M&E of the performance of ULBs' SWM system will be done using **SMART Garbage Management System** and **app for MCF and RRF** and other additional tools developed to capture the required information. Environment and Social Monitoring will also be included in this operational monitoringand hence the tool needs to be linked with the environment and social management tools. (referred to as **Operational Tool** in PIM)

- 6. <u>Environment Monitoring Tool</u>: The tool will capture information with regard to environment management which needs to be linked with the Sulekha tool, sub-project investment monitoring tool and operations monitoring tool. (referred to as **EM Tool** in PIM)
- 7. <u>Social Monitoring Tools or Safeguard Information Management System</u> <u>(SGIMS):</u>Respective software tools for Labour Management, Land management and scheme cyclewill be used for monitoring of social aspects of the project. (referred to as **SM Tool** in PIM)
 - Features of the land management software solution include continued feedback of supervisors on records, generation of reports for project owners, and a single point for record-keeping and convenient access. The software solution seeks to make labour compliance a part of operations and the contract management information system.
 - The IT solution for Land management will be for Process Monitoring that shall support backend data management and uploading field data on real time basis.
 - The scheme cycle app and software would be developed based on the scheme cycle developed duly covering the pre-planning, planning, implementation and closure stages. This would help in monitoring the social safeguards at each and every applicable step.

[The EM tool and the SM tool would collectively form a part of the Safeguards Information Management System (SGIMS)]

The MIS tools, with exception to those already under development/deployment, will be developed by external IT consultants/vendors to be recruited by SPMU using the procurement process as detailed in Volume 2 of the PIM – the Procurement Manual. The SPMU, in consultations with the Bank's project team, Information Kerala Company (IKC), KILA and other stakeholders will decide the contours of the MIS tools, their features, functionalities, inputs and outputs, ability to work on real time basis etc.

The MIS should be made user-friendly for input as well as output. The users of each MIS tool should be able to generate data visualization dashboards for real-time monitoring and standard reports for any desired period. The reporting generated from the above tools can be used for the purpose of various periodic program reporting as well as reporting on the results framework The SPMU will be responsible for designing necessary trainings and tutorial programs for all prospective users of MIS tools.

10.3.2. Physical progress

For upward accountability, a system of **quarterly administrative reporting** to the SPMU will be followed which should provide updates on the physical progress, asset creation and other activities under various components of the Project.

The responsibility of reporting among various agencies/ institutions/ management units would be as follows:

- 1. Training Organisations involved in the project will make use of MIS system (TCB tool) to monitor and report the status of trainings conducted for any period. The Training Organisations will be responsible for updating the relevant information into the MIS. At the end of each quarter, the training organisation(s) will submit a Training Implementation Report to SPMU, which will include the report generated by the MIS for the quantitative information, along with comparison to the targets set in the Annual Training Plan, and details of actions plans, observations, comments from the training organisation(s).
- 2. Monitoring and Reporting for ULBs will include the following:
 - i. **Progress of SWM integration:**The ULBs will monitorvarious aspects of solid waste management operations on a real-time basis with the help of the MIS (Operational Tool). The ULBs will input he field level information into the MIS on a periodic basis, covering all aspects of solid waste management and labor management, including collection, transportation, treatment, recycling and dumping of solid waste. Details regarding human resources including number of staff involved in the waste management by the operators, number of women's self-help groups will also be included in the MIS. The SM/ SPMU will make suitable arrangements to provide access to ULBs to this Tool to ensure upload of necessary information.

For input to the MIS, the operators/ organizations offering SWM services will be responsible for collection of necessary field data for the solid waste management on a daily basis. The operators/ organizationswill provide the same to the ULB in the desired formats on a weekly basis. The amount of waste transferred to any of the treatment/ MCF/ landfill sites should be measured and noted using a weigh bridge system. The reports generated from the weigh bridge system should be provided to the ULBs along with the inputs provided in the reporting format. The reporting format to be used by the organisations to report to ULBs is provided in Annexure A.10.2 in Volume 3.

The information to be collected and the operators/ organisations responsible for reporting the information to the ULBs will be as follows:

- Haritha Keralam Mission (HKM) / any other agency involved in collection of waste will maintain an updated record of the no. of wards/ households/ establishments from which the waste is being collected including the waste category and frequency.
- Each treatment facility will weigh and record the incoming BDW to their site on a daily basis. The facility will also record the quantity of waste transferred to landfills, as and when transferred.
- Operators of MCF/RRF/MRF facilities will weigh and record the amount of NBDW transferred to their sites on a daily basis.Operators should separately weigh total plastic waste segregated from the NBDW, weight of plastic waste sold/ given out to road contractors/ cement manufacturers/ other organizations for reuse/ recycling.
- Operators of city/ regional landfill sites and dumpsite remediation contractors will weigh and record the amount of waste transferred to

their sites and report to ULBs periodically as appropriate (weekly/ monthly).

- Operators of biomedical waste management facilities will weigh and record the amount of waste transferred to the facilityand report to ULBs periodically as appropriate (weekly/ monthly).
- Agencies involved in the SWM value chain will provide details of the human resources involved in the activity on a monthly basis, with details of number of staff involved, gender, type of work performed, etc. with supporting documents.
- Information regarding households paying fees as under cost recovery system, amount collected, details of households, etc. to be provided by agency appointed for the work.

The ULBs will collate the data and duly maintain records received from the operators and field workers involved in SWM in a standard format for reference purpose (preferably in electronic form). Each ULB will update the gathered data in the **MIS (Operational Tool)** on a weekly basis.

The standard report generated by the MIS tool will form a part of Monthly Progress Report to be submitted by each ULB to its respective DPMU.

ii. **Physical Progress of sub-projects:** To record the physical progress of the sub-projects, the site team of the ULBs will conduct monthly site visits along with the site team of Contractors. The ULB will capture the information in the real time MIS system (**IM Tool**) being developed. Further, the data on sub-project implementation also needs to cover financial information (using the IM tool of the MIS) as well as environment, labour and land related matters (to be captured and monitored using the **EM and SM Tool** of the MIS that are being provided to SM by the Bank).

The standard report generated by the MIS tool will form a part of Monthly Progress Report to be submitted by each ULB to its respective DPMU.

iii. <u>Grievance Monitoring:</u> The ULBs will manage the SWM related grievances through various mediums including physical entry (written records at the ULB office), telephone, email, online grievance portal and social media accounts of the ULB/SM. The ULBs will record and manage the grievances through an online Grievance Management System which will have necessary interactivity with Social Networking Apps such as Twitter, etc.

The Complaint Flow Process for registration of complaint and entry into the MIS system shall be as discussed in Section 3.8.2 of the PIM (figure 3-5). The MIS entry shall be visible at all levels from ULB to SM including SPMU and DPMU. The responsible staff at ULB/ SPMU will review the query and assign the query to the relevant department for resolution. The staff will be responsible for monitoring the status of the grievances. In case of non-closure of a grievance at the ULB level in a period of 20 days, the status of grievance should be escalated to the DPMU, which would assist the ULB for the closure

of the query/ grievance. The DPMU shall proactively coordinate with the ULB if the grievance is not resolved within 20 days. The MIS system should also trigger an automatic notification/ alert at the SPMU level so as to ensure that the complaints are addressed within the 30-day period.

The standard report generated by the MIS tool will form a part of Monthly Progress Report to be submitted by each ULB to its respective DPMU.

iv. Annual Staff Requirement Plan for SWM and Hiring Schedule: In order to meet the adequate staffing requirement for managing the SWM services and to comply with eligibility criteria related to hiring SWM staff, the ULBs will prepare an Annual Staff Requirement Plan for SWM and Hiring Schedule prior to the beginning of each year, with details of the current staff strength, tasks requiring additional staff strength for the upcoming year, additional staff required, compliance with eligibility criteria related to hiring SWM staff and hiring schedule for the next year. The ULBs (wherever applicable based on population thresholds as stated in chapter 3) which would undertake segregated appointment of C&T agencies instead of single contracts, should also include hiring for women help groups, thus involving adequate number of such groups in the SWM lifecycle. In case a blanket contract is structured for SWM in a ULB, the agencies would ensure adequate staffing for the SWM processes. Th ULBs should submit the plan and schedule to the respective DPMUs for review, which will be required to be approved by the SPMU.

The ULBs will report the strength of the staff on the MIS (**Operational Tool**) on a **monthly** basis. The Compliance with eligibility criteria related to hiring SWM staff, and involvement of women's help groups in SWM will be reviewed against the **Annual Staff Requirement Plan for SWM and Hiring Schedule** by DPMUs on a biannual basis.

- v. For environmental and social monitoring, ULB will have the following tasks, as per the ESMF documents prepared by SM, and discussed in section 10.2.4 of this document:
 - Conduct site visits at periodic intervals to check compliance to environment and social requirements for the projects
 - Receive and review Monthly Implementation Report from Contractor
 - $\circ~$ Prepare and submit Monthly Supervision Report by PIU / TSC to DPMU
 - Conduct community consultations with support from the PMC on a quarterly basis
- vi. At the end of **each month**, each ULB will submit a **Monthly Progress Report** to their respective DPMU. The report should include the following details:
 - Status of issue of by-laws and issue of city SWM plan, probable timelines for issue, and any remarks to mention to DPMU.

- Progress regarding achievement of eligibility criteria, probable timelines for its achievement
- Status of compliance to annual triggers, timelines
- Status of cost recovery system for SWM policy formulation, timeline for execution. If under execution, quantitative information like % households covered under cost recovery, amount collected will come from the standard report generated by the MIS (Operation Tool).
- Status of SWM services, waste collection, transportation, treatment and disposal (quantitative information coming from the standard report generated by the MIS tool). ULB will include its observations and comments on the numbers.
- Details of physical and financial progress of Sub-Projects (quantitative information coming from the standard report generated by the MIS tool). This would help in tracking the progress of the sub-projects and also ascertain if there are any challenges
- Status of grievance redressal (quantitative information coming from the standard report generated by the MIS tool), actions planned and timeline for open grievances, reasons for non-compliance if any.
- Human resource capacity available for SWM (quantitative information coming from the standard report generated by the MIS tool). ULB will provide comments on status of recruitment of SWM Staff including women's groups, against the Annual Staff Requirement Plan for SWM and Hiring Schedule.
- Details of the Beneficiary satisfaction survey and impact assessment survey and observations from the survey

The format for the Monthly Progress Report is provided in Annexure A.10.3 in Volume 3.

vii. **Status of Procurement:**In addition to the above monthly reporting,theULB-PIUs will prepare and submit a **Procurement Report(for component 2)** on a **quarterly basis.** The report will include details regarding the status of procurement for various sub-projects, with details of projects tendered, stage of tender, due dates, schedule of procurement for other sub-projects, work order / purchase order wise report for goods, services, works etc. The reports shall be forwarded to DPMU for review and submitted to SPMU for record.

The format for the Quarterly Procurement Report is provided in Annexure A.10.6 in Volume 3.

In addition to the above, the ULBs will be responsible for communicating the details of the procurement packages to be tendered for component 2 subprojects to SPMU as and when required. The SPMU will be responsible for managing the STEP system for getting the Bank's approval for such requested projects on behalf of the ULBs. Communication regarding the Bank's clearances received for the procurement should be timely conveyed to the ULBs by SPMU.

- 3. Monitoring and reporting to/ by DPMUs will include the following:
 - i. Receive and review **Monthly Progress Reports** from the ULBs with details as mentioned above. The DPMU will consolidate the information for each ULB under its purview for onward submission to SPMU.
 - ii. Receive and review quarterly **Procurement Report** from the ULBs for onward submission to SPMU.
 - iii. Receive and review **Reports from IVAs** regarding the eligibility criteria for the access to grant by the ULBs.
 - iv. The DPMUs, with assistance from DPMC and with necessary inputs from ULBs, will be responsible to monitor and record the environment and social compliance status of the operation of treatment plants, MCFs, RRFs, landfills under its purview, and ensure the ET and SM tools are updated with such data.
 - v. To review the ULB level activities periodically, each DPMU will conduct **Beneficiary Satisfaction Surveys** and impact assessment survey in each ULB in the first, fourth and sixth years to gather citizen feedback. The guidelines for the survey and reporting format will be defined by DPMC and approved by SPMU. The agency conducting the survey will prepare and submit a **Beneficiary Satisfaction Survey Report to the DPMU.** The report will include details of the methodology followed, checks and reviews performed, analysis of information, observations and conclusion.
 - vi. At the end of each quarter, the DPMU with support from DPMC will collate data and information from the Monthly Progress Reports and the online MIS tools, and submit the **Quarterly Progress Report** to the SPMU with the following details:
 - Updated figures corresponding to each intermediate result indicator for Component 1 and 2 for the ULBs under its purview (quantitative information coming from the standard report generated from the MIS tool), observations on the numbers and remarks.
 - Details regarding achievement of eligibility criteria like criteria achieved, yet to be achieved, current status, actions planned and timelines, probable timeline for achievement of eligibility criteria.
 - Status of sub-projects (including physical and financial progress, environmental and social compliance) (quantitative information coming from the standard report generated from the MIS tool)
 - Timelines of ULBs for: accessing incentive grants for improving SWM services, issue of by-laws, issue of city level SWM plans, conducting beneficiary satisfaction survey and impact assessment survey
 - Status of compliance with ATs, steps taken, actions planned and targeted timeline for compliance.
 - Details of the Beneficiary satisfaction survey and impact assessment survey (if performed in the period of reporting), observations from the survey and action points

The Quarterly Progress Report should be submitted in the prescribed format provided in Annexure A.10.4 in Volume 3.

- vii. In addition to the above, the DPMU will prepare and submit **AT compliancereport** to the SPMU annually with details of compliances with ATs, to ensure that the sub-projects are part of the eligible investment menu and are designed and implemented in compliance with basic technical, fiduciary and safeguards systems as outlined in PIM, ESMF and procurement manual.
- viii. For Component 3, at the end of each month, DPMU with assistance from PMC will collate details for Results Monitoring, regarding solid waste management disposed safely in engineered landfills and status of regional sub-projects and input the details, in the MIS (Operational Tool and IM Tool).

The operators/ organisations will be responsible for reporting the following information to DPMU on a monthly basis:

- Operators of transfer stations and city/ regional landfill sites will weigh and record the amount of waste transferred to their sites.
- Operators of regional MCF/RRF/MRF facilities will weigh and record the amount of NBDW transferred to their sites on a daily basis, total plastic waste segregated from the NBDW, weight of plastic waste sold/ given out to road contractors/ cement manufacturers/ other organizations for reuse/ recycling.
- Operators of any regional biomedical waste management facilities will weigh and record the amount of waste transferred to the facility.
- Status of closure/remediation of existing waste dumpsites and development of incremental disposal cells as interim safe disposal facility
- ix. For environmental and social monitoring, DPMU will have the following tasks, as per the ESMF documents prepared by SM, and discussed in section 10.2.4 of this document:
 - Receive and review **Monthly Supervision Report** prepared by PIU / PMC regarding EMP compliance and prepare **Quarterly Supervision Report** based on a monthly report by PIUs/PMCs, Monitoring report by Quality assurance Consultants and quarterly supervision by DPMU for submission to SPMU
 - Receive and review the **Quarterly Social Safeguards Monitoring reports** prepared by DPMC for submission to PMC
 - Prepare and submit **Monthly progress reports on safeguards implementation** to SPMU
 - Conduct community consultations with support from the PMC on a quarterly basis
- 4. Monitoring and reporting to/ by SPMU will include the following:
 - i. Receive and review Quarterly Progress Reports from each DPMU, as detailed above and submit the same for information of Project Director.
 - ii. Receive and review AT compliance from DPMUs and prepare a consolidated report for PD and Bank.

- iii. Receiving **Reports from IVAs** and reviewing the eligibility criteria for the access to grant by the ULBs.
- iv. Receive and review Trainings Report from respective training organisations, with quantitative information from the MIS (TCB Tool).
- v. Prepare quarterly **Consolidated Progress Report** based on Quarterly Progress Reports received from DPMUs. The report will contain consolidated information from the reports from the DPMUs and updated figures corresponding to each intermediate result indicators for Component 1 and 2. The format for the Consolidated Progress Report is provided in Annexure A.10.4 in Volume 3.
- vi. <u>Status of Procurement:</u> The procurement department of SPMU will initiate and upload the details of procurement for new sub-projects on the STEP system and will update the status on a regular basis based on inputs from the ULBs. The SPMU will also prepare a **Procurement Report (for component 1** and 3) on a quarterly basis and submit the report to SM for review. The format for the Quarterly ProcurementReport is provided in Annexure A.10.6 in Volume 3.
- vii. The SPMU with inputs from DPMU and MIS (Operational tool) will prepare a **Quarterly Progress Report for Component 3**, with details regarding physical and financial progress of sub-projects for the development of regional landfills and cluster-based facilities, SWM related status for regional facilities. The format for the report is provided in Annexure A.10.5 in Volume 3.
- viii. For environmental and social monitoring, SPMU will have the following tasks, as per the ESMF documents prepared by SM, and discussed in section 10.2.4 of this document:
 - Receive and review Safeguards monitoring report by Quality Assurance Consultants along with monitoring of Civil Works
 - Receive and review **Quarterly Supervision Report** prepared by DPMU regarding EMP compliance
 - Receive and review **Safeguards monitoring report** prepared by Quality Assurance Consultants
 - Receive **Annual Environmental Audit reports** for select projects (all E1, S1, and select E2, S2) prepared by independent consultants appointed by SPMU. SPMU will review these audit reports and identify technical, managerial, policy, or regulatory issues with regards to the compliance of the EIA and EMP reports.
 - Receive and review the **Quarterly Social Safeguards Monitoring reports and social audit report as per the scheme cycle included in Chapter 3** prepared by PMC based on the consolidation of monthly safeguards monitoring reports from all districts and submit to The World Bank.
 - Appoint **Independent Safeguards Audit Consultants** to conduct half-yearly Social Audit of selected sub-projects for compliance with the TDF-SMF and RPF and RAP implementation

- Receive **monthly progress reports on safeguards implementation** from DPMU
- Prepare an **annual report of the social development outcomes in the project districts**
- Undertake quarterly field visits to those projects which are under implementation to review the implementation of environmental safeguards

10.3.3. Financial progress

FM arrangements for components 1 and 3 of the project would be handled by SPMU, whereas FM arrangements for components 2 will be handled by participating ULBs with support from SPMU and DPMUs.

The reporting requirements for monitoring and evaluating the financial progress are listed below:

- i. For component 2, the ULBs will maintain the record of detail of the expenditures incurred for each period against each sub-project, along with necessary documents and invoices, and cumulative grants received till date. Each ULB will provide the details to its respective DPMU in the **Quarterly Grant Utilization Reports as per format attached at Annexure A.11.2 in Volume 3.**
- ii. The DPMU will monitor the expenditures undertaken by the ULBs, ensuring that they are eligible as per the project guidelines. DPMUs will report the details of expenditures undertaken by the ULBs to the SPMU in its Quarterly Progress Reports. Observations regarding deviations and eligibility of expenses should be discussed with the SPMU in the biannual meetings.
- iii. SPMU will reconcile the funds released and corresponding utilization made by ULBs from the information provided in the periodic progress and financial reports to include in the **Consolidated Progress Report**.
- iv. For component 1 and 3, SPMU will keep an account of the funds released. PMC will include details on the actual expenditure incurred for components 1 and 3 in the financial report (PFS/ IFR format as per agreed and included in the Section 11 of this PIM). PMC will also collate the expenditure details for all the project components and status of allocation of funds based on review of Validation Report received from IVA and will prepare the six-monthly consolidated IFRs for submission to the Bank as per the formats attached at Annexure A.11.1in Volume 3.
- v. Based on the periodic reports received from the ULBs and DPMUs, the PMC also prepare the **Annual Financial Statement** for the state SWM which will be audited annually by the Comptroller & Auditor General (CAG).
- vi. Reports from IVAs will be submitted to the SPMU (with a copy to DPMU) which would include details of the compliance of eligibility criteria ad corresponding approved grant allocation.
- vii. DPMUs will prepare **Annual Report of AT compliance** with details of the compliance with annual triggers, remedial action taken against observation / non-compliance of annual triggers etc. including details on grant suspended.
- viii. In addition to the above, the DPMUs will also assist the SPMU to prepare a Grant Allocation and **Grant Utilization Report**, detailing the status of grant utilization for

sub-projects under each component, including grant suspended. Format for the report along with details to be included in the report are detailed in Section 11 of this PIM.

ix. The PMC will prepare and submit **Grant Allocation/ Reallocation Announcement Report** to SPMU based on the status of AT compliances and grant utilization by the ULBs. The report would be prepared based on the Grant Management Manual, as defined in Chapter 6 of this PIM.

10.3.4. Environment and Social Safeguards Monitoring and Reporting

Environment and Social Safeguards Monitoring and Reporting would be an important part of this project to ensure environment and social safeguard compliance for all sub-projects which would be implemented as part of the KSWMP Project under the World Bank.

Monitoring of safeguards shall be carried out through the state Environmental and Social development Unit (S-ESDU) and District- Environmental and Social development Unit⁴³ (D-ESDU). Monitoring of Environmental components will be carried out through environmental compliance reports that form part of Quarterly Progress Reports. S-ESDU shall ensure that the D-ESDUs make adequate internal arrangements to monitor the EMP/SMP implementation quarterly, receive regular monitoring and progress reports from PIUs/PMCs, and in turn submit regular progress reports including environmental compliance reports to The World Bank.

For effective management of safeguards, the project will prepare a Safeguards Information Management System (SGIMS) for monitoring ESMF compliance and recording the improvements in environmental and social parameters. This will be updated daily by PIU and DESDU and will be continuously monitored and reviewed by SESDU (State Environment and Social Development Unit). Management Information System linking project details, scheduling, and documentation to the EIA process and EMF implementation will support the SPMU in effectively guiding the preparation of safeguard instruments, supervision, and monitoring.

10.3.4.1. Reporting requirements

The roles and responsibilities of the various agencies for monitoring and reporting of the environmental and social compliance shall be as follows, the details of which are further described in the ESMF documents finalized by SM:

- Environment Monitoring Framework (EMF) as per the ESMF documents finalized by SM requires the following monitoring and reporting measures:
 - PIU, with the support of TSC, will monitor the implementation of EMP measures during implementation monitoring and report to DPMU / SPMU.
 - Reporting on Safeguards / EMPs will be: Monthly Implementation Report by Contractor to PIU; Monthly Supervision Report by PIU / TSC to DPMU, Quarterly report by DPMU to SPMU (based on a monthly report by PIUs/TSCs, Monitoring report by Quality assurance Consultants and quarterly supervision by DPMU).

⁴³ As per the DPMU organisation structure finalized with SM and as discussed in chapter 3 of this PIM, there is only one Environmental Engineer position at the DPMU, which will be considered as D-ESDU for this purpose.

- SPMU will undertake quarterly field visits to those projects which are under implementation to review the implementation of environmental safeguards and the findings will be shared with respective implementing agencies for their follow-up. The non-compliance and their remedial measures will be highlighted in these reports which will be communicated and followed-up.
- **Safeguards monitoring report by Quality Assurance Consultants** along with monitoring of Civil Works when the works are ongoing and at work exit/operations.
- Annual Environmental Audit for select projects (all E1, S1, and select E2, S2) by independent consultants. SPMU will undertake annual audits to review the status of EMF compliance. SPMU will review these audit reports and identify technical, managerial, policy, or regulatory issues with regards to the compliance of the EIA and EMP reports.
- Social Monitoring
 - The ULB-PIUswith inputs from the TSC will prepare and submit monthly social safeguards monitoring report to DPMC. The DPMC will scrutinize these, add their own social monitoring reports and that of TSC if any, prepare Quarterly Social Safeguards Monitoring Reports and submit these to the D-ESDU⁴⁴. The D-ESDU will scrutinize these before submission to S-ESDU.
 - The PMC will consolidate the quarterly safeguards monitoring reports from all districts and prepare **quarterly consolidated safeguards monitoring reports**. Though the safeguards quarterly monitoring reports are prepared by S-PMC, the S-ESDU will be responsible for vetting them before submission to the Bank. The SPMU will submit quarterly Social Safeguards Monitoring reports to The World Bank.
 - Independent Safeguards Audit (ISA): The SPMU will appoint Independent Safeguards Audit Consultants to conduct half-yearly Social Audit of selected sub-projects for compliance with the SMF/TDF and RPF and RAP implementation. This Social Audit will be conducted from the second year of project implementation.
 - For Safeguards supervision, all the sub-projects will be visited at regular intervals by Social Specialists of D-ESDU to check if all safeguard requirements are met and to identify any issues that need to be addressed. The ULB-PIUs, TSCs and DPMCswill support the DPMUs in this regard. DPMUs would submit quarterly progress reports on safeguards implementation to SPMU. Using these reports and field visits, the SPMU will monitor safeguards implementation.
 - The concurrent internal social monitoring will be done as part of the regular monitoring by the DPMUs, PIUs, and TSC and DPMC consultants. However, DPMU, with the help of in-house Social Specialists will do the regular social

⁴⁴ As per the DPMU organisation structure finalized with SM and as discussed in chapter 3 of this PIM, there is only one Environmental Engineer position at the DPMU, which will be considered as D-ESDU for this purpose.

monitoring of sub-projects for safeguards compliance with the support of SO. The contractors/ implementing agencies/ supervision consultants will do the regular monitoring of SMF/TDF and RPF implementation of all sub-projects. This is done under the supervision and coordination of the Social Specialists at DPMUs and SPMU.

• The SPMU will prepare an **annual report of the social situation in the project districts** including data and analysis of relevant parameters. The indicators will include parameters on social inclusion, citizen engagement, enterprise development, land required, livelihood of the vulnerable, labour compliance, GBV and GRM. Thematic monitoring, Annual Environment Audit and Social Audit will be carried out.

The D-ESDUs will be responsible for monitoring and evaluation of the compliance to environmental and social requirements, and to track the reporting on compliance to Annual Environment Audit and Social Audit, using the ICT tools, and generate progress reports. This will be updated daily by PIU and DESDU and will be continuously monitored and reviewed by SESDU.

The relevant experts at DPMU shall i) undertake a monthly visit to subprojects to ensure compliance with ESMPs, TDP-RAP and guide and support PIUs/TSC/Support Organization/contractors to oversee safeguards management, ii) review monthly progress reports by PIUs to resolve any issues, and iii) prepare quarterly progress reports on ESMF implementation (based on the monthly reports of PIUs and their observations during monthly visits) and submit to S-ESDU, iv) join the field visits undertaken by S-ESDU and the WB as part of the monitoring of the subprojects.

The progress reports should include monthly concurrence monitoring, thematic reports, ESMP/RAP/TDP implementation monitoring for dumpsites closures and remediations, and annual of compliance of ESMF –TDF-SMF and RPF.

S-ESDU will be responsible for the preparation, implementation and monitoring of RAP, review and monitoring of ESMF for all regional projects, and periodic reporting to the World Bank.

S-ESDU will carry out field visits to all sub-projects, the progress of implementation.

10.3.4.2. Safeguards Information Management System

For effective management of safeguards, the SM/ SPMU is in the process of development of suitable ICT tools to monitor the social and environment safeguards. The tools would cover labour management, land management & rehabilitation and the various social and environment factors through the pre-planning, planning, implementation and closure phases of the sub-project scheme cycle. They will help in providing real time information. They would be called the Safeguards Information Management System (SGIMS)⁴⁵ in the form of ICT tool for monitoring ESMF compliance, EMP implementation and recording the improvements in environmental and social parameters. Management Information System linking project details, scheduling, and documentation to the EIA process and EMF implementation will support the SPMU in effectively guiding the preparation of safeguard instruments, supervision, and monitoring.

⁴⁵ This would be a part of the SM tool as listed along with the other tools which form a part of MIS system

The EMPs shall be included in the bid documents for all projects under this KSWMP, which shall guide the contractor to prepare Contractors EMP at the start of implementation for effective environmental management of the subproject and reporting. Each of the contractors which would be engaged as a part of this KSWMP project, including but not limited to EPC, BOT/BOO contracts etc. will be responsible for providing the necessary data on a periodic basis for inputs to the SGIMS system. Such requirement should also form a part of the bidding documents and the Concession Agreements for all projects to be proposed under KSWMP.

The SGIMS tools would form a part of the SM tool of the MIS system which tracks the project progress and aligns the same with the environmental safeguard implementation such as EIA report preparation, procurement of relevant clearances, EMP implementation will help the executing agency to effectively supervise and monitor all subprojects. For example, the interlinkage of the MIS should not allow a contractor to start construction work until the environmental and social compliances have been met, compensation is paid, and RAP is implemented.

The details on the tools being developed has been provided below.

Labour M&E system

Indian Labour Law Compliance: Handbooks and Toolkits has been prepared to provide comprehensive guidance and support for ease in implementation of labour laws. Additionally, the Software Tool (Monitoring Information System and Mobile application) has been developed for tracking employment and monitoring compliance of labour laws on real time basis. Features of the software solution include continued feedback of supervisors on records, generation of reports for project owners, and a single point for record-keeping and convenient access. The software solution seeks to make labour compliance a part of operations and the contract management information system.

Land Acquisition and Resettlement and Rehabilitation (LAR&R)

The Process Monitoring System shall be an enterprise solution to provide effective and efficient management of LAR&R implementation process to improve transparency in the process via this system and ensure that the same is made universally available to the involved stakeholders. The solution shall assist in carrying out operational and administrative processes to better manage the LAR&R activities. The IT solution will be for Process Monitoring that shall support backend data management and uploading field data on real time basis.

Scheme Cycle Monitoring with regard to Social Safeguards

The app and software would be developed based on the scheme cycle developed duly covering the pre-planning, planning, implementation and closure stages. This would help in monitoring the social safeguards at each and every applicable step.

Social management for ULB level scheme cycle and ULB level investments is included in Chapter 7.

10.3.5. Timeline for rollout of M&E framework

At the beginning of the project, the M&E Expert at the PMC/ SPMU will be responsible for defining the timelines for the rollout of entire M&E framework including all ICT tools. The

framework should list timelines for activities including but not limited to: development of necessary tools listed under MIS system, on-the-job training and capacity building of staffs for use of MIS system for periodic monitoring and reporting, flow of information amongst various stakeholders and inputs in reporting formats, operation and maintenance and periodic calibration of systems in use for real-time monitoring; define guidelines and reporting format for Beneficiary Satisfaction Survey and impact assessment survey to be conducted by ULBs and get approval by SPMU. These activities shall be completed within 6 months from the commencement of the project.

10.3.6. Reporting Calendar for M&E Framework

The organisations are required to comply with the reporting requirements and timelines mentioned in the reporting calendar below:

S.	Report/	To be Filled/	To be	Frequency of	Timeline for
No.	Activity for	Prepared/	Submitted to	Reporting	Submission
	Periodic M&E	Collected by			
1.	SWM field data (information relevant for weekly input in the form of a logbook as defined under as per Section 10.2.2 point 1. i, and under the heading 'Status of SWM' in Annexure 10.2)	Agencies/ Operators working on SWM delivery in each ULB	ULB for input to MIS (Operational Tool)	Weekly	Every Tuesday (next business day if Tuesday is a holiday). Endeavour to make real time MIS.
2.	Site visit check list for Physical and financial progress for Component 2 sub-projects (refer to Annexure 10.7 for indicative format)	ULB site officers	Relevant Expert at ULB PIU for input into MIS (IM Tool)	Monthly	Within 5 days from the end of each month
3.	Site visit checklist for physical and financial progress for Component 3 sub-projects (refer to Annexure 10.7 for indicative format)	ULB site officers	DPMU for input into MIS (IM Tool)	Monthly	Within 5 days from the end of each month

Table 10-6: Reporting Matrix for M&E

S.	Report/	To be Filled/	To be Submitted to	Frequency of Reporting	Timeline for
NU.	Periodic M&E	Collected by	Subilitieu to	Reporting	500111551011
4.	Monthly Progress Report (refer to Annexure 10.3 for indicative format)	ULBs	Respective DPMUs	Monthly	Within 7 days from the end of each month
5.	Monthly Implementation Report for EMP (refer to Annexure 10.10 for indicative format)	Contractor	ULB	Monthly	Within 5 days from the end of each month
6.	Monthly Supervision Report (refer to Annexure 10.10 for indicative format)	ULB/ TSC	DPMU	Monthly	Within 7 days from the end of each month
7.	Monthly Social Safeguards Monitoring Reports (refer to Annexure 10.10 for indicative format)	PIU/DPMC	DPMC/ D-ESDU	Monthly	Within 7 days from the end of each month
8.	Training Implementation Report(refer to Annexure 10.9 for indicative format)	KILA/ Training organizations (using TCB Tool)	SPMU	Quarterly	Within 10 days from the end of each quarter
9.	Quarterly Progress Report (refer to Annexure 10.4 for indicative format)	DPMUs	РМС	Quarterly	Within 10 days from the end of each quarter
10.	Consolidated Progress Report (refer to Annexure 10.4 for indicative format)	РМС	SPMU	Quarterly	Within 15 days from the end of each quarter
11.	Quarterly Progress Report for Component 3	РМС	SPMU	Quarterly	Within 15 days from the end of each quarter
S. No.	Report/ Activity for	To be Filled/ Prepared/	To be Submitted to	Frequency of Reporting	Timeline for Submission
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	Periodic M&E	Collected by			
	(refer to				
	Annexure 10.5				
	format)				
12	Quarterly	DPMII	SPMII	Quarterly	Within 10 days
	Implementation	DINO	01110	Quarteriy	from the end of
	report on EMP				each quarter
	(based on a				
	monthly report				
	by PIUs/PMCs, Monitoring				
	monitoring report by				
	Ouality				
	assurance				
	Consultants and				
	quarterly				
	supervision by				
12	DPMUJ. Ouarterly		SDMIL/WR	Quarterly	Within 10 days
15.	safeguards	1 MC/ 3-E3D0	51 107 100	Quarterly	from the end of
	monitoring				each quarter
	reports (refer to				-
	Annexure 10.10				
	for indicative				
11	format)	DMC	SDMII	As por the	
14.	Allocation /	F MC	3F MU	Grant	
	Reallocation			Management	
	Announcement			System	
	Report(refer to				
	Annexure 6.1				
	for indicative				
15.	Grant	ULBs	DPMU and	Monthly	Within 7 days
	Utilization		SPMU		from the end of
	Report(refer to				each month
	Annexure 11.2				
	for indicative				
16	IFR	PMC	WB	Biannually	Within 15 days
10.	(refer to	1 110		Diamually	from the end of
	Annexure 11.1				2 nd and 4 th
	for indicative				quarter of each
	format)				year
17.	FM Supervision	-	-	Biannually	-
	[UDServations				
	supervision may				
	be recorded				
	appropriately]				

S. No.	Report/ Activity for	Report/To be Filled/To beActivity forPrepared/Submitted toDeried is M&FCallested has		Frequency of Reporting	Timeline for Submission	
18.	Reports from IVAs [external agency to use a suitable reporting format to include necessary details]	IVA	SPMU	Annual	Within 10 days of completion of verification	
19.	Annual report of the social situation in the project districts (Refer Annexure A10.10 for indicative format)	SPMU	WB	Annual	Within 15 days from the end of the year	
20.	Annual Audit Report [external agency to use a suitable reporting format to include necessary details]	Auditing Agency	DPMU	Annual	Immediately upon completion of audit	
21.	Annual Environmental Audit for select projects (all E1, S1, and select E2, S2) [external agency to use a suitable reporting format to include necessary details]	Independent consultants/ Auditing Agencies	SPMU	Annual	Immediately upon completion of audit	
22.	Independent Safeguards Audit (ISA) [external agency to use a suitable reporting format to include necessary details]	Independent consultants/ Auditing Agencies	SPMU	Annual	Immediately upon completion of audit	
23	Beneficiary	Independent	DPMU	Baseline (end	Within 10 days	

S. No.	Report/ Activity for	To be Filled/ Prepared/	To be Submitted to	Frequency of Reporting	Timeline for Submission
	Periodic M&E Satisfaction Survey Report [external agency to use a suitable reporting format to include necessary details]	Agency		of 1 st year), Mid-term (end of 4 th year) and End-term (end of 6 th year)	of completion of survey
24.	Procurement Report - ULB for Component 2 - SPMU for Component 1 & 3(refer to Annexure 10.6 for indicative format)	ULB/ SPMU	SM	Quarterly	Within 10 days from the end of quarter
25.	Social Audit Report [external agency to use a suitable reporting format to include necessary details]	External Agency	SPMU	Annual	Within 10 days of completion of audit
26.	Annual Staff Requirement Plan for SWM and Hiring Schedule for next year(refer to Annexure 10.8 for indicative format)	ULBs	DPMU	Annual	Along with Annual Plan
27.	MIS Reports generated from the MIS System (TCB Tool, GRMS Tool, Grants Tool, IM Tool, Operational Tool, EM Tool, SM Tool)	-	-	Can be fetched from the MIS system for any desired period	-

10.3.7. Reporting matrix for M&E Reporting for KSWMP program

The reporting matrix for the monitoring and evaluation purpose would be as follows:

Figure 10-2: M&E Reporting Matrix flowchart



Chapter 11. Financial Management Systems

A financial management assessment of the LSGD, participating ULBs (Municipalities) & Suchitwa Mission (SM) was undertaken as part of appraisal of the Kerala Solid Waste management Project ("the Project"). The assessment focused on the respective institutions' capacities in the areas of budgeting, fund flow, accounting, financial reporting, internal controls and auditing. The assessment revealed that at ULB level, there were well laid rules, regulations and procedures for the aforesaid activities but their implementation and adherence to significant timelines have issues and need substantial improvement. Nevertheless, it can be reasonably determined that as long as ULBs adhere to the current systems, rules, regulations and timelines and their capacities in terms of FM staff and separate PIUs within the ULB are strengthened, ULBs will be able to handle the Component 2 funds and maintain necessary fiduciary oversight and control over the funds disbursed and expended. Similarly, the assessment at the SM level revealed that setting up a dedicated PMU within SM with required technical and support staff and strengthening their FM capacities is imperative. SM will then be capable of implementing the Project and handling the funds released and expended under Project Components 1 and 3 by maintaining necessary fiduciary oversight.

The proposed Financial Management (FM) arrangements are in line with the fiduciary requirements of OP 10. The project will operate on a joint co-financing approach with AIIB covering all components. A dedicated pooled Designated Account (DA) in US dollars will be used to remit World Bank/AIIB funds to the project through CAAA & GoK. The disbursement method to be used will be "Advance" and "Re-imbursement" for Bank/AIIB funds. Disbursements amounting to a maximum 15 percent of the total WB/AIIB loan value, will be remitted under "Advance" method at project commencement, after which the subsequent disbursements from WB/AIIB would follow "Re-imbursement" method. Under "Reimbursement" method, GoK would need to pre-finance the project expenditures related to total loan as well as GoK share, using GoK funds first and later claim re-imbursements from WB/AIIB. Disbursements will be report-based using Interim Financial Reports (IFRs). Initially under advance method, the advances will be deposited into the DA by the Bank/AIIB. Thereafter, replenishments/withdrawals from the DA will be made based on the annual forecasts in the six monthly IFRs for the maximum of 15 percent of loan value.Consolidated IFRs for the project will be prepared by the SPMU at SM and will be submitted to Bank within 45 days following the end of each period under both advance and re-imbursement method.Annual Financial Statements of the project will be prepared by the SPMU and audited annually by the Comptroller and Auditor General (CAG). These audited financial statements, together with the auditor's report, will be submitted to the Bank within six months of the end of the fiscal year. There are no overdue audit reports or ineligible expenditures under the Bank financed GoK implemented projects.

The Project will be jointly financed by the AIIB/Bank (50:50) to the extent of USD 210 Mn and the GoK to the extent of USD 90 Mn over the expected Project period of 6 years. The GoK share of project funding needs to be provided alongside USD 210 Mn of AIIB/IBRD funds at agreed percentages. The GoK share of USD 90 Mn is over and above the existing annual

development plan fund allocation to SM/ULBs. The budget allocation for the entire project has to be provided on top of the existing allocation for regular activities. The allocation has to be made yearly for that particular year's budgeted expenditure (in case of multi-year projects and multiyear forecasts and unutilised expenditure that gets carried over to future years, the budget provision will reflect the expenditure equivalent to the financial year including unutilised expenditures that are carried over). The GoK has to create distinct sub-major heads and budget line items to track the Project funds and expenditure. The Bank funds will come to the State under the advance and reimbursementmode and the corresponding contribution of GoK would also need to be made available alongside the Bank's portion of funds to ensure seamless project implementation.

The PMU at SM (the SPMU) will be responsible for overall oversight and monitoring of funds and expenditure under all the 3 components of the Project. In order to ensure this, the participating ULBs will, through their respective DPMUs, interact and work together with the PMU at SM.

The FM arrangements for the Project are as follows:

11.1. Budgeting

The Project will be budgeted in the State Budget under LSGD. The Government of Kerala will open a separate line item for the Project under the appropriate Major Heads as indicated below:

- a) A sub major head under the expenditure Major Head 2217 (or any other code to be determined by State Planning Board or Finance Department, Government of Kerala from time to time) for releasing funds under the Components 1 and 3 of the Project – Institutional development, Capacity Building and Project Management & Development of regional SWM facilities - to SM-PMU. The source for this activity will be the Annual Plan of SM in which the funds' forecast for component 1 and component 3 of the Project will be separately identified
- b) A sub major head under the Major Head 3604 (or any other code to be determined by State Planning Board or Finance Department, Government of Kerala from time to time) Compensation and assignments to local bodies and Panchayati Raj institutions in the Demand for Grants of the LSG department, for releasing funds to LSGs under the Component 2 of the Project Grant Support to ULBs for SWM. Below this, one minor sub-head/s will be created for ULBs. The source for this activity will be the Annual Plans of ULBs as approved and forwarded by the respective DPCs and as further consolidated at LSGD.

These sub-major heads will be distinct from the other regular budget lines of the government. The expenditure on various activities of the Project will be incurred from the funds disbursed under these sub-major heads and will be subject to internal audit by the Internal Auditors appointed for this purpose and external audit by the CAG and/or its authorised representative institutions such as Local Fund Examiner or the Chartered Accountants.

11.2. Fund Flows and Disbursement Arrangements

The Kerala State Treasury System and the LSG financial management systems will be used for transferring and accounting for the funds under the Project in much the same way as for existing grants/fund releases by the State Government.

11.2.1. Fund Flows for Components 1 and 3

The SPMU will open a Special Treasury Savings Bank Account (STSB) into which the funds will be released by the GoK from the State Consolidated Fund for incurring expenditure under Components 1 and 3 of the Project. This will be done using the regular treasury system of the Government of Kerala, but the funds will physically be transferred to the STSB as per the requirements of the SPMU. Physical transfer of funds would happen to STSB account using WB/AIIB funds that may come initially on advance basis. Subsequently when the project shifts to re-imbursement method, the physical funds transfer would need to happen from GoK consolidated fund to STSB account.Expenditure for various activities under Components 1 and 3 will be expended by SPMU from the STSB account. In respect of expenditure incurred by any supporting agency/institution (refer Responsibility Matrix attached at Annexure A.3.2 in Volume 3) for providing services to SM/SPMU/DPMUs and ULBs under these components, SPMU will process the bills of the related vendors/suppliers directly and pay the same from the STSB account. GoK will ensure that all payments made through the STSB account is exempted from all restrictions imposed by state for other regular funds.

The SPMU will collate the expenditure for all project components (Components 1, 2 and 3) and prepare the six-monthly IFRs, in the format attached at Annexure A.11.1 in Volume 3 for submission to CAAA (GoI) for onward transmission to the Bank. A copy of these IFRs will be forwarded by the SPMU to LSGD (simultaneously while being transmitted to the Bank) for information and control.

11.2.2. Fund Flows for Component 2

A total of 6 Municipal Corporations (MC) and 87 Municipalities' participate in the Project, who will be provided grants in accordance with the Grant Management System detailed in Chapter 6 of this PIM. At the ULB level, the grant funds from the Project will be separately identifiable in the ULB budget and its books of accounts and the funds will be used only for the approved activities under the Component. The grants to ULBs will be released once a year in a single instalment, in the beginning of the financial year.. In line with the ULB financing mechanisms currently followed by the State Government, "release" will not mean actual cash outflow of funds to ULBs, but an authorisation limit or "allotment" for the participating ULBs to incur expenditure up to that limit over a specified period of time.

The rules and procedures as envisioned in the Kerala State Treasury System and the ULB Financial Management Systems will be used for releasing the grants from the State Consolidated Fund to meet expenditure on various activities eligible under the Component 2. Accordingly, the funds will be directly allotted from State Consolidated Fund to the treasury

account⁴⁶ of the respective MC/Municipality. Unspent grants (i.e. the value of the Letter of Allotment minus the actual expenditure disbursed by the Treasury) in this account will not lapse and will be carried over to the next year thus ensuring timely access to funds. The unspent balances will be reported as Annex to the IUFR and will be monitored by the SPMU and the Bank and appropriate remedial action, in consultation with the LSGD, GoK, will be taken if the unspent balances become significantly large. The grants disbursed by the Bank (to GoK) and remaining unutilised by the closing date of the Project, will be refunded to the Bank. In the event of non-conforming expenditure by ULBs on items or activities which are ineligible or non-compliant in terms of the Grant Management System (Chapter 6), remedies will be exercised as per the Grant funding in the subsequent year, in accordance with normal Bank procedures.

CAAA (Government of IUFRs/Advance Applications State Government of Kerala ISGD SPMU Cash Transfer ULBs Letter of Allotment

The Fund Flow arrangement for the Project is as below, for immediate reference:

Figure 11-1: Fund flow arrangement for the Project

Forecast of funds for ULBs under component 2 and expenditure authorization, raising bills, making payments and accounting for funds usage will be carried out in the same way as for the existing grants using state government financial regulations, systems & processes suitably modified for the additional requirements as detailed in Grant Management System (refer Chapter 6). All payments to contractors/vendors/beneficiaries will be processed by the concerned Treasury/Sub-treasury and no part of the grants will be transferred to the bank account of the ULBs. The steps involved in this process are:

a) SPMU in consultation with ULBs will determine the annual plan size of respective ULB based on (i) status of ULB's eligibility criteria (ii) redressal of outstanding noncompliance to ATs and (iii) projected expenditure on various single-year/multi-year SWM

⁴⁶ There will be no need to open a project specific treasury account. The MC/Municipality will be able to use their existing account with the subtreasury/treasury to which it is mapped.

sub-projects and other eligible activities under component 2 likely to be taken up by ULB in the ensuing financial year. The forecast so arrived at will be included in the Annual Plans of ULBs that are submitted to the DPC for discussion and approval and thence to the state government for including in the appropriate budget head. This is the "Annual Cap" of expenditure that ULBs are likely to incur in the financial year for which their budget is approved by GoK.

- b) Upon the approval of the annual budgets (as part of the GoK's annual budget process) the LSGD (Urban Affairs), GoK issues a "letter of allotment" to participating ULBs once a year, preferably in the month of April with the yearly allotment authorising the ULBs to draw/expend the amounts stated in the letter of allotment. A copy of this letter will also be sent to the Treasury/Sub-treasury of the ULBs. The ULBs will also communicate to their respective treasuries of the amounts they are authorised to draw/spend as per their respective letter of allotment.
- c) While the letter of allotment provides the annul fund size up to which a ULB is authorised to spend, SPMU, will have the right to withhold actual expenditure by a ULB for not redressing the non-compliance of previous years ATs and also progress in meeting eligibility criteria. This normally happens by the Project Director addressing a letter to LSGD for withholding the expenditure and the LSGD in turn advising the concerned Treasury.
- d) The ULBs will maintain a Project specific dedicated line in their budget and accounts and record the releases in that account to track the allotments as well as the expenditure from such allotment.
- e) The administrative and technical sanction for the sub-projects to be implemented by the ULB will be given Municipal Council and the Project Director as shown in Project Approval Matrix at Annexure A.3.7 and Annexure A.3.8 in Volume 3. The ULB will be assisted by a district-level Technical Support Consultant (TSC) team and the DPMU in overseeing the implementation of its sub-projects.
- f) The expenditure will be incurred in accordance with the Grant Management System (Chapter 6). The Contractor/Vendor/Beneficiary submits an invoice together with supporting documents for payment for goods/works/services supplied/rendered. The bills will be verified by PIU in association with TSC and approved by ULB Secretary.
- g) ULB-PIU submits the bills/invoices along with necessary documents to the concerned treasury/subtreasury for payment to the contractor/vendor/beneficiary.
- h) Treasury/sub-treasury processes the bills and issues a payment order to the Treasury Bank.
- i) The payment order/s are processed by the bank and amounts transferred to the accounts of the contractors/vendors/beneficiaries.
- j) The bills are returned to the ULB with Treasury/Sub-treasury payment stamps for necessary accounting and reporting.

The ULB will maintain accounts for component 2 receipts and payments, collate all the expenditure incurred on various activities under this component and shall prepare a quarterly Grant Utilisation Report in the format attached at Annexure A.11.2 in Volume 3. The GURs will be submitted to DPMU for verification and onward submission to SPMU. The GURs will feed into the preparation and submission of six monthly IFRs by SPMU. The expenditure will be subject to such controls and fiduciary arrangements as detailed in the "Internal Controls" in Section 0 of the PIM.

Considering that a portion of Bank and AIIB funds are disbursed in advanceat commencement of project, also in order to ensure smooth implementation of KSWMP activities& subsequently under the re-imbursement approach where GoK would need to pre-finance expenditures, GoK has specifically agreed for a legal covenant in the Project Financing Agreement to ensure uninterrupted funds flow to the SPMU and ULBs and adequate space for expenditure utilization to be made available for the Project. This legal covenant covers the following to ensure smooth implementation of the Project:

- a) The treasury gives priority to process the payments related to the Project.
- b) Any expenditure freezes (like treasury ban) applicable for other state expenditure would not apply to Project.
- c) The Department of Finance would issue authorization/re-authorisation as applicable in the month of April which will include current year and previous year rolled over unutilized allotments if any.
- d) Not to impose ways & means clearance that is restricting payments being made above a certain limit for the Project payments.

Disbursement Arrangements

The disbursement method for the Project is "Advance" and "Reimbursement" for the Bank/AIIB funds. In the case of advance, Bank/AIIB will deposit funds in the Designated Account (DA) in US\$ which is managed by CAAA. The ceiling of the DA will be variable based on the project annual cash forecast. Funds will be transferred from the Bank to the Government of India (GOI) which will pass these funds on to the GoK through the regular budgetary mechanisms between the GoI and the states. To facilitate the withdrawal of funds from the Bank, the SPMU assisted by PMC will forecast the fund requirements (advance up to a maximum of 15% of total loan value), component wise, (based on the annual plans of the ULBs, compliance with Annual Triggers and annual plans for Component 1 and 3 of the project) and include the projected requirement in the IFRs which are submitted to the Bank through CAAA. Consolidated IFRs for the project will be prepared by the SPMU at SM and will be submitted to Bank within 45 days following the end of each period under both advance and re-imbursement method.Based on the IFRs and due diligence of the fund forecast, the Bank/AIIB will deposit its share of funds (the Bank's/AIIB contribution as reflected through the disbursement percentage, the balance being the counterpart funding) into the DA. Immediately upon the receipt of these funds, the CAAA will make arrangements to transfer these funds to the State Consolidated Fund. Soon after the receipt of funds from the Bank/AIIB, the GoK, in turn, will physically transfer the funds along with its share to STSB account of the SPMU to finance expenditure under components 1 and 3 of the Project. The funds relating to component 2, will remain with the state consolidated fund account until drawn by the treasuries to honour the bills of the ULBs. The activities that will facilitate the disbursement of funds by the Bank/AIIB are as below:

Table 11-1: Activities that will facilitate the disbursement of funds by the Bank

	Step No	Activity
•	1	Signing of Loan & Project Agreements by GoK, GoI and Bank

	Step No	Activity
	2	Declaration of Effectiveness of Loan
of Initial Advance	3	SPMU prepares a forecast of fund requirements for first 6 months from date of effectiveness of loan (for initial advance) and submits to Bank's technical team for review and in-principle approval.
	4	Review of the forecast by the Bank's technical team & provision of their in- principle approval.
	5	SPMU/SM requests disbursement of initial advance - preparation of Application of Withdrawal to Bank by SPMU/PMC and submission to CAAA
	6	CAAA to verify and transmit the application to Bank along with six monthly funds' forecast.
nt	7	CAAA to open Designated Account in US \$
Disburseme	8	Bank to review and approve the funds' forecast and remit its share of total fund requirement.
	9	Receipt of Bank's remittance in DA and transfer of funds to CFI account of GOI
	10	Transfer of funds from CFI account of GoI to State CFI account with RBI
	11	Transfer of funds from State CFI account to STSB account of SPMU, KSWMP to meet expenditure under components 1 & 3.
	12	Issue of LOA by LSGD to ULBs for component 2 expenditure

	13	SPMU prepares a consolidated Annual Plan and KSWMP Annual Budget (end of					
	March) & submits to Bank's technical team for review and in-principle approv						
Subsequent Disbursements	14	Discussion of annual plan and budget with Bank's technical team and in- principle approval there of (By 10 th April)					
	15	KSWMP to meet expenditure under components 1, 2and 3 and prepare IFRs on the basis of expenditure made.					
	16	Submission of IFRs (for applicable half-year/year) by SPMU to Bank through CAAA					
	17	SPMU/SM requests disbursement - preparation of Application of Re- imbursement to Bank by SPMU/PMC and submission to CAAA					
	18	CAAA to verify and transmit the application to Bank along with the IFR.					
	19	Bank to review and approve the request and remit its share of total fund requirement					
	20	Receipt of Bank's remittance in DA and transfer of funds to CFI account of GOI					
	21	Transfer of funds from CFI account, GoI to State CFI account with RBI					
	22	Transfer of funds from State CFI account to STSB account of SPMU					
	23	Issue of Letter of Allotment to ULBs (latest by end of May)					

When the project subsequently moves to re-imbursement method of disbursements, all expenditures(including Bank/AIIB share along with GoK share) needs to be pre-financed by GoK&once incurred would claim re-imbursements from Bank/AIIB.Then the GoK funds from state consolidated fund may have to physically flow into the STSB account at SPMU for components 1 & 3 activities. Component 2 would continue to operate on allotment basis as usual. The SPMU and ULBs, will prepare the advance/grant utilisation reports (IFRs and GURs) in the formats annexed and as laid down in Section 11.3 for submission to the Bank. The Grant Utilisation Reports of ULBs may be annexed to the IFRs. The IFRs, with its annexes and the Application for Reporting Use of Funds will be transmitted to the Bank through CAAA in accordance with the established procedures for the Bank's India portfolio.

The SPMU will reconcile, at least once a year, the grant releases and grants expended from the information provided by the ULBs (the grant utilisation reports as well as the ULBs annual financial statements) together with independent reports from IVAs. This reconciliation will identify the grants that may be withheld/reallocated (in accordance with the rules laid down in Chapter 6 – Management System for Incentive Grants to ULBs) and accordingly adjusted in the overall fund forecasts that will be sent to the Bank for compliance and withdrawal of funds. A special reconciliation of the releases will be made six months prior to the close of the Project to identify unutilised funds, if any. This reconciliation will be submitted to the Bank and any unutilised funds from advances released at the close of the Project will be refunded by the GoI to the Bank/AIIB. Any expenditure that did not meet the AT verification (As per Chapter 6 Grant Management System) and outstanding at the end of the Project and the expenditure incurred (whether paid or not) that would have been found ineligible, later either by IVA reports or the audit reports will be returned.

Exchange loss/gain. Any exchange loss or gain arising due to the timing difference between documenting expenditure and receiving of funds (in advance) will have to be absorbed by the state. If there is an exchange loss at the project closure, GoK will refund the amount along with the unused funds to GoI for repayment to the Bank

11.3. Accounting and Financial Reporting

The accounting for Components 1 and 3 will be done by SPMU and for Component 2 by the respective ULBs. The accounting will clearly identify the sources of funds and the expenditure lines for the projects/activities approved under the respective components. This may entail, creation of additional account heads in the Chart of Accounts of the respective institutions.

The Accounting Policies and Procedures as laid down in the respective Municipal Acts will be followed by the ULBs. The SPMU will follow the Accounting Policies and Procedures as laid down in the Kerala State Accounting and Finance Rules. Accordingly, the accounting for the Project will be carried out on cash basis and include the following important features:

- a. Project specific treasury bank account/s will be opened and operated at the appropriate Treasury/Sub-treasury for receipts and expenditure
- b. Fund releases from GoK to ULBs would be accounted for as grants in aid in the books of ULB unutilized grants at the end of each financial year will be non-lapsable and will be carried over to the next year.
- c. Fund releases from GoK to SPMU would be accounted as advances in the books of SPMU.
- d. Payments to contractors/suppliers/consultants/staff will be considered as expenditure. Other payments (if any) will be considered as Inter-Unit transfers to be settled within a certain time period.
- e. Expenditure will be recorded at the time of payments to contractors, consultants, and/or suppliers. Expenditure will be settled through respective treasury accounts & STSB account of the Project.
- f. Allocation/Appropriation of expenditure to KSWMP from other sources/other projects of the SPMU/ULB is not allowed.
- g. Accounts will be prepared by Project/Sub-Project and the expenditure that is common for several projects will be booked in separate account heads and will be allocated to the Project/Sub-Project based on generally accepted accounting principles.
- h. The Project IFRs will be supported by vouchers/ledger accounts in the books of accounts of the SPMU/ULB.

The SPMU will use an off-the shelf accounting package for accounting and reporting on the Project funds. The ULBs will use their existing accounting systems/packages (like Sankhya or any other package approved for their use by GoK) for accounting and reporting on the Project funds, however, the Project related funds and expenditure should be separately and distinctly identifiable and reportable through use of separate account heads for the Project or use of cost centres or both. The following records will be maintained by the SPMU/ULB as part of its Accounting System for the Project.

- a) Cash Book and Bank Book.
- b) Vouchers with supporting documents.
- c) Ledgers, and the broad ledgers heads are as follows:
 - Work in Progress (Activity-wise)
 - Advances (Person-wise and entity wise)
 - Fixed Assets (separately for each asset)
 - Grants (Bank share and GoK share separately)
 - Loan account

- Expenditure (by nature of expenditure)
- d) Fixed Assets Register as per format in Appendix 2

Financial Reporting:

The SPMU will maintain necessary records and documentation for the actual expenditure incurred by it for components 1 and 3. ULBs will maintain appropriate records and documentation for the expenditure incurred on various activities permitted under component 2. The financial reporting for the Project comprises of the following:

- a) Six monthly Interim Financial Reports (IFRs) for all components in the format provided in Annexure A.11.1 in Volume 3 the first and the last IFR may be for periods less than 6 months depending on the project commencement and closure dates.
- b) Quarterly Grant Utilisation Reports (GURs) for component 2 in the format provided inAnnexure A.11.2 in Volume 3; the first and last GURs may be for periods less than a quarter depending on the project commencement and closure dates.
- c) Project's financial statements as defined in para 7 of the Annexure A.11.4 in Volume 3 for the purpose of external audit and audit opinion.

ULB-PIUs with assistance from TSCs will report to SPMU through their respective DPMUs, grants received and spent along with actual expenditure details and previous disbursements found non-compliant in the Annual Trigger process and the status of redressal of these. SPMU will review the same and prepare a consolidated quarterly report for all participating ULBs that will show the aggregate utilisation at the state level. These reports may be annexed to the six monthly IFRs prepared for submission to the Bank for its review.

The SPMU with assistance from PMC, will prepare the IFRs by consolidating and collating the funds received (including the opening balances) and expenditure incurred for all the project components for the period under report, year-to-date and cumulative-to-date, to be submitted to the Bank. These IFRs will be approved by SM prior to submission to the Bank. IFRS will be required to eb submitted to Bank within 45 days of end of the reporting period. The IFRs will contain the following details:

- a) Sources and Application of Funds under all 3 components
- b) Expenditure details for all 3 components
- c) Forecast of funds for the succeeding half year
- d) Details of Prior Review Contracts, if any
- e) Disbursement Summary

11.4. Internal Control and Internal Audit Arrangements

The Project will operate within the State's PFM systems and the internal control framework for control over individual items of expenditure and receipts will follow the Kerala Financial Code (KFC) and Kerala Treasury Code which provide a detailed guidance on the safeguarding of cash, control over inventories, segregation of duties and delegation of authority for administrative and financial approvals and operating the treasury accounts. In addition, the Project will rely on the LSG financial mechanisms, the state's fiduciary framework pertaining to LSGs, and the grant rules, systems and procedures administered by the LSGD to obtain necessary assurance on overall control environment and risk mitigation. Expenditure authorization, raising bills, making payments and accounting for funds usage will be carried out in the same way as for the existing grants using state government financial regulations, systems & processes. During project implementation, Bank supervision will focus on the overall functioning and adequacy of these arrangements and the operation of the BPG system at all levels pertaining to ULBs

The control framework for the Project should encompass the following minimum control activities which should be built into the workflows/processes:

- a) Written Policies, Procedures and Guidelines as approved by GoK/LSGD exist to provide a direction to SM/SPMU and ULBs on project implementation.
- b) SPMU/ULBs organisation wide cognizance of eligible/non-eligible activities and expenditures for those activities a pre-approved list of eligible/non-eligible expenditure given to verification and approving personnel in the organisations.
- c) A delegation of authority for administrative and financial approvals for the Project is drawn and approved by SM in conjunction with LSGD.
- d) Adequate segregation of duties is built into the delegations to ensure review/verifications and authorizations are done by separate individuals.
- e) Grant eligibility guidelines and conditions are succinctly written and communicated to all participating ULBs, DPMU and SPMU employees.
- f) Delegation for authorisation of expenditure is given to individuals who are knowledgeable of various governing rules and regulations of the GoK and the requirements of the Project.
- g) Accounting procedures for Chart of Accounts, collection and verification of documents, recording of transactions, issue of instructions to treasury for bill settlement, issue of cheques/payment orders and generation of periodical information reports are clearly written and communicated to designated personnel.
- h) Annual operating plans and budgets are approved by competent authorities and all Project activities are supported by such plans and budgets.
- i) Contractors/Suppliers/Consultants are duly informed of procurement conditions in the bid documents and standard bid documents are used for all procurement under the Project and the selection of contractors strictly complies with the Procurement guidelines as laid down in Volume 2 of the PIM (Procurement Manual).
- j) Bids are evaluated by competent authority and approval for selection of contractors/suppliers/consultants is given by authorised personnel as per the delegation of authority matrix.
- k) Appropriate level of supervisory review at SPMU and ULBs on all Project activities is implemented.
- Contractors/Suppliers/Consultants bills checked for accuracy, propriety, and compliance with contract conditions; work done is verified by the district TSC/DPMU and ULB approvers in case of ULB projects and the PMC and SPMU approvers in case of SPMU projects. Supporting documentation to be duly verified by those authorising the bills.
- m) Accurate and reliable records are maintained for all expenditure incurred and assets acquired using the Project funds and the records in the custody of authorised personnel of the SPMU/ULBs.

- n) Adequate records are maintained for the assets created and/or acquired using the Project's funds, including details of cost, identification and location of assets; they are properly tagged and verified periodically and matched with books of accounts.
- o) Periodical reconciliations (at least quarterly) of ledger accounts are carried out with treasury statements and treasury reports and that differences if any are accounted with proper authorisation.
- p) Detailed reports on projects progress, comparison of budgets to actuals are provided to appropriate authorities for review on timely basis and necessary corrective action.
- q) Necessary capacity building programs at SPMU, DPMU and ULBs are undertaken on all elements of the Projects to enhance knowledge and skills necessary to implement/monitor the Project.

<u>Internal Audit Arrangements</u>

Internal audit for the Project will be outsourced to firms of Chartered Accountants registered with the Institute of Chartered Accountants (ICAI) as detailed in this section. The Internal Auditors will be appointed by SPMU by following the procurement guidelines as laid down in Volume 2 of the PIM (Procurement Manual) and the procurement guidelines applicable for state entities/agencies under the GoK. The engagement of internal audit firms will be done as below:

- a) Only Audit Firms having a minimum of 2 partners will be eligible to participate in the bidding process as per the qualification criteria included in ToR.
- b) A maximum of 5 Internal Audit Firms to audit all the participating ULBs having considerable presence in the districts where ULBs are situated: clustering of ULBs for this purpose to be decided by SPMU.
- c) A separate internal audit firm for SM/SPMU will be engaged, which in addition to being responsible for audit of component 1 and component 3 activities, will also be responsible for preparing a consolidated internal audit report for the project as a whole by collating the audit observations/actions/issues included in the internal audit reports of ULBs audited by other auditors.

The Internal Audit will be risk focused and will be conducted in accordance with the Terms of Reference (ToR) provided in Annexure A.11.3 in Volume 3. For this purpose, a risk framework will be developed by the Internal Auditors in conjunction with SM and SPMU based on which transaction samples and areas will be selected for audit. All ULBs that received grants from the Project will be subjected to internal audit in addition to SPMU and SM activities that are financed out of the Bank's funds. The ToR describes in detail the audit objectives, scope and coverage, period, timing and reporting and qualification criteria. The Internal Audit Reports will be transmitted to the Bank as soon as the audit report is issued not withstanding its closure.

The Deputy Director- SPMU will be the in-house contact for liaison with the internal auditors and will remain responsible for the internal audit function for the project as a whole. The oversight of internal audit will be done by the Audit Committee.

 Table 11-2: Activities involved in Internal Audit and organisations responsible

Table II Briedvides involved in international organisations responsible			
S. No.	Activity	Responsibility	

S. No.	Activity	Responsibility
1	Appointment of Audit Committee	Audit Committee*
2	Appointment of Internal Auditors	SPMU with approval from
		SM
3	Planning and Completion of Internal Audits and	
	Issuance of Audit Reports:	
	• SPMU – Trivandrum	Chartered Accountant
	• DPMU	Firms appointed for the
	• ULBs	purpose
4	Compliance to Audit Observations and taking	The Auditee Institutions
	corrective actions	
5	Review of Internal Audit Reports of Individual ULBs	Audit Committee
	and SPMU	
6	Review of consolidated observations and remarks (of	Project Steering Committee
	all Participating ULBs and SPMU)	

*An Audit Committee will be formed immediately upon execution of the Project Contracts by the Bank and GoK. The composition of the Audit Committee to be decided by the Project Steering Committee under advice to the Bank.

11.5. External Audit

The CAG is the designated statutory auditor for the audit of Project Financial Statements and the audits will be conducted through the Office of the Accountant General in Kerala in accordance with the Terms of Reference in Annexure A.11.4 in Volume 3 agreed with the Bank. The Project Financial Statements (PFS), will be the IFRs for the second half of the financial year that will capture the financial information for the entire year and will include expenditures incurred under all components of the Projects and these IFRs will be audited by the CAG and an opinion expressed on the same. In addition to conducting the PFS audit, the Bank may expand the scope of CAG audit to cover specific aspects such as internal controls, compliance with Bank procurement policies, and/or efficiency, and effectiveness in the use of loan proceeds.

The Kerala State Audit Department (KSAD) is the statutory auditor for all LSGIs under the Kerala Local Fund Audit Act, 1994 and conducts the statutory audits (which include Financial, Compliance and Performance Audits) of all its Auditee Institutions as per an approved annual calendar and in accordance with the process and procedures laid down in the KSAD Audit Manual. The financial statements which are subjected to audit, will include revenues and grants from all sources and expenditures on all activities/projects undertaken by the ULB during the year. Upon completion of the audits, it issues an Audit Certificate on the financial statements will be translated into English and will be made available to the Bank for supervision purposes on an annual basis.

KSAD, while conducting the audit of the participating ULBs, will ensure inclusion of a separate section in their audit report on their audit of the funds released to the respective ULBs under this Project and the expenditure incurred by the ULBs from such funds. This section will articulate the audit findings and a clear opinion, unqualified, qualified or adverse on the usage

of project funds. Every year, a summary of the KSAD ULB audit findings will be prepared by the SPMU and will be made available to the project auditor, the CAG. In the process of determining the eligibility criteria for the ULB to receive grants, the ULB would need to fulfil the criteria required in terms of the ULB audit carried out by KSAD, i.e. to receive an unqualified or qualified opinion which does not indicate observations that indicate pervasive financial management weaknesses and/or a pervasive lack of integrity of the financial statements.

In view of the elevated risks in the KSAD audits as revealed by the assessment of the financial management systems carried out as part of the Project appraisal, it was agreed that the capacity of the KSAD auditors will be built through the Component 1 of the Project and the auditors assigned for the audit of the participating ULBs will be further trained to conduct audit in accordance with the CAG guidelines and best professional practices. The extent of such capacity building efforts as may be required for the Project will be planned by the SPMU in conjunction with KSAD and implemented during the first year of the Project implementation.

11.6. FM Supervision

Consistent with the risk-based approach, FM supervision would normally consist of visits by the Bank FM specialist to the PMU and selected ULBs, desk reviews of internal and external audit reports, review of IUFRs, and other relevant reviews as required to periodically assess and monitor the adequacy of the project's fiduciary arrangements. The Bank will carry out a field-level FM supervision mission at least once every six months. However, due to the prevailing pandemic situation that is expected to continue during the early stage of project implementation, the FMS will conduct virtual FM implementation support activities to keep engaged with implementing agencies on issues impacting performance, compliance and reporting. This will include preparation of questionnaires, desk reviews of FM Arrangements and Risk Assessment, consulting PM, QA support team, TTL & other task team members, WFA Finance officer and any other personnel as required to keep them informed, seek guidance, agree on any changes/actions & updating Bank FM compliance monitoring systems.

11.7. FM Staffing

As detailed in Chapter 3, SPMU will be staffed with and experienced FM specialist with suitable qualifications and experience together with Project Accountant/s as needed. The key tasks assigned to the FM expert are detailed in that Chapter and include amongst others (a) ensuring compliance with financial covenants in the Project and Loan Agreements; (b) initiating disbursements from the World Bank, sending funding advance claims to the CAAA and managing such funds and monitoring transfer and availability of funds to other levels such as ULBs; (c) providing financial and audit reports to the World Bank; (d) ensuring management of payments and accounting functions of the project; and (e) coordinating and managing the internal and external audit process and any other requirements as necessary. The FM specialist and the Project Accountant/s will be trained in FM systems followed by the GoK and specific KSWMP project requirements.

Similarly, as detailed in Chapter 3, the ULB -PIUs will be staffed with experienced Finance/Accounts officer/s as needed to strengthen their FM capacities with the job

description and responsibilities as provided in that Chapter. These ULB-PIUs F&A staff will be provided comprehensive training on FM systems followed by the GoK and specific KSWMP project requirements either by KILA or such other institution/s arranged by SPMU. There will also be oversight on FM arrangements carried out by the SPMU, PMC and DPMU level.

11.8. AIIB as joint co-financing partner

All project disbursements would be handled by the Bank according to Bank disbursement procedures using Bank Client Connection system. All FM arrangements would also be as per Bank requirements & design. AIIB funds would fund part of the common expenditures in stipulated percentages. Accordingly, there will be one IUFR, one audit report and internal audit etc. AIIB expenditure would not be separately tracked. At the time of documenting expenditure through a Withdrawal Application, the common expenditure would be separated into IBRD share and AIIB share by the Bank disbursement unit as per the established procedures and processed accordingly. In a joint co-financing approach, AIIB funds would also need to be available at the same time when Bank funds are made available to ensure uninterrupted project implementation.

Chapter 12. Data Privacy

12.1. Definitions

- "Data Subject" means an identified or identifiable natural person; an identifiable natural
 person is one who can be identified, directly or indirectly, in particular by reference to an
 identifier such as a name, an identification number, location data, an online identifier or to
 one or more factors specific to the physical, physiological, genetic, mental, economic,
 cultural or social identity of that natural person.
- "Personal Data" means any information relating to a Data Subject. Personal Data can include PII and Sensitive Personal Data.
- "Personally Identifiable Information" or "PII" means information which can be used to distinguish or trace the identity of a Data Subject, such as their name, national identity number, biometric records, etc. alone, or when combined with other personal or identifying information which is linked or linkable to a specific Data Subject, such as date and place of birth, mother's maiden name, etc.
- "Processing" means any operation or set of operations which is performed on Personal Data or on sets of Personal Data, whether or not by automated means, such as collection, recording, organization, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction.
- "Sensitive Personal Data" means Personal Data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a data subject, data concerning health or data concerning a Data Subject's sex life or sexual orientation.

12.2. Minimum data protection elements

- The collection, use or processing of Personal Data must be done on one of the following lawful bases: free and informed consent, in compliance with legal obligation for the protection of vital interests of the Data Subject, the public interest and/or other legitimate interest;
- The Data Subject shall be informed of the purpose of data collection and intended use and sharing of the data;
- The collection, use or processing of Personal Data can be made solely for the stated purpose;
- The collection, use or processing of Personal Data shall be proportionate, relevant, adequate and limited to what is necessary in relation to the purpose for which it is processed;
- The collection, use or processing of Personal Data shall be accurate, complete and up to date;
- Persons or entities collecting, using or processing Personal Data shall be responsible for and shall comply with these data protection requirements;
- Personal Data shall not be kept longer than is necessary for the purposes for which it is processed;
- Personal data shall not be shared with third parties without the consent of the Data Subject;
- Data Subjects may refuse an automatic processing of Personal Data about them; and

Data Subjects shall have the right of redress for abuse of Personal Data about them.

12.3. Consent form (Sample format)

Acknowledgement and consent provided by: [Name] ("Signatory")

By signing this consent form, the Signatory acknowledges that the following data will be collected from him or her: [___]

These data ("Personal Data") are personal data of the Signatory which will be protected in accordance with the data protection elements printed at the back of this Consent form.

The Signatory expressly agrees to the collection and processing of his or her Personal Data.

The Personal Data are collected for the purpose of: _____ to be used for _____ and will be shared with: _____

The Personal Data are intended to be kept and processed for a period of _____ after which they will be deleted.

The Signatory has the right to access his or her Personal Data, request that they be rectified in case of error, updated as he or she feels necessary, or deleted. In order to exercise this right, the Data manager should be contacted at _____.

Claims related to misuse of his or her Personal Data may be filed through the following Grievance redress mechanism: _____

Signature of the Signatory: _____

Date: _____