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Manila City Action Plan for Plastic Circularity

A Consultant's Report produced by the Asian Development Bank in collaboration with the Philippines' Department of Environment and Natural Resources (Environmental Management Bureau) and the City Government of Manila

GENERAL INFORMATION	
Project	TA 6669-REG: Promoting Action on Plastic Pollution from Source to Sea in Asia and the Pacific (Subproject 2) - Prioritizing and Implementing Actions to Reduce Marine Plastic Pollution
Title	Manila City Action Plan for Plastic Circularity
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Executive Summary

Background and Context

Marine plastic waste poses a severe threat to the global ecology with approximately 150 million tonnes of plastic in the oceans, and the problem is escalating at a rate of 8 to 12 million tonnes annually, largely driven by Asia. To combat this crisis, the Asian Development Bank (ADB) has committed $5 billion through its Healthy Oceans Action Plan, focusing on sustainable development for Developing Member Countries. In collaboration with Indonesia, the Philippines, Thailand, and Viet Nam, ADB initiated the Technical Assistance Cluster Project TA 0044: Promoting Action on Plastic Pollution from Source to Sea in Asia and the Pacific. TA 6669-REG: Promoting Action on Plastic Pollution from Source to Sea in Asia and the Pacific - Prioritizing and Implementing Actions to Reduce Marine Plastic Pollution (Subproject 2) supported the drafting of government-led city action plans on marine plastic pollution and circular plastics economy.

Scope of the Assignment

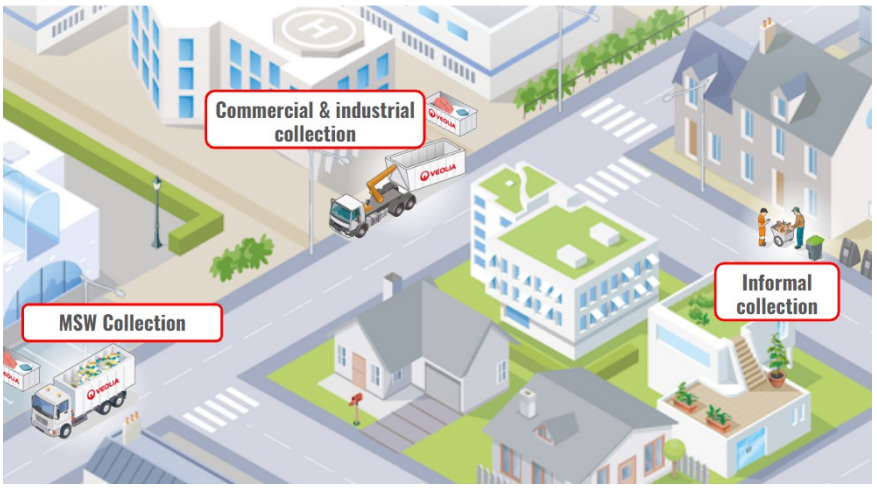
In the Philippines, the project centers on the City of Manila, encompassing the development of a comprehensive City Action Plan to accelerate towards a circular plastic economy. The recommendations within this City Action Plan follow a baseline study that was conducted to identify the areas of opportunities for improvement. This in-depth study involved conducting literature and regulatory reviews, data collection, stakeholder surveys and consultations to understand the existing plastic waste management system in Manila City. With the baseline study completed, the City Action Plan and Roadmap was developed to address the gaps in the formal waste management system, while capturing the opportunities that can be achieved through collaboration with various other actors in the plastic value chain, thereby achieving the goals of the city in managing plastic waste and promoting a circular plastic economy. This City Action Plan would achieve not only the objectives of Manila City, but it could be a reference model to support the objectives of the national action plan.

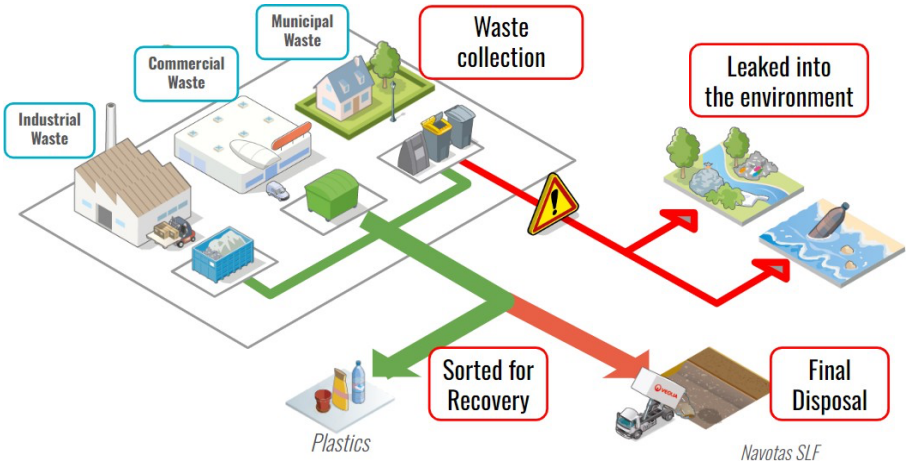
Structure of the Manila City Action Plan

The report unfolds, as illustrated below, with a delineation of the current challenges of plastic waste management. From the gaps identified in the current situation, and the potential to scale up activities and businesses that can accelerate plastic circularity, a set of opportunities linked to these gaps were identified. Each of these opportunities is aligned with corresponding recommendations and several focused strategic actions (detailed in the annex). The City Action Plan brings together the recommendations and the strategic actions into a roadmap that Manila City can execute in collaboration with the relevant and connected stakeholders. The conclusion section of the report outlines the way forward, emphasizing the need for dedicated resources, leadership, and sustained efforts to achieve the city's plastic waste management and circularity goals.

Methodology & Findings

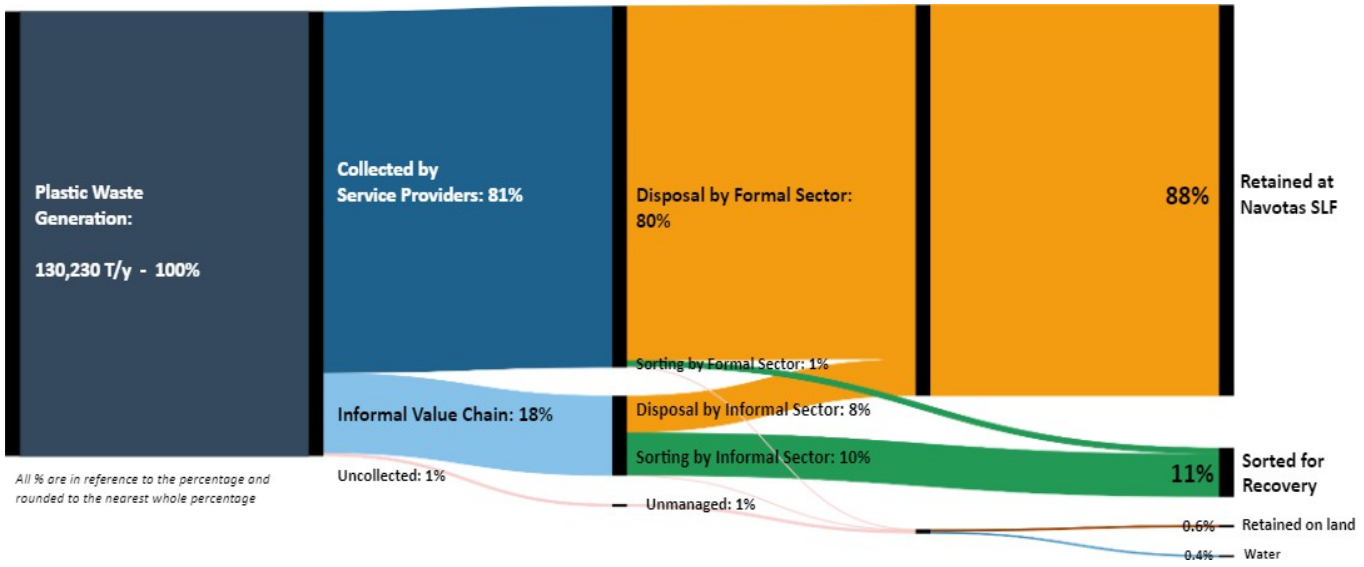
A systematic approach, engaging with various stakeholders, conducting surveys, field visits, and quantitative and qualitative data analysis, provided a holistic understanding of Manila City's plastic management landscape. The study included analysis of the local geographic and socio-economic information, it covers all aspects of municipal solid waste management, and specifically plastic waste management.





The study achieved a good understanding of the complete picture of plastic waste generation, collection and activities supporting a circular economy. It also provided a picture of plastic waste leakages leading to hotspots and marine plastic pollution. Overall, the material flow of plastic waste within the city indicates that although there is a high level of waste collection, most of the plastic waste ends up in the Navotas landfill (88%). The collection of plastics for recycling remains relatively low at approximately 11%.

The overall plastic flow in Manila City (not considering inflows from other cities within Metro Manila) is illustrated in the material flow diagram below:

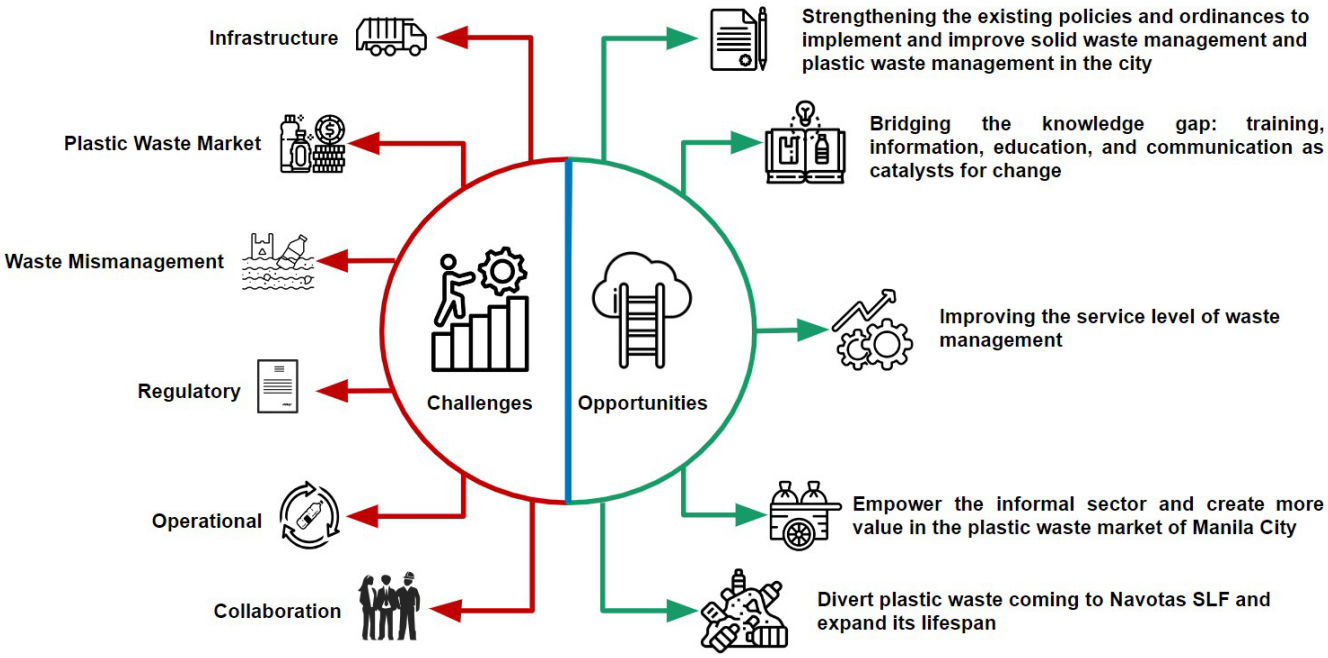


Sankey diagram of plastic waste material flow in Manila City

Recommendations and Action Plan

The recommendations for the Manila City Action Plan were developed following the completion of the baseline study, focusing on challenges and opportunities in the plastic value chain. Key challenges were identified, linked to specific areas of opportunities that included formal and informal waste sector collaboration, private sector involvement, and the potential application of digital solutions. Success stories from the region and relevant project experiences contributed to the development of the recommendations, and strategic actions aimed at overcoming challenges and supporting new initiatives.

Key areas of the gaps identified and the opportunities upon which the recommendations were built upon are illustrated below:



Challenges and Opportunities for Manila City

Based on the opportunities identified, a set of recommendations on the following key areas were developed. A number of recommendations may be applicable and connected to each set of targeted opportunities. These recommendations address specific areas in the plastic value chain where we are confident they will result in transformation and deliver significant impact.

The recommendations are expanded into a more granular level, making them actionable by providing the strategic actions which are described in Section 3 of the report. Further details on the recommendations and actions can be found in the annexes. These actions have the resources, estimated timelines and estimated budgets for the planning and execution of the roadmap. The Roadmap for Plastic Circularity is provided in the format of a Gantt chart for the implementation and roll-out of the activities.

The table below identifies the aspects in the plastic value chain that the nine key recommendations will address:

Recommendation	Area of Impact
Recommendation #1	Capturing and Monitoring Data for Better Plastic Waste Management
Recommendation #2	Streamlining and Harmonizing Ordinances
Recommendation #3	Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City
Recommendation #4	Developing Awareness Engagement and Behavioral Change
Recommendation #5	Formalization and Institutionalization of Informal Groups in Manila City
Recommendation #6	Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Waste Sorting, Recycling and Recovery
Recommendation #7	Assessment of the Adequacy, Efficiency and Effectiveness of the City's MRFs and Developing a Budgetary and Implementation Plan
Recommendation #8	Study and Install Mechanized and Automated Equipment and Systems to Capture Marine Litter
Recommendation #9	Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs

Financing the Recommendations

The budgetary estimates have been carefully provided for each recommendation proposed in the report. These are high level estimates that must be carefully assessed by conducting detailed feasibility studies. The purpose of the budgetary estimates is not only to provide a picture of the scale, resource required and authorization level of the projects, the budgetary estimate can also provide some insights into the types of financing options that should be considered for the respective recommendations. The financing options to be considered for the recommendations can also provide a better understanding of the estimated timelines for the execution of all activities that contribute to the milestones of the Roadmap.

Capacity Building for Empowering and Enabling Plastic Circularity

Empowering stakeholders to conceptualize and execute plastic circularity initiatives requires more than a passion to transform, it necessitates specialized knowledge, skills, and experience. Effective capacity building involves equipping various actors across sectors with the tools they need to implement sustainable practices, innovate solutions, and drive impactful change.

The scope of the necessary knowledge and skills spans a broad spectrum. Core competencies such as safety, health, pollution prevention, and environmental management are fundamental for all stakeholders. However, other areas demand more targeted approaches. For instance, project development, sustainable business model design, the application of financial and policy instruments, securing funding, and proficient project management are crucial to the success of plastic circularity efforts. These areas require collaborative efforts from the public, private, and financial sectors. Experts from these sectors can provide invaluable insights and mentorship, sharing their expertise to foster an environment conducive to innovation and sustained impact.

Gender and Inclusivity

In Manila City, women play a crucial role in the plastic value chain. As key influencers within their households and active members of the community, they spearhead initiatives aimed at reducing waste, promoting sustainable habits, and advocating for better waste management practices. Women also make up a significant portion of the informal waste pickers, often among the most vulnerable and facing particularly high health and safety risks as well as economic instability.

Our approach to the development of the City Action Plan recognizes that women bring unique knowledge and practical expertise in plastic waste management. To ensure that strategies and solutions meet their specific needs and preferences, women must be fully involved in their design and implementation. Women are not just users but key actors in creating sustainable waste management strategies. For example, the recommendations for awareness campaigns and community engagement activities should be tailored to ensure that the content resonates with women and to accommodate their preferred communication channels and schedules, making it easier for them to participate. When engaging with the informal sector, tailored interventions and support, such as appropriate personal protective equipment and dedicated health and safety training, are essential to ensure that women can fully participate in and benefit from waste management initiatives.

Similarly, our approach recognizes that social and economic factors, such as disability, ethnicity, economic vulnerability, affect people's ability to participate in waste management strategies and hence solutions must be tailored to reflect their unique needs and challenges, and include dedicated support as needed. This ensures that the proposed strategies are not only practical and inclusive, but also more effective in addressing the real challenges faced in daily waste management practices.

Conclusion and Way Forward

This executive summary encapsulates the extensive work conducted, presenting a roadmap for Manila City to address plastic pollution and transition towards a circular economy.

The recommendations that have been identified and placed into the Roadmap for Plastic Circularity - Manila City Action Plan aim to capture the opportunities to improve plastic waste management, accelerate circularity of the plastic economy, reduce and eventually stop plastic leakage into the environment.

Executing the City Action Plan demands collaboration at national, regional, and city levels, requiring dedicated resources and sustained efforts. The report's comprehensive structure, along with detailed recommendations and strategic actions, serves as a guide for empowering and implementing the plan. Going forward, in parallel with the activities that can be initiated, efforts on capacity building in the areas highlighted in this report should be progressed to empower and enable the execution of recommendations in this City Action Plan.

Consultative Workshop on the Roadmap for Plastic Circularity in Manila City

Concluding the work on the Roadmap for Plastic Circularity - City Action Plan in Manila, a stakeholder meeting was conducted to present recommendations developed by the international and country experts of the Seureca - DT GLOBAL team. This meeting took place on September 4, 2024, at the Luneta Function Room, Bayview Park Hotel Manila, with key participants including representatives from ADB, DENR - Central Office, DENR - National Capital Region, NCR, DOST, SWMO, DPS, and the City of Manila present both in-person and online.

The team presented and discussed key challenges such as the limitations of existing infrastructure, which impede efficient waste collection, segregation, and recycling efforts. Moreover, the necessity for enhanced data collection and monitoring systems was highlighted, emphasizing that establishing a

robust scientific foundation on marine litter is vital for informed decision-making. The discussion also underscored the need for strengthened policy support and enforcement mechanisms to address these environmental issues comprehensively. Additionally, the integration of the informal waste sector was recognized as crucial, given its substantial role in overall waste management. Raising public awareness and fostering behavior change regarding plastic use emerged as essential strategies for mitigating plastic pollution.

The recommendations to address the key challenges and opportunities included strengthening the existing policies and ordinances in the city to improve plastic waste management, improving waste management services, empowering the informal sector, and diverting plastic waste from the landfill. The recommendations further pointed to addressing the vulnerabilities of women and other marginalized groups in waste management is a significant challenge that the recommendations aim to tackle through a gender equality and social inclusion (GESI) informed approach.

All stakeholders acknowledged and were in alignment with the findings and recommendations of the roadmap, they emphasized the need for coordinated efforts, financial support, and strategic planning to enhance waste management practices in Manila City.

Roadmap for Plastic Circularity and the City Action Plan for Manila City Presentation, Manila City Bayview Park Hotel Regional Luneta Function Room, September 4, 2024

During the consultative workshop, stakeholders provided diverse and constructive feedback regarding the feasibility of the action plan presented. While participants acknowledged the overall quality of the plan, they emphasized that the physical and financial targets necessitated significant effort from local government units (LGUs) and other stakeholders to be successfully realized. Additionally,

stakeholders expressed general appreciation for the opportunities and recommendations offered during the workshop, underscoring the critical importance of collaboration in pursuing the objectives of plastic circularity in Manila. The recommendations highlighted the importance of sustainable financing mechanisms to bolster projects aimed at achieving plastic circularity and promoting private sector collaboration. The alignment of the recommendations in this report with on-going efforts and strategies of the city in tackling the plastic waste pollution was appreciated by the participants.

The roadmap indicates the implementation timeframes that assume availability of resources, stakeholder cooperation, and clear authority and mandate to execute the overall project. Mr. James Baker, James Baker, Senior Circular Economy Specialist (Plastic Wastes) / Plastics TA Officer, concluded the productive discussion by emphasizing the need for actionable recommendations for Manila and surrounding cities. He acknowledged the contributions of local partners and encouraged ongoing engagement. Ms. Annabelle C. P. Rebong, from Manila's Department of Public Services, supported these views, highlighting the collective responsibility for a circular economy and the commitment to sustainability for future generations.

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Acronyms

ADB	The Asian Development Bank
AEPW	Alliance to End Plastic Waste
B-MUSE	Building a Greener Manila: Upgraded Collection System & Community Education
CENRO	City Environment and Natural Resources Office
CSR	Corporate Social Responsibility
CCTV	Closed-circuit Television
CDA	Cooperative Development Authority
CDMS	Centralized Data Management System
COVID-19	Coronavirus Disease
CPOA-ML	City Plan of Action on Marine Litter
DENR	Department of Environment and Natural Resources
DMC	Developing Member Countries
DOLE	Department of Labor and Employment
DPS	Department of Public Services
DPWH	Department of Public Works and Highways
DRS	Deposit/Return Scheme
ECA	Environmental Compliance Audit
EPR	Extended Producer Responsibility
EU	European Union
GAIA	Global Alliance for Incinerator Alternatives
GEF	Global Environment Facility
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GPML	Global Partnership on Plastic Pollution and Marine Litter
GPP	Green Public Procurement
HDPE	High Density Polyethylene
IEC	Information, Education, and Communication
KKK	Kolek, Kilo, Kita
LDPE	Low Density Polyethylene
LGU	Local Government Unit

MMDA	Metro Manila Development Authority
MRF	Materials Recovery Facility
MRS	Materials Recovery System
MSW	Municipal Solid Waste Management
NCR	National Capital Region
NGO	NGOs
NSWMC	NSWMC
OE	Obliged Enterprises
PCX	Plastic Credit Exchange
PET	Polyethylene Terephthalate
PNWWA	Philippine National Waste Workers Association
PP	Polypropylene
PPA	Philippine Ports Authority
PPE	Personal Protective Equipment
PPP	Public Private Partnership
PROs	Producer Responsibility Organizations
PS	Polystyrene
PSA	Philippine Statistics Authority
PSC	Plastic Smart Cities
PW	Plastic Waste
PWFD	Plastic Waste Flow Diagram
Rs	Recommendations
RDF	Refuse Derived Fuel
SDG	Sustainable Development Goal
SUP	Single Used Plastic
SLF	Sanitary Landfill
SME	Small and Medium-sized Enterprise
SOE	State-Owned Enterprise
SWM	Solid Waste Management
SWMP	Solid Waste Management Plan

TA	Technical Assistance
UNDP	United Nations Development Programme
WACS	Waste Analysis and Characterization Study

1. Introduction

1.1. Project Context

The devastation caused by marine plastic waste to our global ecology has reached critical levels. There are now about 150 million tonnes of plastic circulating in the oceans, and this number is increasing by 8 to 12 million tonnes per year, with Asia being the main source of this pollution[2].

The Asian Development Bank (ADB) has pledged $5 billion as part of its Healthy Oceans Action Plan, extending ADB's commitment to sustainable, environmental development for its Developing Member Countries (DMCs).

ADB's commitment to collaborating with Viet Nam, the Philippines, Indonesia, and Thailand includes the Technical Assistance (TA) Cluster Project TA 0044: Promoting Action on Plastic Pollution from Source to Sea in Southeast Asia and the Pacific.

In order to address the management of plastics in the value chain and minimize their environmental impact, this TA covers a wide range of activities with an emphasis on marine plastic pollution, ocean health, and circular economy solutions. In the Philippines, the scope of the TA primarily focuses on the development of a City Action Plan.

The activities conducted as part of project of developing the City Action plan for Manila City include:

- Stakeholders engagement and workshops
- City-Level Analysis of the Cost of Plastic Waste Collection and Recycling
- City-Level Identification and Analysis of the Financing Gap
- Financial and Regulatory Analysis of the Recommendations
- City Level Financing Road Map

1.2. Objectives of the Report

The purpose of this report is to outline potential avenues for enhancing plastic management in Manila City across the entire plastic waste value chain and for all relevant stakeholders. The challenges faced in the city have been evaluated and organized into categories to facilitate the identification of opportunities.

The recommendations corresponding to the improvement opportunities have been shaped to align with the overarching vision and core principles of the Technical Assistance program for Manila. The goal is to address the challenges in a comprehensive and cohesive manner. Additionally, specific strategic actions have been pinpointed as part of the proposed opportunities.

[2] University of California. 2015. An ocean of plastic: Magnitude of plastic waste going into the ocean calculated.

1.3. Vision and Key Principles

1.3.1. Vision

Following a comprehensive assessment of the existing state of plastic waste management in Manila City, a range of challenges affecting the plastic value chain were identified and analyzed. These findings served as the foundation for the development of recommendations to capture and realize the potential opportunities for mitigating plastic waste pollution. This document outlines recommendations that are in line with a long-term vision:

- Reduce permanently plastic waste leakage into the environment (zero plastic leakage objective);
- Increase circular material use;
- Deliver socio-economic benefits for the local community by creating new jobs and ensuring social equity; and
- Reduce environmental impacts.

Notably, these recommendations are harmonized with the National Plan of Action of the Philippines as well as the master plan of Manila City, ensuring alignment with broader national and local objectives.

1.3.2. Key Principles

The key principles pertaining to sound environmental management, waste management, and plastics management are applied globally in this City Action Plan. These principles, derived from international best practices, form the foundation for developing recommendations. In depth analysis of the challenges faced by the city of Manila in managing plastic waste and preventing environmental leakages has enabled the team to identify the root causes of these problems. The following key principles were taken into account when formulating solutions and actions to address these root causes:

- The hierarchy of sustainable waste management favors the prevention of waste, preparing for reuse, recycling and composting of waste, energy recovery and disposal. This hierarchy is promoted by the European Union as a good practice for sustainable management.

Figure 1: The 5 R's to preventing plastic pollution[3]

- The 5 R's principles are quite similar to sustainable waste management principles but relate to plastics management only. The 5 Rs are to Refuse (to buy plastics), Reduce, Reuse, Repurpose (old plastics for different use) and Recycle.
- The precautionary principle that minimizes activities that could potentially be damaging to the environment.
- The 'polluter pays' principle states that the producers of pollution (importers, producers and manufacturers) should participate in the costs of waste and plastic management.
- The principles of coordination that aim for the stakeholders to act according to their functions in an effective manner and collaborative manner.
- The principle of capacity building and education that provides the opportunity for all the stakeholders to develop knowledge, skills and abilities to effectively participate in the management of plastics and waste.

[3]Preventing Plastic Pollution, EU

1.4. Approach to Developing the Recommendations for the Manila City Action Plan

The recommendations for the city action plan were developed following completion of the baseline study in Manila. The baseline study was conducted through a deep analysis of the plastic value chain by engaging and consulting with the actors and stakeholders involved. It involved studying the current waste management operations of the city managed by the Department of Public Services of the City of Manila (DPS), including the commercial and household level collection of waste, and considering the intersection of the formal and informal waste management activities. The baseline study also explored the aspects of the regulatory landscape, extended producer responsibility and private sector led solutions, finance and budgetary resources, new pathways offered by digital solutions, and finally, through observation and gender-sensitive and socially-inclusive surveys, a good understanding of consumer needs and preferences, and how to promote deeper awareness and behavior change.

The baseline study identified key challenges faced by the city in tackling plastic waste management and preventing leakage. These challenges were then grouped and linked with specific areas of opportunities to overcome current bottlenecks, to expand the capacity and meet future challenges, raising the bar in plastic waste management to help accelerate the shift towards a circular economy. These opportunities focus on not only increasing the operational capacity of the formal waste sector, but also encourages collaboration with the informal sector and the private sectors to stimulate market-based solutions and new business models, encouraging plastic circularity solutions.

The expert team researched examples of success stories from the region and brought in the experience gained in other projects relevant to the situation and aspirations of Manila in developing recommendations to meet the key objectives of the opportunities identified. Recommendations are provided for each of the opportunities and the corresponding challenges to overcome. The recommendations consist of a number of strategic actions. The actions under each of the recommendations are focused efforts aimed at overcoming a range of challenges linked to the opportunities they are grouped under.

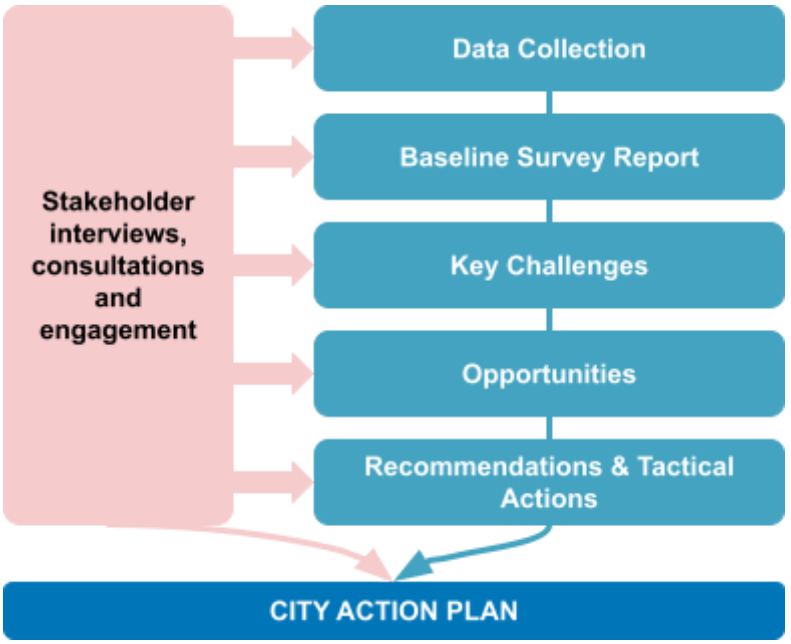


Figure 2: Approach to Developing the Recommendations for the Manila City Action Plan

The strategic actions are aimed at both overcoming specific challenges and supporting new initiatives which will in turn support the path towards the plastic waste management and circularity aspiration of the city of Manila. These strategic actions form the granular action items in the overall city action plan and roadmap.

1.5. Structure of the Manila City Action Plan

The City Action Plan is structured as follows:

- Section 1 - Introduction: presentation of the key principles and approach in developing the City Action Plan
- Section 2 - Plastic management key challenges: identification of the regulatory, operational, financial and behavioral challenges faced in Manila
- Section 3 - Opportunities for Manila city: identification of the opportunities echoing the challenges and development of a set of actionable recommendations
- Section 4 - Way forward: guide for the deployment of the city action plan with a focus on ensuring the buy-in and empowerment of the relevant stakeholders
- Section 5 - Roadmap for recommendations: summary of the recommendations with the identified leading stakeholders, required resources and timeline.
- Appendices: The annexes can be referred to for detailed description of each of the recommendations, the strategic actions, the resources, timeline, enabling conditions and stakeholders involved.

Plastic Waste Management Challenges in Manila City

A series of challenges have been identified and analysed following a comprehensive assessment of the existing state of plastic waste management in Manila City.

Six categories have been defined:

Regulatory
Current policies and incentives for businesses to use less plastic and develop sustainable packaging solutions could be strengthened. The current regulatory model contributes to excessive plastic waste generation.

Collaboration
Limited collaboration between various stakeholders (government, private sector, informal sector, NGOs) hinders resource sharing, knowledge exchange, and capacity building for waste management.

Operational
Low levels of segregation of Municipal Solid Waste at source prevents the diversion of plastic waste. A lack of recognition and integration of informal waste collectors and recyclers into the system also reduces the overall efficiency and misses opportunities.

Infrastructure
Inadequate infrastructure for plastic segregation and recycling within the city contributes to high volumes of waste transported to the Navotas SLF.

Waste Mismanagement
Improper waste disposal contributes to plastic waste finding its way into waterways and the environment. Though collection rates are high, large portion of PW ends up in the landfill.

Plastic Waste Market
The plastic waste market is affected by limited and irregular rates of collection, as well as operational challenges hindering the collection of plastic waste for recovery.

2.1. Regulatory

Current policies and incentives for businesses to use less plastic and develop sustainable packaging solutions could be strengthened. The current regulatory model contributes to excessive plastic waste generation. - Taking advantage of the EPR Law, obliged private sector entities can be encouraged to contribute to reducing plastics packaging, getting involved to scale up collection and recovery through collaboration with retailers. Other policy and market-based instruments can be employed to reduce difficult to recycle plastics and scale up recovery.

2.1.1. Lack of City Environment and Natural Resources Office

One of the significant challenges facing the City of Manila is the absence of a dedicated City Environment and Natural Resources Office (CENRO). Currently, the city's environmental concerns, particularly solid waste management, are managed by the Department of Public Services (DPS). However, the DPS lacks a specific focus on environmental issues, which limits its effectiveness in addressing the city's growing waste management needs.

The DPS is primarily responsible for a wide range of public services, including sanitation, street cleaning, clearing operation, and waste collection. While these are crucial functions, the lack of a specialized department means that there is no dedicated team focusing on comprehensive environmental management. This includes essential activities such as waste segregation, recycling initiatives, public awareness campaigns on waste reduction, and the implementation of sustainable practices.

Establishing a CENRO would transform the city's approach to environmental management. The advantages of having a CENRO in Manila include:

- Focused Environmental Management: The CENRO would concentrate solely on environmental issues, ensuring that waste management, pollution control, and natural resource conservation receive the attention they require. This dedicated focus would lead to more effective and timely interventions.

- Improved Solid Waste Management: With a specialized team, the CENRO could implement advanced waste management techniques, such as enhanced recycling programs, waste-to-energy initiatives, and stricter enforcement of waste segregation policies. This would reduce the volume of waste sent to landfills and promote a more sustainable approach to waste management.

- Enhanced Public Awareness and Education: The CENRO could lead comprehensive public education campaigns to raise awareness about the importance of environmental protection and sustainable practices. Educating the community would foster a culture of environmental responsibility and encourage citizens to participate actively in waste reduction efforts.

- Better Resource Allocation: By having a dedicated department, the city could allocate resources more effectively towards environmental projects. This includes securing funding

for green initiatives, investing in new technologies for waste processing, and supporting research and development in sustainable practices.

- Strengthened Regulatory Framework: The CENRO would have the authority to develop and enforce environmental regulations tailored to Manila's specific needs. This would ensure better compliance with environmental laws and standards, leading to a cleaner and healthier urban environment.

- Collaboration and Partnerships: The CENRO could establish stronger collaborations with national government agencies, non-governmental organizations, and international bodies focused on environmental protection. These partnerships could bring in additional expertise, funding, and innovative solutions to address Manila's environmental challenges.

2.1.2. Lack of Training and Monitoring on Health and Safety

The City also faces the lack of adequate training and monitoring on health and safety for both formal waste management personnel and informal waste workers. This gap not only jeopardizes the well-being of those directly involved in waste management activities but also has broader implications for public health and environmental sustainability.

The SWM of the city comprises both formal workers employed by the Department of Public Services (DPS) and the barangays, and a substantial number of informal waste workers who play a crucial role in recycling and waste segregation. Despite their vital contributions, these workers often operate in hazardous conditions with minimal protection or training. The formal workers, while somewhat better off, still face significant risks due to insufficient training and monitoring of health and safety practices.

2.1.3. Lack of Provision of Safety and Protective Personal Equipment

The City of Manila faces a significant challenge in the lack of adequate provision of personal protective equipment (PPE) for waste management personnel, particularly affecting formal waste workers. Despite the efforts of several organizations, including the Metropolitan Manila Development Authority (MMDA), the Department of Public Works and Highways (DPWH), the DPS and Estero Rangers, the DENR-NCR Estero Rangers program and River Warriors, Team Mandaragat for Manila Bay cleanup, the Baseco Beach Warriors for Baseco Area cleanup, and the barangay staff who maintain MRF/MRS, the provision of PPE is generally inconsistent and insufficient.

The formal waste management personnel are initially provided with PPE such as gloves, masks, and protective clothing. However, the sustainability of these provisions is a critical issue, as they are not replaced or maintained regularly. As a result, many workers are left with worn-out equipment that fail to provide adequate protection, compelling some to purchase their PPE at their own expense. This situation not only places a financial burden on the workers but also compromises their health and safety, exposing them to various hazards including toxic chemicals, sharp objects, and infectious waste.

Furthermore, informal waste workers, who play a crucial role in recycling and waste segregation, do not have any access to the PPE provided to formal waste management personnel. This lack of access leaves them highly vulnerable to health risks. Without proper protective gear, these workers are exposed to injuries and increased risks of infections, exacerbating their already precarious working conditions.

The absence of a structured and sustainable PPE program for all waste management workers for formal waste workers, underscores a significant gap in the city's approach to waste management and worker safety. There is an urgent need for a comprehensive and sustainable PPE program that ensures regular provision and timely replacement of protective gear. This program should include adequate budget allocation to maintain its continuity, training for workers on the proper use and maintenance of PPE, and monitoring mechanisms to track the distribution and usage of PPE.

2.1.4. Lack of Single Use Plastic Ordinances

A key challenge in managing plastics in the city is the lack of specific ordinances regulating single-use plastics. Unlike other local government units (LGUs) in the Philippines, Manila has not yet enacted laws to ban or restrict the use of single-use plastics in various establishments. This gap significantly hinders the city's efforts to manage plastic waste and reduce environmental pollution.

In contrast, several cities within the National Capital Region (NCR) have taken proactive measures to combat plastic pollution. For instance, Quezon City issued Ordinance No. 2876-2019, which bans single-use plastics in hotels and restaurants for dine-in transactions. This includes items such as plastic spoons and forks, knives, plastic and paper cups, plates, straws, coffee stirrers, and Styrofoam containers. Other cities like Las Piñas, Pasay, Pasig, Makati, Muntinlupa, and Parañaque have implemented similar bans or restrictions on single-use plastics.

Despite the absence of local ordinances in Manila, there are regulations in place within the city's ports, these fall under the jurisdiction of the Philippine Ports Authority (PPA) rather than the LGU. The PPA's Memorandum Circular No. 11-2021 enforces a ban on specific single-use plastics, including plastic cups thinner than 0.2 millimeters, plastic drinking straws, plastic spoons, forks, knives, coffee stirrers, and plastic bags thinner than 15 microns. While this regulation is a step in the right direction, it does not cover the entire city.

2.2. Collaboration

Limited collaboration between various stakeholders (government, private sector, informal sector, NGOs) hinders resource sharing, knowledge exchange, and capacity building for waste management.

2.2.1. Lack of Formal Partnership with the Informal Waste Sector

The informal sector plays a vital role in plastic waste collection in Manila City, but the lack of support and collaboration with the formal system negatively impacts the collection rates of plastic waste for recycling and the well-being of waste pickers. At the bottom of the informal sector value chains are waste pickers and waste collectors. These individuals earn low and irregular incomes, which depend on the availability and quantity of plastic waste in the areas they cover. Women, often constrained by family responsibilities and mobility restrictions, face limitations in the time they can spend collecting waste, which directly impacts their earning potential. Although some waste pickers are recognized by communities and barangays, they still operate independently, often found working in the streets, neighborhoods, and public spaces.

The current situation concerning waste pickers is a major challenge due to the lack of accurate data, the number of waste pickers are not known since most of them remain undocumented and have no access to essential health benefits. To make ends meet, waste pickers often juggle multiple jobs and rely on the sale of recyclables for extra income. However, this income source is highly unreliable, as the price of plastic waste fluctuates based on its quality and, more significantly, on the price of virgin plastic.

This instability poses significant challenges for waste pickers throughout the year, as they have no bargaining power over the price of recyclable materials and plastic waste they trade. Moreover, waste pickers heavily depend on their personal connections and relationships with middlemen to determine the price at which they can sell recyclable materials. They must contend with low and fluctuating prices for the materials they collect, as well as competition from other collectors and middlemen. Women, especially those working independently, are among the most vulnerable, with very limited or no bargaining power.

Plastic waste and material prices exhibit substantial variation based on the buyer and market conditions, making the market inherently unstable. Aggregators mitigate these fluctuations by employing cross-subsidization, balancing profits from strong sales to offset losses from weaker ones.

There are opportunities to improve the collaboration between the formal and informal sectors to increase the reliability of the plastic supply chain and bring benefits to all stakeholders. These benefits would include more effective and reliable plastic waste market systems, as well as improved well-being for informal sector workers. Enhancing support for waste pickers through formal recognition, provision of essential health benefits, and establishing stable pricing mechanisms would significantly improve their livelihoods and contribute to a more sustainable and efficient waste management system in Manila City.

2.3. Operations

Low levels of segregation of Municipal Solid Waste at source prevents the diversion of plastic waste. A lack of recognition and integration of informal waste collectors and recyclers into the system also reduces the overall efficiency and misses opportunities. – we observed limitations to provide for plastic recovery activities. This could be due to the lack of early-stage segregation of plastic waste to enable plastic waste to be diverted away from the landfill.

2.3.1. Lack of Common Monitoring Platform and Digitalization of Data

In terms of the operations, the absence of a common monitoring platform and the digitalization of data hampers efficient waste management and environmental monitoring. Currently, the Department of Public Services (DPS) receives monthly reports from 896 barangays. They also receive environmental compliance audit (ECA) reports that must be submitted to the Department of Interior and Local Government (DILG). However, many of these reports are still not digitized, leading to inefficiencies and delays in data processing and analysis.

The lack of a unified digital platform for monitoring and reporting creates several issues. First, it results in fragmented data management, where information is scattered across different formats and locations. This fragmentation makes it difficult for DPS and other relevant agencies to access, analyze, and utilize the data effectively. Moreover, the manual handling of numerous reports increases the likelihood of errors and omissions, which can compromise the accuracy and reliability of the data.

Without digitalization, the process of compiling and submitting reports becomes cumbersome and time-consuming. Barangays often rely on paper-based reports, which some barangays have to be physically delivered to DPS, leading to delays in data transmission. Similarly, ECA reports submitted to the DILG face similar challenges, as manual encoding slows down the assessment and compliance verification processes. This lack of efficiency can hinder timely decision-making and the implementation of necessary interventions to improve waste management and environmental practices.

To address these issues, it is crucial to implement digitalization of data and create a centralized monitoring platform. By transitioning to a digital system, DPS and other relevant agencies can streamline the reporting process, ensuring that data is promptly and accurately recorded. This can be achieved by developing a control service where agencies can input their reports using a standardized template online. Such a system would allow for consistent data entry, minimizing discrepancies and facilitating easier data aggregation and analysis.

The standardized template would ensure uniformity in the information provided, making it simpler to compare and integrate data from different barangays and agencies. Once reports are submitted through the online platform, they can be securely stored in the cloud. Cloud storage offers several advantages, including enhanced data security, accessibility, and scalability. Authorized personnel can access the reports anytime and from anywhere, enabling more flexible and responsive monitoring and decision-making.

Furthermore, a common monitoring platform would enable real-time tracking and updates, allowing

DPS and other agencies to monitor waste management activities and environmental compliance more effectively. This real-time capability would provide valuable insights into the performance and challenges faced by different barangays, facilitating targeted interventions and resource allocation.

The digitalization of data and the establishment of a centralized monitoring platform at the city level would also enhance transparency and accountability. With all reports stored in the cloud, it would be easier to track and audit the performance of various agencies and barangays. Additionally, it is ideal to implement digitalization at the provincial and regional levels to feed into the national plastic data platform. This would support the monitoring and tracking of the national action plan and help meet future country-level reporting requirements that may be mandated as part of the global plastic treaty.

2.3.2. Integration of Recently Enacted EPR Law, Approved CPOA-ML, and Published Plastic Roadmap

One of the challenges identified is the complex task of integrating several recently enacted environmental policies into its solid waste management operations. This integration is occurring against the backdrop of an impending expiration of the city's 10-year Solid Waste Management Plan (SWMP). As the existing plan concludes this year, the Department of Public Services (DPS) has proactively drafted an updated 10-Year SWMP for 2025-2034. This updated plan aims to continue the initial targets set in the previous plan and realizes the vision of establishing a City Environment and Natural Resources Office (CENRO). The alignment with new environmental mandates, including the Extended Producer Responsibility (EPR) law, the approved City Plan of Action on Marine Litter (CPOA-ML), and the published Plastic Roadmap, presents both challenges and opportunities for improving SWM operations in Manila.

The expiration of Manila's 10-year SWMP necessitates a comprehensive review and update of the city's waste management strategies. The current plan has provided a foundational framework for waste management activities; however, the evolving environmental landscape and new legislative requirements mean that the city must adapt its strategies to remain effective. The DPS has thus drafted an updated 10-Year SWMP for 2025-2034, aiming to build on the progress made and address emerging challenges in waste management.

The recently enacted EPR law introduces a crucial framework for reducing plastic waste through producer responsibility. The law mandates targets for the recovery of plastic product footprints, aiming for a forty percent (40%) recovery by the end of December 2024. Integrating these targets into the updated SWMP is essential for aligning Manila's waste management practices with national policies. This integration will require significant adjustments in the city's waste collection, segregation, and recycling processes to meet the mandated recovery targets. Additionally, it will necessitate collaboration with producers and stakeholders to ensure compliance and effective implementation.

The approved CPOA-ML is another critical component that must be integrated into Manila's SWM operations. This plan focuses on reducing marine litter, which is a significant environmental concern for coastal cities like Manila. By aligning the updated SWMP with the CPOA-ML, the city can adopt comprehensive strategies to mitigate marine litter through improved waste management practices on land. This alignment will involve enhancing waste collection systems, promoting community awareness, and implementing stringent measures to prevent waste from entering water bodies.

The Plastic Roadmap in the Philippines prepared by the World Bank (2024) provides a strategic approach to managing plastic waste, emphasizing reduction, reuse, and recycling. Integrating this roadmap into the SWMP will help Manila adopt sustainable practices that reduce plastic pollution. The roadmap outlines specific actions and targets for reducing plastic use, promoting recycling, and supporting innovations in plastic waste management.

These above challenges also present significant opportunities. Aligning the SWMP with the EPR

law, CPOA-ML, and Plastic Roadmap can lead to more efficient and effective waste management practices. It provides an opportunity to enhance the city's waste collection and recycling systems, reduce environmental pollution, and promote sustainability.

2.4. Infrastructure

Inadequate infrastructure for plastic segregation and recycling within the city contributes to high volumes of waste transported to the Navotas SLF. – in the formal sector, limited MRF facilities and capacity to segregate plastic waste for recovery is a challenge to scale up plastic waste recovery.

2.4.1. Lack of Adequate Infrastructure

Following the comprehensive assessment, it has become evident that the existing infrastructure is lacking in several key areas.

The municipal solid waste collected by Leonel, the private collection service provider for the city, is transported directly to the sanitary landfill without any further separation and diversion operations. This direct disposal method bypasses opportunities for sorting and recovering recyclable materials, both high-value plastics and low value difficult-to-recycle plastics. As a result, the city misses out on significant opportunities for waste recovery and recycling which could reduce the volume of plastic waste sent to landfill, shortening the lifetime of the landfill. Moreover, this also is a loss of the potentially economic benefits that could be generated from recycling and recovery of plastic materials.

Currently, over 200 barangays in Manila do not have their own MRFs or MRSs. A significant issue is also the lack of basic waste infrastructure, such as bins in public areas where residents can dispose of their waste when needed and to avoid littering. This lack of infrastructure severely limits the capacity for waste segregation, recovery, and recycling at the community level and effective waste management. MRF and MRS play a crucial role in diverting waste from landfills by enabling the sorting and processing of recyclable materials (i.e., sold to nearby junkshops). Without these facilities, a significant portion of recyclable waste ends up being mixed with biodegradable and residual waste, ultimately being transported to landfills.

Even among the existing MRFs and MRSs, a number are inactive due to inadequate resources and budget constraints. Operating and improving these facilities require adequate budget for equipment maintenance and upgrades, personnel, and other operational costs. The inactivity and ineffectiveness of these facilities exacerbates the city's waste management challenges, as the potential for recycling and waste diversion remains unutilized.

Manila City does have a centralized city MRF, but its capacity is limited. This facility primarily handles waste from the Manila Zoo, nearby markets, and surrounding barangays. Due to its limited capacity, the centralized MRF cannot accommodate the waste generated by the entire city. Consequently, the recovery and recycling rates, particularly for high-value plastics, remain low. The centralized MRF, along with the barangay-level MRFs, is insufficient to manage the city's waste effectively, highlighting the need for more robust infrastructure.

Collection trucks that gather waste from various parts of the city transport their loads directly to the transfer station. From there, the waste is moved directly to a barge without any diversion or sorting activities, ultimately ending up in the landfill.

This direct transfer method, while efficient in terms of logistics, does not take advantage of potential waste recovery and recycling opportunities, particularly for plastic waste. The absence of a Material Recovery Facility (MRF) within the transfer station means that valuable recyclables, including plastics, are not being separated and recovered before disposal. This not only increases the volume of waste sent to the landfill but also misses out on potential economic benefits from recycling.

Another critical issue is the looming capacity limit of the Navotas Sanitary Landfill, which is expected to reach its full capacity within the next five years. This presents a significant challenge for the city, as the landfill currently serves as the primary disposal site for Manila's waste. Without alternative disposal options or strategies to reduce the waste volume, the city faces a potential waste management crisis in the near future.

To address these challenges, there is an urgent need for substantial investment in waste management infrastructure including facilities for segregation, recycling, and storage. The approach of establishing large scale, fit-for-purpose clustered barangay MRFs in the barangays without these facilities should be a priority. Additionally, reviving inactive facilities through proper funding and resource allocation is essential to maximize the city's waste recovery and recycling potential. Enhancing the capacity of the centralized MRF and considering the development of a new, larger facility that can separate plastics waste prior to reaching the Navotas landfill transfer station can contribute to better waste management outcomes.

The possibility of establishing a MRF within the transfer station and exploring sustainable alternatives to landfill disposal, such as waste-to-energy technologies and advanced recycling methods, can provide long-term solutions to the city's waste management challenges. Strategic planning and investment in these areas are crucial to ensuring that the city can manage its waste sustainably and efficiently in the future.

2.4.2. Lack of Collection Vehicle for Hazardous Waste of Households

While the city has implemented a two-stream collection system for biodegradable and non-biodegradable waste from households, there remains a critical gap in the collection of hazardous waste. Hazardous household waste, including items such as plastic face masks, plastic containers of chemicals, and other potentially dangerous materials, requires specialized handling and disposal. The lack of dedicated collection vehicles for this type of waste poses severe environmental and public health risks.

Hazardous waste from households includes a wide range of items that pose significant risks if not managed properly. These items include:

- Plastic Face Masks: The COVID-19 pandemic has led to a substantial increase in the use of disposable plastic face masks. These masks can harbor pathogens and contribute to plastic pollution if not disposed of correctly.
- Plastic Containers of Chemicals: Many households use products that come in plastic containers, such as cleaning agents, pesticides, and solvents. These containers often contain residual chemicals that can be harmful to the environment and human health.
- Other Hazardous Materials: Batteries, electronic waste, fluorescent lamps, and other hazardous materials also fall under this category and require special handling.

It was identified during the consultation with relevant stakeholders that there should be dedicated collection vehicles designed to handle and transport hazardous materials safely. These vehicles should be equipped with appropriate containment systems to prevent spills and contamination during collection and transport.

2.5. Plastic Waste Mismanagement

Improper waste disposal contributes to plastic waste finding its way into waterways and the environment. Though collection rates are high, large portion of PW ends up in the landfill. – this is specific to plastic waste; it refers to the high portion of plastic waste ending up in the landfill.

2.5.1. Plastic Hotspots

Plastic pollution has become a significant environmental challenge in the City of Manila, with several identified plastic hotspots throughout the city. These hotspots are primarily located near the esteros (waterways), rivers flowing through the city, and other water bodies which serve as conduits for dumping plastic waste into Manila Bay. The city's geographical position, combined with its urban dynamics, exacerbates the issue, making effective waste management and pollution control crucial.

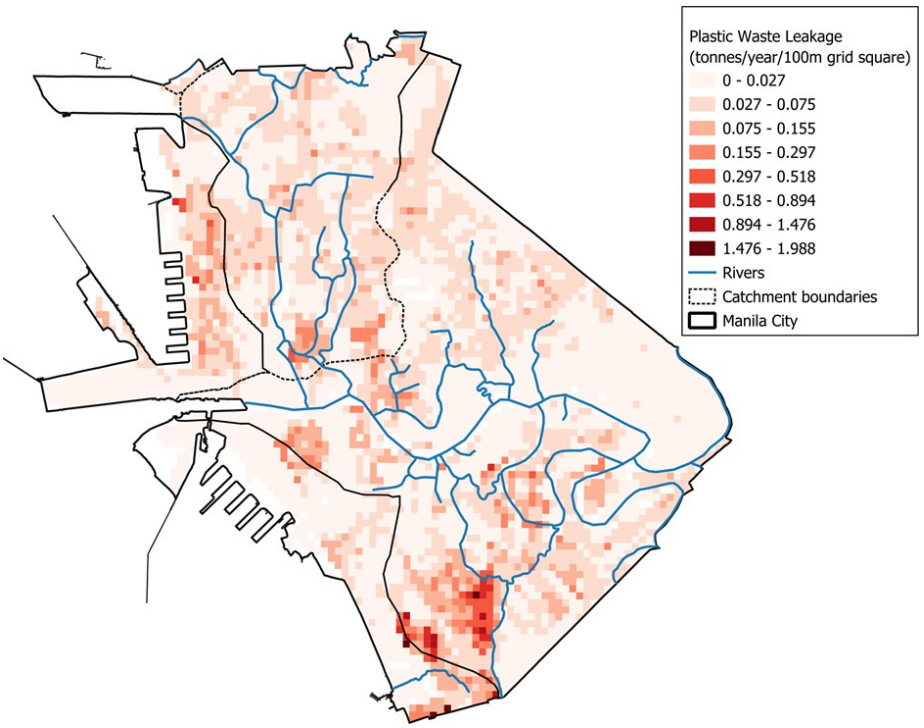


Figure 3: Plastic Waste Leakage Distribution Map in Manila City

Figure 4: Plastic Leakage Hotspots along the Esteros in Manila City

The city is home to approximately 32 esteros that traverse all its districts. These esteros play a critical role in the city's drainage system but have also become major plastic pollution hotspots. A Waste Assessment and Characterization Study (WACS) conducted in 2021 in Estero de Magdalena revealed alarming findings: around 38% of the waste in this estero consisted of plastics. These plastics range from high-value items such as PET bottles to low-value plastics like sachets and food wrappers, which are more challenging to recycle and often end up clogging waterways. It is estimated that the amount of plastic waste collected from the esteros is approximately 135 tons in 2022 and 191 tons in 2023.

Being situated downstream, the city also receives significant waste discharges from upper cities in Metro Manila, including Quezon City and Valenzuela City. This downstream flow contributes to the accumulation of plastic waste in Manila's esteros and other water bodies. The waste transported by these waterways often includes a mix of household and industrial waste, further complicating the pollution scenario. Recent cleanups, such as those conducted during the International Coastal Cleanup Day, have highlighted the severity of plastic pollution in this area. The majority of waste collected from Manila Bay comprises common household items, including food wrappers and plastic sachets. These findings suggest that the plastic waste originates from nearby communities along the bay and from upstream areas along the Pasig River.

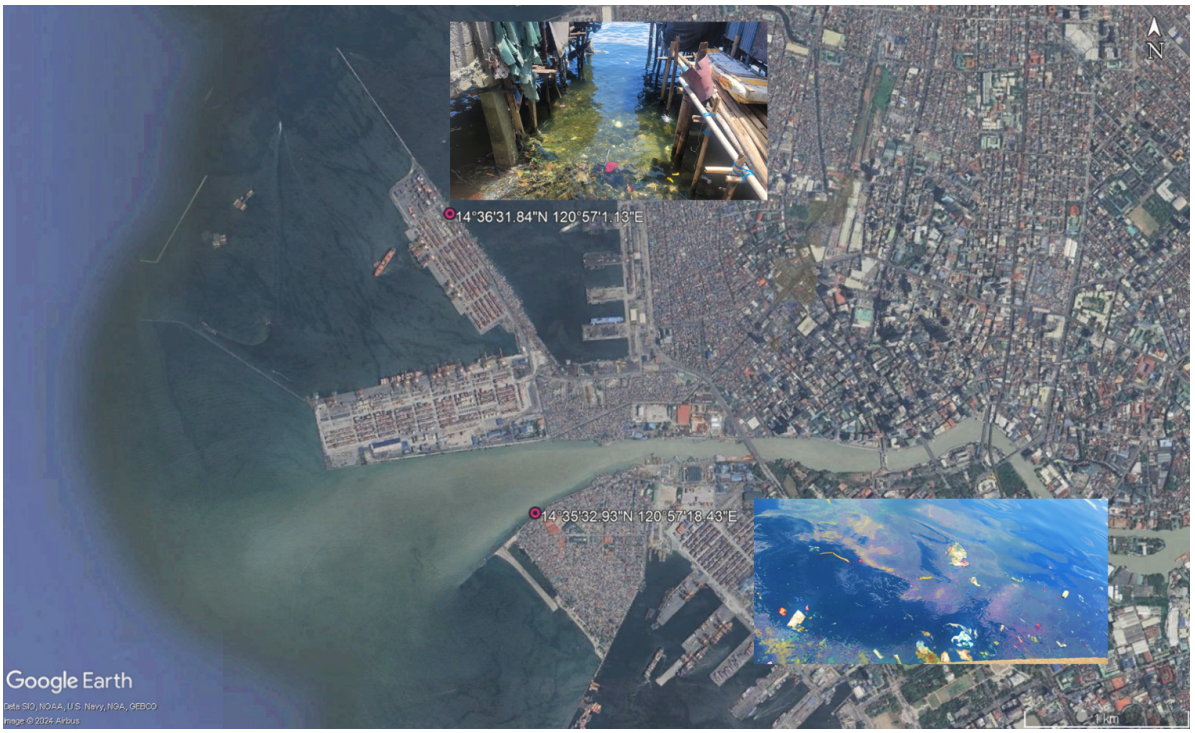


Figure 5: Plastic Leakage Hotspots along the Manila Bay in Manila City

To address the plastic pollution in these hotspots, it is crucial to implement at-source prevention strategies. Improving waste collection and recycling systems can significantly reduce the leakage of plastics into the environment.

2.5.2. LACK OF TECHNOLOGY FOR MARINE LITTER

The lack of advanced technology for addressing marine litter is one of the pressing issues in the city. Currently, the city employs trash traps in esteros (creeks and waterways) to capture floating waste. These traps play a crucial role in preventing debris from reaching larger bodies of water, such as Manila Bay. However, the collection process is labor-intensive and inefficient, relying heavily on manual recovery by the estero warriors—a dedicated group of workers tasked with maintaining the cleanliness of these waterways.

To enhance the efficiency and effectiveness of marine litter management, the city needs to invest in advanced technologies that can automate and improve the process of capturing and cleaning collected waste. This can be addressed in two parts:

Firstly, for the capture and removal of surface-floating and submerged waste, mechanized and automated solutions should be implemented. These solutions, although not necessarily high-tech, can significantly increase the efficiency of trapping and removing plastics from water bodies. Examples include automated trash skimmers, bubble barriers and robotic waste collectors, and conveyor belt systems that can operate continuously and require minimal manual intervention.

Secondly, for monitoring floating waste and hotspots, both on land and in water bodies, advanced imaging and other technologies should be utilized. Drones equipped with high-resolution cameras, satellite imaging, and remote sensing technologies can provide real-time data on the location and accumulation of waste. This information can help in identifying hotspots and optimizing the deployment of cleanup efforts.

2.6. Plastic Waste Market

The plastic waste market is affected by limited and irregular rates of collection, as well as operational challenges hindering the collection of plastic waste for recovery. - plastic waste market requires domestic demand to create stability of the market. Combining with green procurement policies, local demand can be introduced for products from recycled materials that has lower market demand and value compared types of plastics such as PET.

2.6.1. Lack of Available Markets for Low-Value Plastics

Low-value plastics, such as sachets and thin plastic films, constitute a large portion of plastic waste and are notoriously difficult to recycle. While high-value plastics like PET bottles, hard plastics, and certain plastic e-waste have established markets such as junkshops, and recycling pathways, low-value plastics continue to be a persistent problem.

The city boasts a network of junkshops across all its districts. These establishments primarily focus on high-value plastics, providing a market for materials that are easier and more profitable to recycle. High-value plastics, such as PET bottles, hard plastics including HDPE and PP containers and products, and certain types of plastic e-waste (such as disks, computer parts), are collected, sorted, and sold for recycling. This established market helps in managing a portion of the city's plastic waste effectively.

To address the issue of low-value plastics, the city has partnered with various initiatives such as Aling Tindera, Kolek, Kilo, Kita (KKK), and Alaskalikasan. These programs are designed to collect low-value plastics from selected barangays. For instance, the Aling Tindera initiative engages small-scale store owners in collecting low-value plastics from their customers, which are then picked up by recycling partners. Similarly, the KKK program incentivizes residents to collect and exchange low-value plastics for goods or cash.

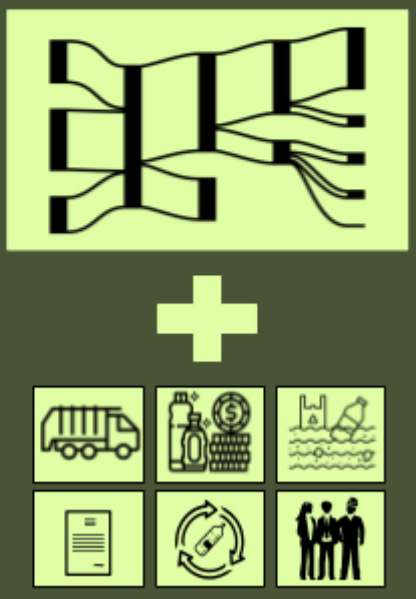
Despite these efforts, the coverage of such initiatives remains limited. They cater to only a few barangays, leaving many areas without access to these programs. Consequently, a significant amount of low-value plastics continues to be discarded improperly, contributing to environmental pollution. These types of plastics are commonly found in urban waste streams and are prone to leak into waterways and public spaces, exacerbating the pollution problem.

Addressing the problem of low-value plastics requires creating new markets and enhancing existing ones. There is a critical need to develop innovative solutions that can add value to low-value plastics, making them more attractive for collection and recycling.

3. Plastic Waste Management Opportunities for Manila City

Strategy-based opportunities have been developed, encompassing recommendations targeting plastic waste pollution and leakages into the environment. By exploring these opportunities, the objective is to minimise the use of plastic and disposable plastic items in Manila City in order to reduce marine pollution. The strategy is to support the local shift towards a circular economy for plastics, emphasising the importance of reuse and closed loop recycling by promoting sustainable practices and reducing plastic waste. This strategy is aligned with the objectives of the City Action Plan on Marine Litter and the targets of the EPR Law. **Five opportunities have been identified and studied from the current situation in the city.**

GAP ANALYSIS & IDENTIFICATION OF CHALLENGES



5 STRATEGIC OPPORTUNITIES

- **Strengthening the existing policies and ordinances to implement and improve solid waste management and plastic waste management in the city**
- **Improving the service level of waste management**
- **Empower the Informal Sector and create more value in the plastic waste market of Manila City**
- **Divert plastic waste coming to Navotas SLF and expand its lifespan**
- **Bridging the knowledge gap: training, capacity building, information, education, and communication as catalysts for change**

3.1. Opportunity 1 - Strengthening the existing policies and ordinances to implement and improve solid waste management and plastic waste management in the city

Manila City currently has several policies and ordinances in place for Solid Waste Management, along with the recently approved City Plan of Action on Marine Litter (CPOA - ML). Despite these efforts, there is a pressing need to strengthen existing policies to better align with the CPOA - ML, the recovery targets established by national laws including Republic Act 9003, the Ecological Solid Waste Management Act, and RA 11898, the Extended Producer Responsibility (EPR) Law, and other commitments of the City (e.g., Plastic Smart Cities).

This opportunity outlines several approaches to achieve improvement of the city's solid waste and plastic waste management, contributing to a cleaner and more sustainable urban environment.

CHALLENGES TARGETED:

Plastic Waste Market

Regulatory

Waste Mismanagement

Coordination and Collaboration

RECOMMENDATIONS TO IMPLEMENT:

- R#1 - Capturing and Monitoring Data for better Plastic Waste Management
- R#2 - Streamlining and Harmonising Ordinances
- R#3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City
- R#5 - Formalisation and Institutionalisation of Informal Groups in Manila City
- R#9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRF

3.1.1. Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City

The establishment of a City Environment and Natural Resources Office (CENRO) can be a pivotal step for Manila in its quest for efficient waste management systems. CENRO can serve as a centralized authority dedicated to environmental preservation and sustainable resource management.

The establishment of CENRO would streamline the coordination and management of various environmental initiatives within Manila. By consolidating responsibilities under one umbrella organization, CENRO could ensure better collaboration among different departments and agencies involved in waste management. This unified approach reduces duplication of efforts, enhances communication channels, and fosters a more cohesive strategy towards waste reduction and recycling. CENRO could implement comprehensive monitoring and evaluation systems to track progress in waste management initiatives. CENRO could develop metrics to assess the effectiveness of waste collection, recycling programs, and pollution control measures. By analyzing data and conducting regular assessments, CENRO could identify areas for improvement and adjust strategies accordingly to achieve better outcomes.

CENRO could spearhead investment in infrastructure and technology to enhance waste management capabilities in Manila and can facilitate better financial planning and budgeting for waste management activities. This includes the establishment of recycling facilities, waste-to-energy plants, and modernized waste collection systems. By leveraging technology such as GIS mapping and data analytics, CENRO could optimize waste collection routes, improve resource allocation, and enhance overall efficiency in waste management operations.

City Environment and Natural Resources Offices in Metro Manila Cities

In Metro Manila, each city typically has a dedicated department responsible for environmental management activities, including solid waste management. However, Manila City is an exception, as it is the only city without a City Environment and Natural Resources Office (CENRO). This distinction is significant, considering the vital role that CENROs fulfil in urban environmental governance. They are instrumental in areas such as providing environmental education, conserving natural resources, reducing waste, and controlling greenhouse gas emissions.

3.1.2. STRENGTHEN THE "NO SEGREGATION, NO COLLECTION" POLICY OF THE CITY

Effective waste segregation is crucial for sustainable waste management, yet challenges persist in ensuring compliance with existing policies. This action plan aims to enhance the enforcement of the "No Segregation, No Collection" policy in the City, addressing the issue of mixed waste collection and improving waste segregation practices at the barangay level.

The deputization of the Environmental Police and the monitoring team during the collection in the city plays a critical role in monitoring household waste practices. However, their numbers are limited, and currently, only a fraction of the 896 barangays are adequately covered. To address this, a multifaceted approach is proposed:

- A robust monitoring tool should be developed and implemented to assess segregation compliance across all barangays. This tool shall enable real-time tracking of waste segregation practices, allowing for prompt identification of non-compliant areas and swift corrective actions. The features of the tool may include a digital platform accessible by barangay officials, collection monitoring team, and the Environmental Police, allowing regular reporting and data analytics to monitor compliance trends, and GPS-enabled tracking to ensure accurate location-based compliance checks.
- To encourage compliance, the policy should also incorporate a system of incentives for barangays and households demonstrating exemplary waste segregation practices. Incentives may include financial rewards or grants for barangay development projects, public recognition and awards for top-performing barangays, and discounts or rebates on waste collection fees for compliant households.
- Infrastructure with continuous IECs should be upgraded to support effective waste segregation. Key infrastructure improvements will include establishing common collection points equipped with clearly labelled segregation bins for different types of waste (biodegradable, recyclable, residual, special).

By strengthening the "No Segregation, No Collection" policy and implementing targeted interventions at the barangay level, the City can improve waste segregation practices, reduce mixed waste collection and disposed waste to the sanitary landfill, and promote a culture of environmental responsibility among residents and businesses.

3.1.3. INTEGRATION OF SINGLE-USE PLASTICS REGULATION IN THE CITY ORDINANCES

In the City of Manila, there is an existing plastic ordinance banning the use of plastic bags on dry products and regulating the usage on wet goods. City Ordinance No. 8282, signed in 2012, also includes the prohibition on the use of polystyrene as packaging for food, goods, and other products (City of Manila, 2012).

The ban is imposed more heavily on business establishments than on consumers. Sections 4 to 7 of the ordinance specifically prohibit the commercial sector's usage of plastic bags and polystyrene, including the sale of plastic bags. The ordinance also mandates all stakeholders to properly clean used plastic bags for barangay collection. Noncompliance by business establishments with City Ordinance 8282 can incur penalties depending on the number of offences (City of Manila, 2012). In

addition, the city has already planned to amend the CO 8282 to include specific single-use plastics such as Styrofoam. The amendment is now its third hearing.

The Department of Public Services (DPS) of Manila City is mandated by the ordinance to conduct monitoring of the ban's implementation and to conduct a feasibility study on packaging alternatives. They are also authorized to provide livelihood programs for the manufacture and distribution of eco-friendly packaging as alternatives to the banned SUPs. The City of Manila is tasked with conducting a massive IEC campaign through printed, radio, television, and internet media and promoting biodegradable and reusable packaging (City of Manila, 2012).

However, within the ports of Manila, there is an expanded policy, PPA Memorandum Circular No. 11-2021, that prohibit the use of unnecessary single-use plastics (SUPs) in all ports and port facilities under the jurisdiction of PPA, including all offices and establishments within the port area (Philippine Ports Authority, 2021). The ban is deemed effective on July 18, 2021, and it also enforces the report submission of the port managers and department managers regarding the implementation of the ban.

By integrating similar regulations into the city ordinances, Manila can significantly reduce plastic waste, mitigate pollution, and promote sustainable practices among residents and businesses. This proactive approach will not only enhance environmental protection but also set a standard for other urban areas to follow, contributing to a broader national effort to combat plastic pollution.

PHILIPPINE PORTS AUTHORITY'S MEMORANDUM CIRCULAR NO. 11-2021

The PPA Memorandum Circular No. 11-2021 is based on the NSWMC Resolution No. 1363 s. 2020, Presidential Decree No. 857, and the PPA Board Executive Committee directive during its 344th meeting held on June 22, 2021. This policy covers all ports and port facilities under the jurisdiction of PPA, including all offices and establishments inside the ports. It identifies the following types of plastic products as unnecessary SUPs, and its usage is prohibited within the ports based on the guidelines of the memorandum circular.

- Plastic Cups (lower than 0.2 mm in thickness)
- Plastic Drinking Straws
- Plastic Coffee Stirrers
- Plastic Spoons, Forks, and Knives
- Plastic Labo and Thin-filmed Sando Bags (lower than 15 microns)

3.2. Opportunity 2 - Improving the Service Level of Waste Management

In Manila City, although plastic waste collection rates are relatively high at 99%, the existence of plastic hotspots and insufficient diversion of plastic from the waste stream underscore significant challenges. Most of the waste including recyclables in the city are being disposed to the landfill. The city struggles to accurately monitor progress due to a lack of monitoring platforms. This scenario offers a distinctive chance for the City to improve its waste management services by optimizing current processes.

In addition, improving and establishing infrastructure would also contribute to the improvement of waste management in the city.

CHALLENGES TARGETED:

- **Infrastructure**
- **Operational**
- **Plastic Waste Market**
- **Regulatory**
- **Waste Mismanagement**
- **Coordination and Collaboration**

RECOMMENDATIONS TO IMPLEMENT:

- R#1 - Capturing and Monitoring Data for Better Plastic Waste Management
- R#2 - Streamlining and Harmonizing Ordinances
- R#3 - Establishment of City Environment and Natural Resources Office (CENRO under a Newly Formed Department of Manila City
- R#4 - Developing Awareness Engagement and Behavioural Change
- R#6 - Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Recycling
- R#8 - Secure Technology-Based Equipment and Systems to Capture Marine Litter
- R#9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRF

3.2.1. Establishment of centralized Data Management System

Accurate data on plastic waste generation, management, and environmental impact is essential for effective decision-making. It guides policy formulation, legal reforms, and resource allocation strategies to address plastic pollution. Reliable data monitoring of plastic pollution is also crucial to monitor progress and establish realistic targets for cities and countries. Despite the existing data reporting and management system of the Department of Public Services of the Manila City on waste generation, collection, diversion, and recovery from across 896 barangays, it encounters several challenges:

- No existing electronic document management system or absence of a centralized platform for the existing data collection system.
- The quality of data collected by the DPS is variable despite the provided template. This is due to several factors, including the different types of reports to be submitted to various agencies such as DENR and DILG, and the lack of capacity among barangay staff responsible for data reporting.
- Manual data reporting by the barangays. Some barangays submit data on paper, which the DPS then needs to encode manually into their system.
- Lack of information system infrastructure; the DPS has limited hardware for data management, leading to delays in encoding data from across the barangays.
- The data is not always used effectively to improve waste management in Manila City. This is due to several factors, including a lack of awareness of the system and insufficient capacity to utilize the data.

This represents an opportunity for Manila City to establish a framework for building maturity in plastic waste management through a comprehensive and systematic approach to monitoring plastic pollution in Manila City. **This framework emphasizes the establishment of a centralized data management system and a network of data reporters for effective data collection, analysis, and utilization.**

A centralized digital data management system will form the backbone of the monitoring program, aggregating and recording plastic waste data from all waste management sectors in Manila City. This data will be electronically categorized and stored for easy access, analysis, and reporting. Funding for the system could come from grants and a budget from CENRO for its operation and maintenance, partially sourced from city-level EPR collection.

The program will establish a network of data reporters, coordinated by a central data coordinator. This network will include stakeholders involved in various stages of plastic waste management, such as: Waste collectors (formal and informal), recycling facilities, sorting facilities and disposal facilities.

Regular data collection from these stakeholders will ensure a comprehensive picture of plastic waste flows within the city. Existing data may not capture the complete plastic waste picture. The program will address this by generating new data through targeted activities, including:

- Identifying plastic waste sources: This could involve conducting surveys or waste characterization studies in specific locations within the city.
- Quantifying plastic waste generation rates: Regular monitoring of plastic waste generation at key source points, such as markets or households, will be implemented.
- Identifying polymer types disposed of: Analyzing the types of plastic discarded will inform targeted interventions for specific plastic types.

A data framework based on the Plastic Waste Flow Diagram (PWFD) will be established. This framework will categorize plastic waste data across each stage of the waste flow, including generation, collection, sorting, recycling, and disposal. Existing plastic waste management facilities

(formal and informal) will be equipped with the necessary tools and training to record data accurately within this framework.

Long-term data analysis and evaluation are crucial components in assessing progress in plastic waste management. An evaluation framework would continuously monitor the effectiveness of implemented policies and programs. This framework will utilize collected data to make data-driven adjustments and improvements as needed. Additionally, an annual update of the plastic leakage model will be conducted, which will involve updating the Geographic Information System (GIS) mapping and waste data archetype based on data collected through the PWFD framework. This updated model will help monitor the impact of plastic waste management interventions on plastic leakage into rivers and the sea. By utilizing these tools and frameworks, stakeholders can better understand the effectiveness of their efforts in reducing plastic pollution.

	DIGITAL SOLUTIONS USED TO MONITOR PLASTIC POLLUTION
GPML Global Partnership on Plastic Pollution and Marine Litter	The GPML digital platform gathers data from different surveys and provides maps of different types of waste, including beach litter or floating microplastics. It includes other functionalities such as viewing the amounts of plastics produced, imported or exported, and the amount of mismanaged plastic waste. These data are aggregated from many other digital platforms or academic papers and surveys.
PLASTIC PLITTER	pLitter uses an AI model that identifies plastic waste through imagery. An example would be CCTV, cars with mounted cameras as with the StreetView car, boats equipped with cameras, images and videos from volunteers etc. This solution has been developed by the Asian Institute of Technology and tested in the Philippines, Thailand, and Viet Nam. The software can provide information about plastic litter hotspots and the different data gathered can be found in its open data platform. All the technical information needed to implement this AI model is available to the public.

These solutions are often coupled with data collection supervision features which allow local authorities and waste service providers to improve their collection efficiency.

3.2.2. ASSESSMENT OF THE MRFS

The centralized City Material Recovery Facility (MRF) currently processes approximately 373 tonnes per year (about 1,021 kg per day) of plastic waste, which represents roughly 0.29% of the total plastic waste generated. Additionally, the City MRF handles 365 tonnes per year (around 1,000 kg per day) of biodegradable waste and 18 tonnes per year (about 50 kg per day) of other recyclables, based on 2023 baseline data. Furthermore, the barangay MRFs and Materials Recovery Systems (MRS) collectively process 1,850 tonnes per year of recyclables. Given these figures, it is crucial to assess the MRFs to optimize their capacity and ensure sustainable operations.

Evaluating the current centralized MRF is essential to determine its potential for expansion or the need for establishing additional MRFs to enhance waste sorting and recycling capabilities. The city is already planning to develop another MRF on city-owned land, but this initiative requires further feasibility studies.

The establishment of additional Materials Recovery Facilities (MRFs) is essential for enhancing waste sorting and recycling in Manila. These new facilities will supply the necessary infrastructure to handle rising waste volumes, assist barangays without MRFs and MRS, and further the city's recycling goals, while easing landfill pressure. Improved sorting capabilities will enable efficient recovery of valuable materials, promoting a circular economy and minimizing environmental pollution. Furthermore, upgrading existing MRFs can boost collection capacities, and collaboration with private sector partners can create sustainable demand for recycling services. The sale of recyclable plastics has the potential to generate revenue that can help sustain MRF operations. Funding for the establishment of new facilities or the expansion of current ones may be sourced through various options outlined in section 4, including blended finance, loans, and private sector collaborations.

Regarding barangay MRFs, current policies mandate that each barangay must have its own MRF (per RA 9003), but there are only 10 operational barangay MRFs out of 896 barangays in the city. Due to limited open areas in Manila for installing additional MRFs, the city is struggling to meet compliance requirements.

A pilot study is necessary to assess the feasibility of clustering barangay material recovery facilities (MRFs) to serve multiple barangays based on capacity. Identifying suitable barangays with shared characteristics will enhance efficient waste management operations. This approach could improve overall waste processing efficiency and better meet regulatory requirements. Funding for the pilot study may be available through grants from donor organizations.

3.2.3. ADVANCING THE TECHNOLOGY TO CAPTURE MARINE LITTER

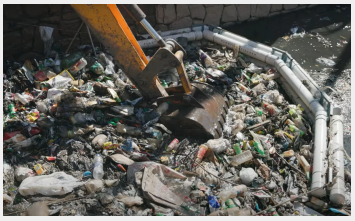
Marine litter poses a significant threat to marine life, ecosystems, and human health. Implementing technology-based solutions to capture and remove surface floating and submerged waste in rivers and esteros with effective, mechanized, and automated solutions will help mitigate these impacts, promote cleaner coastal environments, and support sustainable marine resource management.

There are existing initiatives to manage marine litter under the Blue Carbon economy of the Department of Environment and Natural Resources (DENR), where the Department of Public Services (DPS) of Manila has participated. Several esteros within the city have been equipped with trash traps, and the Metropolitan Manila Development Authority (MMDA) has installed pumping stations to extract trash from water bodies. However, site observations indicate that despite these

barriers, plastic waste and other debris can still pass through without being captured effectively. This highlights an opportunity to improve the system and technology to fully recover waste, particularly plastic waste and microplastics.

By investing in advanced equipment and systems, Manila can lead the way in innovative marine pollution control, ensuring that the city's waterways remain clean and healthy. This initiative is essential to achieving the city's Plan of Action on Marine Litter, which targets a 100% recovery of plastic leakage by 2025. Aligning with global environmental goals, this effort can attract support from international environmental organizations, positioning Manila as a leader in sustainable marine resource management.

SOME ADVANCED TECHNOLOGY FOR MARINE LITTER

	WasteShark (Marine Litter Prevention with Autonomous Water Drones) offers a comprehensive, data-driven waste capture and delivery solution utilizing advanced robotics. SharkPod enables aquadrones, called WasteSharks, to autonomously transport and unload waste, debris, or biomass from ports and inland waters to the shore safely. Each WasteShark can carry up to 200 liters and has a buoyancy of 400 kg. These self-organizing swarms can work together, using sensors to collect essential environmental data while gathering garbage[4].
	Germany-based company Plastic Fischer has developed a floating barrier designed to stop tons of plastic waste from entering the oceans. Named 'TrashBoom,' this modular solution is constructed from locally sourced materials and employs low-cost, straightforward technology, making it affordable for developing countries. By avoiding high-tech imports, it saves time, carbon, and money, while ensuring quick repairs and high scalability. Equipped with steel mesh that extends 50 centimeters deep, each unit can be linked with others to form a chain, easily adapting to various river sizes[5].

[4]Aquadrones remove, deliver and safely empty marine litter | WasteShark Project | Results in brief | H2020 | CORDIS | European Commission (europa.eu)
[5]'trash boom' barrier stops tons of plastic from entering the oceans (designboom.com)

Geocycle's Bubble Curtain Project in India aims to tackle the pressing issue of plastic waste entering the Yamuna River, one of the country's most vital waterways. Located in the Mantola Canal of Agra City, Uttar Pradesh, the initiative employs an innovative bubble curtain system that generates an air barrier to trap floating plastic debris effectively. A bubble curtain is a non-invasive solution to stop plastic from entering the oceans. Ships and fish can pass through the air bubbles, but plastics are stopped[6].

Key stakeholders in this project include Geocycle, a subsidiary of LafargeHolcim, in collaboration with the UNEP, the Agra Municipal Corporation, GIZ India, and the Canadian technology provider, Canadian Pond. The project not only reduces plastic pollution and enhances water quality by increasing dissolved oxygen levels, but it also promotes sustainable waste management through co-processing technology for the safe disposal of collected plastics. By recycling recyclable plastics and responsibly processing non-recyclables, the project is designed with replicability in mind, allowing successful strategies to be applied in other regions.

Funding for these solutions should start with grants for detailed studies on suitable technologies, installation locations, and operational costs. Subsequently, sustainable financing for operations may be partly sourced from city-level Extended Producer Responsibility (EPR) collection or support from civil societies and private sector actors. Private sector actors may be able to benefit from participating in such projects directly as in the case of Geocycle India, able to produce RDF from the non-recyclable waste collected or these businesses may be willing to demonstrate their environmental stewardship through such projects. Funding for equipment and systems can also be obtained through city loans combined with support from donors or relevant agencies though various possible financing models mentioned in section 4.

[6]Yamuna to get bubble curtain to stop plastic from entering the river, Kalpana Pathak, 18 May 2021

3.3. Opportunity 3 - Empower the informal sector and create more value in the plastic waste market of Manila City

The informal sector is essential to the plastic waste value chain in Manila City, playing a pivotal role in waste diversion and helping to mitigate plastic pollution. This sector is predominantly composed of marginalized individuals, including women and those with limited educational opportunities, and its workforce particularly vulnerable to health and safety risks and fluctuations in the market.

However, there are substantial opportunities to improve the circumstances of informal workers. By fostering collaboration between the city government, the informal sector, and relevant stakeholders, there is potential to enhance organizational structures, establish a sustainable vision for increased efficiency, and elevate the voices of these workers within the plastic waste ecosystem. This empowerment, especially at the levels of collection and recycling, would not only improve the working conditions for these individuals but also strengthen the entire plastic waste management system in Manila City.

CHALLENGES TARGETED:


Infrastructure


Plastic Waste Market


Waste Mismanagement


Operational


Regulatory


Coordination and Collaboration

RECOMMENDATIONS TO IMPLEMENT:

- R#2 - Streamlining and Harmonizing Ordinances
- R#3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City
- R#4 - Developing Awareness Engagement and Behavioural Change
- R#5 - Formalization and Institutionalization of Informal Groups in Manila City

3.3.1. CREATE POLICIES IN THE INCLUSION OF INFORMAL WASTE SECTOR

There are existing informal groups in Metro Manila who make a significant contribution to plastic reduction but remain undocumented and unorganized, without access to basic health insurance and social security. Efforts to empower the informal waste sector are often outsourced to NGOs or the private sector since the DENR focuses mainly on regulatory functions. The process of formalizing waste workers into cooperatives or associations is fraught with bureaucratic hurdles, which requires appropriate guidance through extensive paperwork and compliance with multiple agencies, such as the Department of Labor and Employment (DOLE), Cooperative Development Authority (CDA), and local government units, which may not be well understood by those in the informal sector.

There are opportunities to clearly define the specific roles and collaborative activities under the EPR Law, such as the direct hiring of waste pickers by recyclers for the recovery of materials. For inclusive policy making, it is important to have at least one representative from the private sector who has experience working with the informal waste sector in the formulation of action plans such as the solid waste management plans. The existing regular consultations with the informal waste sector and the government agencies must be continued to further gain insights into policymaking and implementation. There are also further opportunities to train waste pickers on legislative processes to empower them to represent their best interests in discussions.

A better understanding of the social and economic profiles of informal waste workers would provide valuable insights into their needs and critical areas for support. There is an opportunity for a comprehensive census of the sector, led by the DENR and implemented by the Philippine Statistics Authority (PSA), with support from various government agencies, academic institutions, and the private sector. This census could enable the development of data-driven policies that more accurately reflect current realities.

In addition to policy improvements, strengthening the role of the government in the EPR scheme is crucial. Formalizing partnerships between the government, NGOs, and the private sector may significantly help to facilitate resources and expertise sharing to support initiatives that empower the informal waste sector beyond regulatory compliance obligations.

It is recommended to simplify the process of registration by reducing the paperwork and launching Information, Education, and Communication (IEC) campaigns with clear, step-by-step guidance on formalization and its benefits. Additionally, establishing service centers and help desks in convenient locations would provide waste workers with the necessary support for clarifications and inquiries. These measures are beneficial in expanding the role of the informal waste sector in the EPR scheme and in promoting their involvement in policy making.

FORMALIZATION OF THE INFORMAL WASTE WORKERS

The formation of the Philippine National Waste Workers Association (PNWWA) in February 2024, the first national alliance of waste workers, signifies a unified move towards empowering waste workers and advocating for their rights within the legislative framework. The association, established by various waste workers in the country through the support of Mother Earth Foundation and Global Alliance for Incinerator Alternatives (GAIA) Asia Pacific, aims to draft a centralized system to address their key concerns and lobby them to legislators. A charter was developed which outlines their 10-point demands, seeking to formalize their rights such as enforcement of labor standards, hazard pay, health insurance and services, humane and safe working conditions, job security, just compensation, meaningful participation in policy spaces, right to organize, social benefits and protection, and training, which ensures that waste workers are recognized and protected under national laws. The initial members of the association represent over 1,000 waste workers in the country, including Barangay 33 Peñaranda Eco Negosyo Association, Calapan City Association of Paleros Inc., City of San Fernando Pampanga Waste Workers, Dumaguete Women Waste Workers Association, Fort Bonifacio Taguig Waste Workers, Legazpi City Waste Workers, Malabon-Navotas Waste Workers Association, San Jose Sico Landfill Multipurpose Cooperative, Siquijor Waste Workers Association, Tagumpay 83 Zero Waste Association of Manila, and Women Waste Warriors of Manila.

3.3.2. INCREASE PLASTIC WASTE RECYCLING CAPACITY

In alignment with the empowering of the informal sector to sort plastic waste for recovery, Manila City has the opportunity to effectively increase their plastic recycling capacity. The collaborative efforts with the informal waste collectors, the private sector, and obliged enterprises, can not only increase collection efficiency but also contribute to building a more sustainable and circular approach to plastic waste management and improve well-being for the informal sector stakeholders.

Supporting the creation of purchase agreements between aggregators and plastic recyclers and buyers

Plastic circular models only work if there are offtakers. All intermediaries in the plastic supply chain work with selected buyers with whom they have (formal or informal) contractual agreements, typically recyclers or factories that turn plastic into pellets. This guarantees demand for the plastic collected and recycled. Without off-takers, waste organizations would have to rely mainly on CSR budgets and donor support. Corporates are obliged by EPR rules to recycle a certain amount of their products. Hence, they have a strong incentive to partner with plastic circular economy organizations and are an essential part of the supply chain for any organization trading plastic waste. Examples of these are the Aling Tindera of Plastic Credit Exchange (PCX) and Plastic Bank. They are currently operating in the City of Manila, but their coverage can be expanded.

ALING TINDERA

Plastic Credit Exchange (PCX), the country's first homegrown global non-profit plastic offset organization introduced the "Aling Tindera" Waste-to-Cash program together with the City of Manila, and with the support of the PepsiCo Foundation (Business Mirror, 2020). Through the Aling Tindera Program, women sari-sari store owners incentivize the community to exchange post-consumer plastic waste for cash. This allows the program to efficiently aggregate, store, and transport the waste to appropriate processing facilities. (Plastic Credit Exchange, 2021).

Plastic Bank, a for-profit business with a specific social objective to reduce the amount of plastic in the oceans, launched a project in the Philippines entitled "Building a Greener Manila: Upgraded Collection System & Community Education (B-MUSE) Project," which aims to enhance the involvement of informal waste pickers especially women (WWF, 2023). Plastic Bank primarily makes use of a mobile application to monitor the plastic exchanges between the collectors, partner junk shops, haulers/aggregators, and processors and provides a monetary incentive for each kilogram of recyclables that their members sell to accredited junk shops subsequently through the mobile application. The enterprise provides starter kits to waste pickers who want to become partner collectors. The starter kits include a reflectorized long-sleeve shirt, facemask, plastic bank ID, sack/backpack, goggles, non-slip shoes, hard hat, puncture-resistant gloves, poncho, whistle, and flashlight. Plastic Bank Philippines also provides health and life insurance to partner collectors in case of accidents. Plastic Bank also offers different courses with a wide variety of topics ranging from basic occupational safety and health, especially during the collection and sorting of collected plastic wastes, to personal well-being courses, to financial literacy courses to participating community members. In the Baseco area in the City of Manila, there are currently 1,162 waste collectors, 760 of which or 65% are members of Plastic Bank (Plastic Bank, 2023).

Manila City has a unique opportunity to leverage the strength of its informal waste sector. By empowering these stakeholders, the city can significantly improve plastic waste collection and recycling. This multifaceted approach requires organizing the informal sector, promoting community engagement in waste reduction, and fostering a circular plastic economy. Through collaboration and targeted interventions, Manila City can create a more efficient and sustainable waste management system, ultimately leading to a cleaner and healthier environment.

Scaling-up Integrated and Inclusive Waste Management Models through Empowering the Informal Sector and Fostering the Circular Economy[7]

The **"Scaling-up Integrated and Inclusive Waste Management Models through Empowering the Informal Sector and Fostering the Circular Economy"** project aims to address the pressing issue of waste management in Viet Nam over a 3-year duration, with a financial backing of USD 1.3 million from the Norwegian Embassy. In partnership with UNDP and the Vietnamese government, the initiative seeks to improve waste management practices, particularly focusing on the rampant problem of plastic pollution that affects urban and rural environments alike.

A significant component of the project includes the empowerment of informal waste workers, with a particular emphasis on women, who play a critical role in waste collection and recycling yet often work under vulnerable conditions without formal recognition or support.

The establishment of a MRF in Quy Nhon, situated in Binh Dinh province, aims to enhance the efficiency of waste processing and promote sustainable practices within the community. By encouraging the widespread adoption of circular economy practices, the project aspires to not only increase the recycling and reuse of materials but also reduce overall plastic pollution in the environment.

The anticipated outcomes include enhanced livelihoods for informal waste workers, the replication of successful waste management models across other regions, and a significant contribution towards achieving Sustainable Development Goals (SDGs), particularly those focused on responsible consumption and production, climate action, and sustainable cities and communities.

[7] New project to scale up integrated and inclusive waste management models to be implemented in Viet Nam, June 17, 2021

3.4. Opportunity 4 - Divert plastic waste coming to Navotas SLF and expand its lifespan

The Navotas Sanitary Landfill, which is operated by Phil Ecology Systems Corp., stands as the sole disposal site for the majority of waste from Manila City. Given the current trajectory, it is evident that the landfill is on track to reach its maximum capacity in the next five years. Thus, it becomes imperative to prolong the landfill's operational lifespan in order to keep up with the needs of the city. This can be achieved through the implementation of the key strategy: reorganising the city's solid waste management system in order to divert plastic waste before it reaches the landfill. By executing this measure, the city can effectively extend the viability of its primary waste disposal facility.

CHALLENGES TARGETED:

- Infrastructure
- Operational
- Plastic Waste Market
- Regulatory
- Waste Mismanagement
- Coordination and Collaboration

RECOMMENDATIONS TO IMPLEMENT:

- R#1 - Capturing and Monitoring Data for Better Plastic Waste Management
- R#2 - Streamlining and Harmonizing Ordinances
- R#3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City
- R#6 - Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Recycling
- R#7 Assessment of the City MRF
- R#9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRF

3.4.1. ADDRESSING THE COLLECTED WASTE PRIOR TO ITS FINAL DISPOSAL

A multifaceted approach is required to address the waste being disposed of in the landfill to prolong the landfill operational capacity. This includes recommendations to establish another dedicated waste sorting and transfer station for Manila-wide plastic recycling and utilize plastics for refuse-derived fuel (RDF). These strategies aim to not only manage the current waste effectively, but also to minimize the environmental impact of landfill operations.

3.4.1.0. Establishment of the Waste Sorting and Transfer Station for Manila City

Establishing a dedicated waste sorting and transfer station in Manila City for plastic recycling will streamline the management and recycling of plastic waste before transferring it to a disposal facility. This will also facilitate plastic diversion, such as waste-to-energy and recycling. Currently, there is only one transfer station, the Vitas Marine Loading Station, which caters to waste from different cities in Metro Manila and neighboring provinces. This loading station does not have a Materials Recovery Facility (MRF) on-site. Collected waste is loaded onto barges for final disposal in sanitary landfills without further sorting and recovery of non-residuals. Additionally, there are no sorting activities conducted at the landfill.

The proposed city sorting and transfer station will act as the link between waste collection and the Vitas Marine Loading Station, enabling sorting and recovery activities. It can be located either within or outside the city. This facility will serve as a large-scale sorting facility. Recyclables will be sorted and collected for recycling and processing at MRFs using existing technologies, while non-recyclables will become feedstock for producing Refuse-Derived Fuel (RDF).

The sorting activities will complement the existing MRFs in the city, including the City MRF, to enhance recovery efforts. It is recommended that the City Environment and Natural Resources Office (CENRO) establish a pre-feasibility study on potential off-takers of collected plastic waste (recycling, energy, RDF, disposal) and assess social acceptability.

This initiative aims to monitor the volume of generated plastic and the volume of garbage that goes to the landfill. It will promote sustainable waste management practices, incorporate a circularity framework, and enhance the efficiency of the recycling process. Funding for the facility can be secured through public-private partnerships, where the city provides the site while a project developer manages the financial aspect, including the procurement of equipment and construction. Establishing a special purpose entity, the project has the potential to generate revenue through the sale of recyclables and refuse-derived fuel (RDF), allowing its operations to be financially self-sustaining. Additionally, the project developer can explore various blended financing options (mentioned in section 4) and specialized loans to support the initiative, thereby enhancing its financial viability and long-term success.

3.4.1.1. Reduction and diversion of landfill bound residual plastics for refuse derived fuel (RDF) production

Manila City faces a growing challenge with non-recyclable plastics accumulating in landfills. These materials not only contribute to environmental pollution but also represent an untapped resource that can be harnessed for energy generation. The production of Refuse-Derived Fuel (RDF) emerges as a sustainable solution to address both waste management and energy needs. There is the opportunity to explore the advantages of RDF production, emphasizing its relevance to Manila City and proposing a potential off-take partnership with a local cement manufacturer for an economically viable and self-sustaining income generating project.

Advantages of RDF Production:

1. **Energy Recovery from Non-Recyclable Plastics:** Non-recyclable plastics, often deemed a burden in traditional waste management systems, can be transformed into a valuable energy resource through RDF production. By processing these plastics into a high-calorific fuel, plastic waste leakage can be reduced, offering a better solution than landfill disposal, though this option cannot be considered a fully circular solution.
2. **Job Creation and Economic Opportunities:** Implementation of RDF production facilities creates job opportunities particularly for folks from low-income categories such as the informal waste pickers and women. It promotes the development of a skilled workforce for waste management and renewable energy sectors, fostering community growth and resilience.

Off-Take Partnership with a Local Cement Manufacturer:

To ensure the success and sustainability of RDF production, establishing a partnership with a reliable off-taker is crucial. In Manila City, the local cement manufacturing players such as Holcim and Republic Cement could be RDF offtakers and they could even be potential co-investors in such a facility. Cement production is energy-intensive, and incorporating RDF as an alternative fuel can offer numerous benefits to both the waste management and cement manufacturing sectors.

1. **Demand for Alternative Fuels:** Cement manufacturing requires substantial energy inputs, traditionally met through fossil fuels. The integration of RDF as an alternative fuel aligns with sustainability goals, reduces reliance on non-renewable fossil fuels, and contributes to the cement industry's commitment to environmentally friendly practices.
2. **Contribution to Circular Economy:** The collaboration between the waste management sector and the cement industry establishes a closed-loop system. Non-recyclable plastics, instead of ending up in landfills, become a valuable resource for energy production, fostering a circular economy model in Manila City.
3. **Local Economic Growth:** Partnering with a local cement manufacturer ensures that economic benefits generated from RDF production stay within the community. It strengthens the local industrial ecosystem, promotes sustainable business practices, and encourages responsible resource management.

WASTE SORTING AND REFUSE-DERIVED FUEL (RDF)

Waste segregation and processing technologies in the Philippines have seen significant advancements, particularly with the establishment of state-of-the-art facilities by Prime Integrated Waste Solutions. The first such facility, located in Cebu, followed by another in Pampanga, represents a critical step in improving waste management practices in the country. The Pampanga facility specializes in accepting mixed waste from both private entities and local government units (LGUs), employing advanced technologies like vibrating sieve machines, magnetic separators, and shredders to effectively segregate organic and inorganic materials. The 10-hectare facility, operated by Prime Integrated Waste Solutions (PWS), is designed to process up to 5,000 tons of municipal solid waste per day from various barangays in Porac, Pampanga, with a goal of recovering and recycling 80-90% of the waste[8]. This sophisticated process aids in reducing over 15,000 tonnes of methane emissions annually[9]. The estimated cost for the design, construction, and operational setup of the facility, including the technology and equipment for waste processing, is around 1 billion pesos (USD 18 million). Land costs may need to be considered separately as these were not explicitly mentioned in the available sources.

Moreover, cement companies such as Republic Cement, Lafarge, and Holcim play a significant role in diverting residual waste for co-processing in cement kilns, adhering to the DENR Administrative Order No. 2010-06. By transforming non-recyclable waste into RDF, these companies not only diminish landfill reliance but also promote sustainability. Collaborations with LGUs and industries are essential, with LGUs incentivized to deliver waste to cement facilities without fees and industries responsible for the costs of waste management services.

[8] Prime Infra launches Pampanga materials recovery facility, Jed Macapagal, June 2024

[9] Source: Automated segregation at processing ng basura, mas efficient at environment-friendly | 24 Oras

3.4.1.2. Environmental Concerns

Plastic waste that is leaked into the environment or ends up in open dumps, or unsanitary landfills can release harmful pollutants and greenhouse gases into the environment, contributing to air, soil, and water pollution. This not only harms the local ecosystem but also represents a lost opportunity to recover and repurpose valuable materials through recycling.

Diverting plastic waste from the MSW flow in Manila City would be useful in order to increase the capacity of the city in terms of plastic waste recycling. However, despite the positive impact that plastic recycling has on waste reduction, the process still poses challenges, environmental concerns are multifaceted. Energy consumption remains a significant issue, as recycling plastic demands energy, thereby contributing to greenhouse gas emissions. Moreover, certain recycling methods may release harmful chemicals and emissions (e.g. chemical recycling processes), further exacerbating environmental worries.

PLASTIC LIFECYCLE ASSESSMENT CALCULATOR FOR THE ENVIRONMENT AND SOCIETY (PLACES)

The Circulate Initiative

PLACES
Plastic Lifecycle Assessment Calculator for the Environment and Society

PLACES is an open-access tool developed by The Circulate Initiative (TCI), a non-profit organisation established in 2018 to solve the ocean plastic pollution challenge and build circular and equitable economies across emerging markets.

PLACES calculates reductions in greenhouse gas emissions, energy usage, and water consumption from diverting plastics (PET, HDPE, LDPE, PP and mixed plastics) from various end-of-life fates towards recycling. The tool currently covers six countries in South and Southeast Asia: India, Indonesia, Malaysia, Philippines, Thailand and Vietnam.

The PLACES platform has quantified the potential environmental benefits achievable through the implementation of circular strategies aimed at mitigation plastic waste in Manila City. Utilizing a best-case scenario estimation, the platform assessed the amount of recyclable plastics (PET, HDPE, LDPE, PP) that are currently disposed of at the Navotas SLF each year, which could be sorted for recovery. This assessment relied on data from the baseline study[10] and from the EPR Scheme Assessment for Plastic Packaging Waste in the Philippines, WWF-Philippines, October 2020[11] reports were used.

The analysis reveals that by diverting approximately 58,440 tonnes of recyclable plastics from their current end-of-life disposal method at Navotas SLF, Manila City could achieve substantial annual savings:

- **CO2eq Environmental Savings: 44,393 tonnes/year**
- **Energy Consumption Savings: 454.6 GWh**
- **Water Consumption Savings: 470,906 m3**

[10]Plastic Waste Disposal: 88% of all plastic waste generated (PET, HDPE, LDPE, PP, PS, PVC, Other) in Manila City is disposed at Navotas SLF

[11]Figure 28: Disposed plastic waste per type in the Philippines: Plastic waste composition (PET, HDPE, LDPE, PP, PS, PVC, Other) in Sanitary and Unsanitary landfills in 2019

These figures highlight the immense positive impact that can be generated through the implementation of effective circular economy approaches, underscoring the importance of prioritizing sustainable waste management practices to mitigate the environmental consequences associated with the mismanagement of plastic waste. By leveraging these insights, policymakers and stakeholders can make informed decisions and take decisive actions to drive progress towards the goal of achieving zero plastic waste. Manila City would also be increasing the amount of plastic waste being sorted for recovery by 34% (currently 11% of PW is sorted for recovery) arriving at a total of 45% of PW sorted for recovery.

From a greenhouse gas (GHG) balance point of view, the best recycling options are those that minimize energy consumption, reagent consumption and residue treatment and maximize material and energy recovery.

3.5. Opportunity 5 - Bridging the knowledge gap and mobilizing women and the community as catalysts for change

In Manila City, women's involvement is crucial in transforming plastic consumption and enhancing waste management practices. As key influencers within their households and active members of the community, women spearhead initiatives aimed at reducing waste and promoting sustainable habits. They often take on roles in community-based organisations and local environmental groups, advocating for better waste management practices. Women also comprise a significant portion of the informal waste pickers.

To maximise the impact of these efforts, strategies must focus on strengthening women's engagement in the design of proposed solutions and providing the necessary support, such as training, infrastructure, and resources, to make waste segregation and disposal easy and convenient. This includes ensuring that communities have access to the tools and facilities they need to manage waste effectively, such as differentiated bins, accessible collection points, and reliable waste collection services and that informal workers are trained and supported to collect and manage recyclables more effectively. Community-based organisations, junk shops, and private sector partners can play a significant role in supporting effective waste management; yet, their engagement with residents, particularly women, needs to be enhanced. By combining practical resources with awareness-raising and education, communities can cultivate behavioural changes that pave the way for more sustainable waste management practices, ultimately leading to a cleaner and healthier environment.

CHALLENGES TARGETED:

Waste Mismanagement

Coordination and Collaboration

RECOMMENDATIONS TO IMPLEMENT:

- R#2 - Streamlining and Harmonizing Ordinances
- R#4 - Developing Awareness Engagement and Behavioural Change
- Recommendation #5: Formalisation and Institutionalization of Informal Groups in Manila City

3.5.1. Increase Awareness Engagement and Behavioral Change

Existing Information, Education, and Communication (IEC) activities in Manila City focus on developing awareness and encouraging behavioral change among residents, but these efforts need further enhancement to be more effective. Raising awareness about the environmental impact of plastic waste and educating the public on sustainable practices, such as avoiding single-use plastics, proper segregation of plastic waste, and recycling, is crucial.

To achieve this, the city must engage the community - and particularly women, given their primary role in waste management at household and community levels - through effective communication campaigns and hands-on activities that provide practical guidance on segregating and recycling waste, fostering a sense of responsibility and collective effort towards plastic reduction. Additionally, providing the necessary infrastructure, such as differentiated garbage bins in public places with high foot traffic, and technology, such as online platforms to schedule waste pickup services safely and conveniently, will support the practical implementation of these waste management practices, making it easier for residents to adopt sustainable habits.

Integrating plastic reduction education into schools and businesses is also essential to ensure that the message reaches a broad audience and promotes long-term behavioral change. By embedding these principles into the educational curriculum and corporate practices, the city can instill a culture of sustainability that extends beyond individual actions to encompass community-wide efforts. The younger generation, being more digitally native, can also play an important role in supporting older household members to adopt and effectively use waste management technologies.

Similarly, informal waste workers need to be better aware of available government subsidies and assistance programs to increase their access to healthcare, education, housing, clean water, and electricity without undue financial strain. Women, who are among the most vulnerable informal waste workers, need dedicated support and outreach strategies. Implementing IEC campaigns on legal rights can also further educate waste workers about their rights and available legal resources and strengthen their capacity to advocate for themselves. Human rights NGOs and government agencies can provide further support through continuous education and assistance.

Overall, enhancing IEC activities to raise awareness, engage the community, and promote behavioral change will be instrumental in reducing plastic waste and supporting Manila City's environmental goals.

3.5.2. Private Sector Led Capacity Building

Manila City can take the lead by encouraging and fostering private sector-led efforts and collaborations to build plastic waste collection and plastic circularity capacity. Private sector involvement, as part of environmental stewardship and to meet EPR obligations, can be a powerful force in enhancing plastic waste management capacity and creating circular solutions. Currently, the city has ongoing partnerships with Coca-Cola, Alaska Milk Corporation, Plastic Credit Exchange, WWF Philippines, and Unilever. However, these efforts can be further strengthened through collaboration with additional private sector entities involved in waste management activities.

The city can complement these efforts by focusing on the capacity building of the informal waste sector, particularly in facilitating their transition into organized, recognized entities. Collaboration with private sector entities can provide the necessary training and resources to informal waste workers,

helping them to formalize their operations and integrate into the broader waste management system. This approach not only enhances their livelihoods but also improves the efficiency and effectiveness of plastic waste collection and recycling.

The city has the opportunity to transform its plastic waste management landscape through meaningful collaboration with the private sector. By adopting best practices from other cities and countries, encouraging EPR commitments, and promoting joint awareness campaigns and collection initiatives, the city can reduce plastic waste leakage and build a sustainable, circular approach to plastic waste management.

PUBLIC-PRIVATE PARTNERSHIPS FOR WASTE REDUCTION

The Ara Damansara Door-to-Door Recycling Programme, initiated as a pilot project in 2016 and officially launched in 2020, represents a collaborative effort to enhance waste management within the Ara Damansara community in Petaling Jaya, Selangor, Malaysia.

Led by the Petaling Jaya City Council (MBPJ) and supported by Nestle (M) Bhd and KPT Recycle Sdn Bhd, the program has reached Phase 5 by 2023. **Key achievements include a remarkable participation rate exceeding 70% and the collection of 6,851 tonnes of recyclables, thanks in part to effective resident education initiatives**.

The program operates under an EPR framework, allowing manufacturers to contribute to waste management costs, and features door-to-door collection of various recyclable materials such as paper, plastic, glass, and metal. Participating residents benefit from yellow bins and the "3R Famili" app, which offers real-time tracking and scheduling details. Despite its successes, the program faces challenges in expanding resident participation and the types of recyclable materials collected. In recognition of its achievements, the initiative was awarded the Public Private Partnership for Recycling Kumpulan 3P4R Champion in 2022, further underscoring its impact on community recycling efforts[12].

[12] PJ recycling ideal grows ever stronger, The Star, Friday, 22 Mar 2024

3.5.2.0. Capacity Building for Empowering and Enabling Plastic Circularity

Empowering stakeholders to conceptualize and execute plastic circularity initiatives requires more than passion—it necessitates specialized knowledge, skills, and experience. Effective capacity building is therefore a critical element in advancing plastic circularity. This process involves equipping various actors across sectors with the tools they need to implement sustainable practices, innovate solutions, and drive impactful change.

The scope of necessary knowledge and skills spans a broad spectrum. Core competencies such as safety, health, pollution prevention, and environmental management are fundamental for all stakeholders. However, other areas demand more targeted approaches. For instance, project development, sustainable business model design, the application of financial and policy instruments, securing funding, and proficient project management are crucial to the success of plastic circularity efforts. These areas require tailored capacity-building programs supported by collaborative efforts from public, private, and financial sectors. Experts from these sectors can provide invaluable insights and mentorship, sharing their expertise to foster an environment conducive to innovation and sustained impact. Development agencies and partner organizations have launched and supported capacity building in ASEAN and other developing economies. It would be good to explore such opportunities for capacity building through development organizations such as the Asian Development Bank (ADB), the United Nations agencies and other agencies who have a focus on addressing the marine plastic pollution problem.

An exemplary model of such collaborative capacity building is the ADB Regional Capacity Building Workshop - Accelerating Investments for Plastic Circularity, held on June 26-27, 2024, in Jakarta, Indonesia. This event brought together leaders from the public sector across the TA and COBSEA countries, development finance experts, and private investment fund managers. The workshop served as a platform for discussing and exploring regional opportunities and highlighting successful case studies. By engaging in such events, stakeholders not only gain practical knowledge but also build networks essential for the scaling and replication of successful circularity projects.

Another example of ADB’s support for capacity building related efforts is the Blue Southeast Asia Finance Hub. Established in 2021, it is a crucial initiative aimed at fostering a sustainable blue economy in the ASEAN region. In the Philippines, this hub can significantly impact the country's marine conservation efforts and economic development by identifying and financing promising blue economy projects. One of the hub's key activities is capacity building to empower small and medium-sized enterprises (SMEs), central and municipal government entities as well as state-owned enterprises (SOEs), to develop and implement sustainable marine-related projects. By providing training and technical assistance, the hub helps to bridge the financing gap and accelerate the transition to a more resilient and prosperous blue economy.

To ensure the momentum from such initiatives continues, it is imperative that leadership across various organizations dedicate resources to identifying capacity gaps. By conducting effective capacity-building programs, these organizations can translate the strategic recommendations of the City Action Plan into tangible results. This concerted effort will empower stakeholders to not only envision a circular economy for plastics but also to actively contribute to its realization, thereby driving meaningful progress toward a sustainable future.

4. Sustainable Financing for Plastic Circularity

The opportunities for the city of Manila to reduce its plastic footprint on the environment, as described in the opportunities and recommendations in section 3 highlights the need for diverse resources and financing approaches for effective implementation.

Investment in plastic waste management infrastructure, particularly Material Recovery Facilities (MRFs), is crucial for promoting plastic circularity in Asia, especially in Southeast Asia where plastic pollution is a significant environmental challenge. A variety of funding mechanisms can be employed to support these investments, including from public-private partnerships, city level extended producer responsibility (EPR) obligations, loans from development banks, grants from international agencies and blended financing approaches for private sector project developers. Securing funding is a critical step in the successful implementation of any project, particularly those with environmental and economic implications. To attract investments, it is essential to prepare and submit compelling and comprehensive funding proposals to various entities, including government agencies, international organizations like UN Habitat and WWF, and private investment funds such as Circulate Capital. These proposals should clearly articulate the project's environmental and economic benefits, accompanied by detailed budgets, timelines, and expected outcomes.

Here are some examples of sustainable financing options that local governments in the Philippines, such as Manila City, could explore to implement projects and programs aimed at reducing plastic pollution:

1. **Public-Private Partnerships (PPPs):**
    - Public-Private Partnerships are a key mechanism for funding MRFs in Asia. These partnerships involve collaboration between city agencies and private companies, where the private sector typically provides capital for the construction and operation of MRFs, and the public sector offers incentives such as land, tax breaks, or long-term contracts for waste processing.
    - Joint Ventures: Partner with private companies to establish waste management facilities or recycling plants.
    - Concession Agreements: Grant private companies the right to operate and manage waste management services for a specific period.
    - Build-Operate-Transfer (BOT) Models: Private companies can invest in and operate waste management infrastructure, transferring ownership to the government after a specified period.
    - **Example in Southeast Asia:** In the Philippines, the partnership between Pasig City and Green Antz Builders led to the construction of an MRF. Green Antz, a private company, provided technology and operational expertise, while the city government facilitated land acquisition and waste collection contracts.
2. **Extended Producer Responsibility (EPR) Schemes:**
    - EPR regulations require producers to take responsibility for the end-of-life management of their products, which often includes financial contributions to recycling infrastructure like MRFs.
    - **Example:** The newly implemented EPR law in the Philippines establishes a framework for reducing plastic waste. It sets a target for recovering 40% of plastic product footprints by December 2024. This provides the opportunity for the City of Manila to explore ways to support obliged enterprises (OEs) to develop initiatives that can deliver results at the city level. Integrating such private sector led and collaborative initiatives for plastic waste collection and recovery with the solid waste

management plan in Manila City will open up more capacity to manage plastic waste, preventing plastic leakage. Achieving these targets will involve substantial changes to the city's waste collection, segregation, and recycling systems and possibly even city level ordinances to provide the legal framework for such city level private sector initiatives.

3. **Loans from Development Banks/International Finance Institutions:**
    - For large-scale investments in waste management infrastructure, cities often secure loans from development banks. These banks may provide lower-interest, preferential loans or support with blended financing options to de-risk the construction of MRFs and related facilities.
    - **Example:** In Indonesia, the Asian Development Bank (ADB) has provided loans to support waste management projects, including the construction of MRFs in major cities like Jakarta. These loans are part of broader initiatives to improve urban infrastructure and promote sustainable waste management practices.
4. **Grants from United Nations Agencies:**
    - United Nations agencies, such as the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF), offer grants to support the development of waste management infrastructure in developing countries, including MRFs and river plastic debris capture barriers.
    - **Example:** In Vietnam, the UNDP has funded projects aimed at reducing marine plastic pollution. This includes grants for the construction of MRFs in coastal cities and the installation of barriers to capture plastic debris in rivers.

Case Studies in Southeast Asia:

- **Malaysia:** The Waste Management Association of Malaysia (WMAM) has partnered with private firms to establish MRFs in cities like Kuala Lumpur. These facilities were funded through a combination of private investment and municipal support, demonstrating the effectiveness of PPPs in the region.
- **Indonesia:** In Surabaya, a collaboration between the city government and private waste management companies has led to the development of MRFs that process large volumes of plastic waste. The project received partial funding from the World Bank as part of a broader urban waste management initiative.

5. **Sustainable Bonds**
    - These include project-based financing, such as green, blue, gender and sustainability bonds, where the proceeds are "ring-fenced" or utilized only for projects eligible under the issuer's financing framework, as well as sustainability-linked bonds that can finance general corporate purposes and come with sustainable performance targets. Sustainable bonds are designed to fund projects with positive environmental and social impacts, such as plastic circularity initiatives, and can attract a wider range of investors.
6. **Plastic and Carbon Credits**
    - Generate Plastic and Carbon Credits: Implement plastic waste reduction projects that generate plastic or carbon credits, which can then be sold to offset carbon emissions.
    - Revenue Generation: The sale of carbon and plastic credits can provide additional funding for plastic circularity initiatives.
    - Municipalities can encourage and facilitate plastic credit project developers by supporting engagement with informal waste collectors to increase collection of recyclables.

7. **Impact Investing**
    - Attract Impact Investors: Seek investment from organizations focused on social and environmental impact.
    - Align Goals: Ensure that the project aligns with the investor's sustainability objectives.
8. **Grants and Donations**
    - Explore Funding Opportunities: Research and apply for grants and donations from international organizations, foundations, and corporations.
    - Leverage Partnerships: Partner with NGOs or academic institutions to increase the chances of securing funding.
9. **Tax Incentives**
    - Implement Tax Breaks: Offer tax incentives to businesses and individuals involved in plastic waste reduction activities.
    - Encourage Investment: Tax breaks can stimulate private sector investment in circular economy solutions.
10. **User Fees and Charges**
    - Implement User Fees: Introduce fees for waste collection and disposal services.
    - Promote Recycling: Implement a "pay-as-you-throw" system to encourage recycling and waste reduction.
11. **Community-Based Financing**
    - Involve Communities: Encourage local communities to participate in financing waste management projects by forming voluntary, risk-pooling schemes that are led and managed at community levels.
    - Micro-Loans: Provide micro-loans or community-based financing options to support small-scale recycling initiatives.
    - For female waste pickers, who typically lack access to social protection, community-driven financial solutions such as rotating credit and savings schemes could enhance their access to health care and education, helping to prevent them from falling deeper into poverty.
12. **Economic Instruments**
    - Economic instruments are market-based tools that incentivize (subsidies, benefits, rebates, and refunds) or disincentivize (taxes, levies, and fees) specific behaviors related to plastic circularity. These instruments aim to address plastic pollution by encouraging sustainable practices and discouraging wasteful or harmful ones. Many economic instruments related to plastic circularity exist such as: Tax on virgin plastics, Tax incentive for recycled plastics, Tax incentive for investment, Green public procurement, Rebate, Single-use levy, Extended producer responsibility, Deposit-refund system, Pay-as-you-throw fee, Tipping fee, etc.
    - **Examples:**
        i. Deposit/Return Scheme (DRS): Perth in Western Australia has implemented a container deposit program since October 2020. The scheme has resulted in increased collection and recycling rates of beverage containers. Starting from April 1, 2026, consumers in Singapore will pay a refundable 10-cent deposit on all bottled and canned drinks, as part of a beverage container return scheme. This initiative will require an additional charge for drinks in plastic bottles and metal cans, ranging from 150 ml to 3 liters, with a full refund upon returning the empty containers at designated points.
        ii. Green Public Procurement (GPP): In the Philippines, Envirotech Waste Recycling Inc. (EWRI) is transforming PW into durable chairs for schoolchildren. The city mayor of Davao has created a “Green Fund” to

support the surge in demand for such chairs[13]. Over the years, EWRI has introduced more products into their catalogue: tiles, pallets, bricks, pots and planters, lamps, garbage bins, canisters, picnic tables, lounging chairs, foot-disinfecting baths, and foot-operated alcohol dispensers, tables and chairs. The company currently has recycling plants in Davao City, Claver in Surigao del Norte, Zambales, Nueva Ecija, and Koronadal City[14]. GPP at a city or municipal level supporting such products would help support such businesses to grow and put a stop to plastic leakage.

Table 1: Examples of Sustainable Financing Options for Plastic Circularity

#	Financing Option	Source of Financing	Type of Financing	Example
1	**Public-Private Partnerships (PPPs)**	Public and Private	Debt, Equity, Grants	Pasig City and Green Antz Builders
2	**Joint Ventures**	Private	Equity	Partnership between city and private company
3	**Concession Agreements**	Private	Equity	Granting rights to operate waste management services
4	**Build-Operate-Transfer (BOT) Models**	Private	Equity	Private company invests in and operates infrastructure
5	**Extended Producer Responsibility (EPR) Scheme**	Private	User Fees	Philippines EPR regulations
6	**Loans from Development Banks/International Finance Institutions**	Public	Debt	Asian Development Bank loans
7	**Grants from United Nations Agencies**	Public	Grants	UNDP funding for waste management projects
8	**Sustainable Bonds**	Private	Debt	Green, blue, gender, and sustainability bonds
9	**Plastic and Carbon Credits**	Private	Revenue Generation	Selling credits to offset carbon emissions
10	**Impact Investing**	Private	Equity	Investing in projects with social and environmental impact
11	**Grants and Donations**	Public and Private	Grants	Funding from organizations or corporations
12	**Tax Incentives**	Public	Tax Breaks	Offering tax breaks to businesses
13	**User Fees and Charges**	Public	User Fees	Implementing fees for waste collection
14	**Community-Based Financing**	Community	Equity	Community-driven financial solutions
15	**Economic Instruments (DRS, GPP)**	Public and Private	Equity (GPP), Refund (DRS)	DRS in Perth, Australia and Singapore, Republic of Singapore GPP initiative in the Philippines

[13]Filipino Engineer Uses Recycled Plastic Waste to Create Chairs for Schoolchildren, Envirotech Waste Recycling Inc., June 2019
[14]Transform plastic waste into treasure with Envirotech, Due Dash, April 2023

When selecting the appropriate financing options for a project, several additional criteria should be considered to ensure successful funding. The scale of the project plays a crucial role; larger initiatives often necessitate more substantial funding sources such as debt or equity financing, whereas smaller projects might be effectively supported through grants or community-based financing mechanisms. The risk profile of the project is another important factor; high-risk ventures may benefit from blended financing solutions or government guarantees to attract investors. Additionally, the environmental and social impact of the project can open doors to specialized financing opportunities, such as Sustainable Bonds or Impact Investing, particularly for initiatives that demonstrate significant positive effects on society and the environment. Finally, alignment with government policies can enhance funding prospects, as projects that resonate with governmental priorities are more likely to secure public funding or tax incentives, thus improving overall feasibility and financial viability.

The development of MRFs in Asia, particularly in Southeast Asia, relies on diverse funding mechanisms, including PPPs, EPR schemes, development bank loans, blended financing and international grants. These mechanisms are vital for enhancing the region's capacity to manage plastic waste effectively and support the transition to a circular economy. Examples from the Philippines, Thailand, Indonesia, and Vietnam illustrate the successful application of these funding strategies, highlighting the potential for further expansion and replication across the region.

5. Conclusion and Way Forward

The comprehensive assessment of Manila City's MSW System, coupled with a holistic analysis of the challenges encountered, has allowed the expert team to identify the gaps and the opportunities as a basis for the specific recommendations designed for the city. These challenges and opportunities are illustrated below:

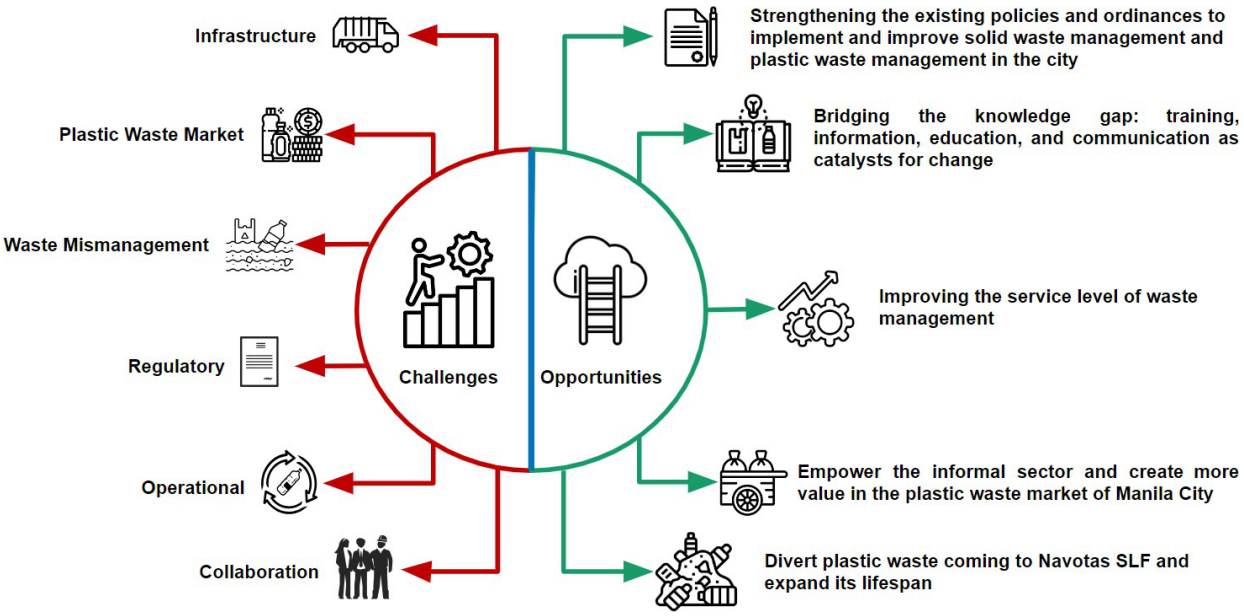


Figure 6: Challenges and Opportunities for Manila City

Based on the opportunities identified, the set of recommendations below addressing all key areas were developed. Several recommendations may be applicable for each set of targeted opportunities. The description and interrelation of the recommendations is provided in the explanation of the logical framework in Sections 5.1 and 5.2.

- **Recommendation #1: Capturing and Monitoring Data for better Plastic Waste Management**
- **Recommendation #2 - Streamlining and Harmonizing Ordinances**
- **Recommendation #3 - Establishment of City Environment and Natural Resource (CENRO) under a Newly Formed Department of Manila City**
- **Recommendation #4 - Developing Awareness Engagement and Behavioral Change**
- **Recommendation #5 - Formalization and Institutionalization of Informal Groups in Manila City**
- **Recommendation #6 - Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Waste Sorting, Recycling and Recovery**
- **Recommendation #7 - Assessment of the Adequacy, Efficiency and Effectiveness of the City's MRF and Developing a Budgetary and Implementation Plan**
- **Recommendation #8 - Study and Install Mechanized and Automated Equipment and Systems to Capture Marine Litter**
- **Recommendation #9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs**

The recommendations are made actionable by providing the strategic actions which are described in the Sections 3 and 4 and in more detail in the annexes B to J. These strategic actions have the estimated resources and timelines for the planning and execution of the roadmap.

To effectively act on the recommendations, a review of the challenges and opportunities outlined in Sections 2 and 3 of the report is required. This initial step allows one to gain a comprehensive understanding of the areas that require attention and the potential avenues for improvement. Following this review, it is important to prioritize the identified opportunities based on their urgency, feasibility, and alignment with the overarching objectives of the organization or project.

Once the opportunities have been prioritized, it is advisable to concentrate on the corresponding actions within each chosen opportunity. These specific actions are key steps that need to be taken to address the identified challenges or leverage the potential opportunities. To gain a deeper understanding of each recommended action, it is recommended to refer to the relevant annexes of the report, where detailed explanations and additional information are provided.

Collaboration with stakeholders is essential to successfully implement the recommendations. By engaging with relevant parties, necessary resources can be secured, roles and responsibilities assigned, and the collaborative efforts can facilitate the execution of the action plan. Effective communication and coordination among stakeholders are vital to ensure that all stakeholders are aligned and committed to the implementation process.

Monitoring progress is a critical aspect of the implementation phase. Regularly tracking and evaluating the outcomes of the actions taken will help in identifying any deviations from the plan and making necessary adjustments. It is important to remain flexible and adaptable, ready to modify strategies and approaches as needed to achieve the desired results.

It is important to bear in mind that while the roadmap provides a structured framework for action, successful implementation ultimately hinges on the active engagement and collaboration of all stakeholders involved. By working together towards a common goal and remaining committed to the process, the organization or project stands a better chance of realizing its objectives and driving meaningful change. The implementation timeframes as well as the cost estimates presented in the Roadmap for Recommendations assume availability of resources, stakeholder cooperation, and clear authority and mandate to execute the overall project.

6. Roadmap for Recommendations

This section presents the roadmap for the Recommendations (Rs) that will enable the implementation of the proposed opportunities. The Recommendations are detailed in the annexes B to J where the following are explained:

- **Objectives**
- **Solutions proposed**
- **Expected outcomes and monitoring**
- **Strategic Activities to implement**
- **Stakeholders to engage**
- **Timelines**
- **Cost estimates**

Executing the roadmap in a programmatic way, to achieve the desired outcomes, from the activities contained in the recommendations will require close attention and monitoring to the various activities, their indicators and targets. A logical framework would help to bring all these aspects together. The following section describes the logical framework that was constructed to execute the City Action Plan Roadmap.

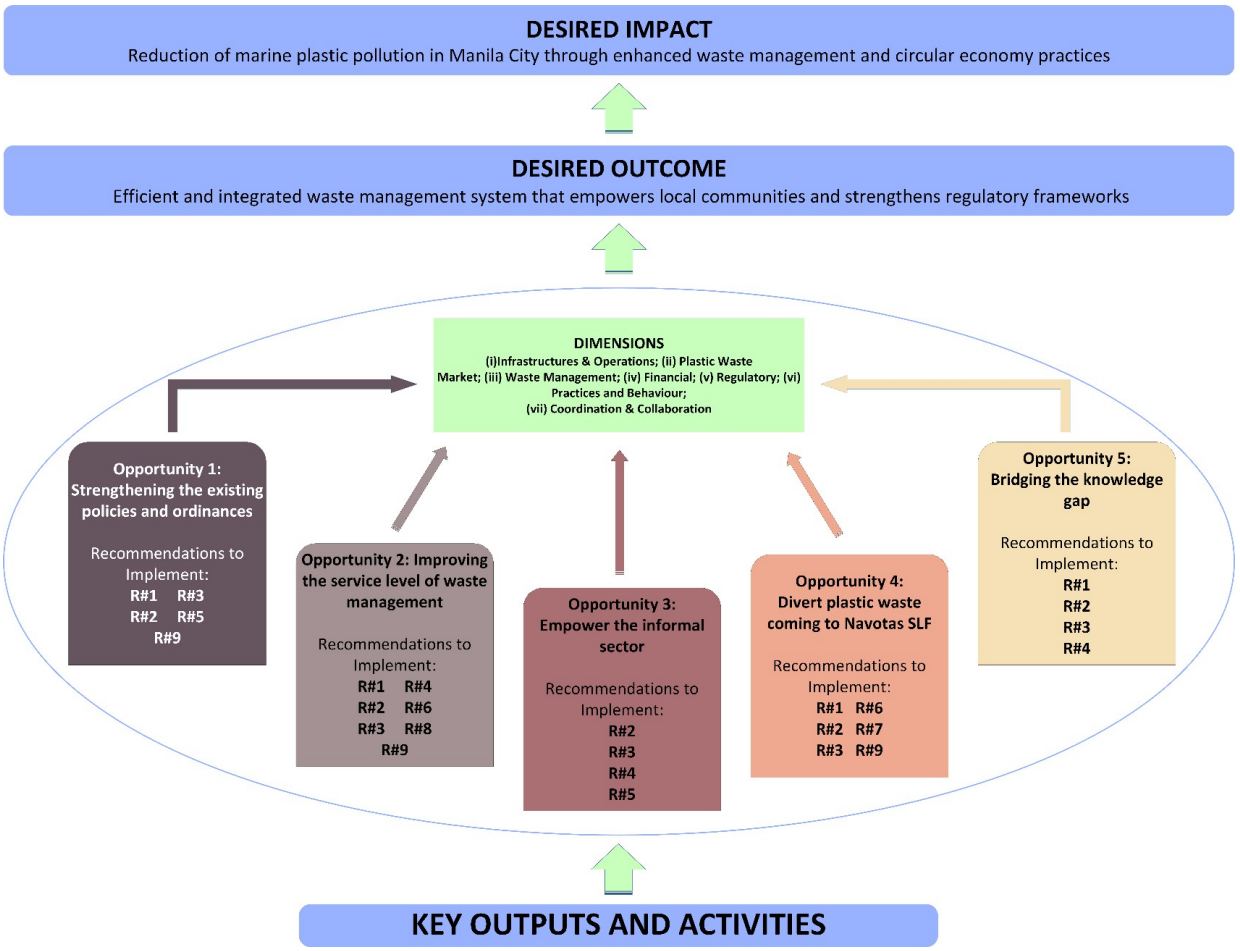
6.1 Logical Framework

The logical framework (logframe) is a strategic planning and management tool used to provide a structured approach for project implementation and evaluation. It outlines the project's objectives, activities, outputs, outcomes, and impacts in a clear and concise manner. This section of the report presents the detailed logframes for the various recommendations identified in our project.

The logframes serve multiple purposes for the decision-makers and stakeholders involved in the project, in terms of:

- **Clarity and Structure**: The logframe offers a clear and structured overview of the project's components, making it easier to understand the linkages between activities, outputs, outcomes, and the desired impact.
- **Monitoring and Evaluation**: It provides a framework for monitoring and evaluating the project's progress by setting specific, measurable indicators and targets for each activity. This ensures that the project stays on track and achieves its objectives.
- **Accountability**: By outlining the expected outputs, outcomes, and impact, the logframe holds all stakeholders accountable for their roles and responsibilities in the project.
- **Decision-Making**: The detailed breakdown of activities, timelines, and targets helps decision-makers allocate resources effectively, identify potential risks, and make informed decisions to ensure the project's success.
- **Stakeholder Engagement**: The logframe facilitates better communication and engagement with stakeholders by clearly articulating what the project aims to achieve and how it will be accomplished.

Figure 7 presents the Logical Framework Model, detailing the integral components of an effective waste management strategy. Each element of the model works synergistically to achieve key objectives: it aims for a sustained decrease in plastic waste leakage into the environment, promotes higher rates of circular material use, and seeks to deliver socio-economic advantages to local communities by generating new job opportunities while ensuring social equity. Additionally, this comprehensive approach targets an overall reduction in environmental impacts, highlighting the multifaceted benefits of a well-structured waste management system.



KEY OUTPUTS AND ACTIVITIES

RECOMMENDATION 1: CAPTURING AND MONITORING DATA FOR BETTER PLASTIC WASTE MANAGEMENT

Output 1.1 - Establish a Centralised Data Management System (CDMS)
Output 1.2 - Develop User Manual for the CDMS
Output 1.3 - Feedback Presentation to Relevant Manila City Offices and other Stakeholders
Output 1.4 - Finalise CDMS and User Manual and submit to the City Council for Mayor's Approval and Adoption
Output 1.5 - Personnel Training on the New CDMS
Output 1.6 - IEC for Public Awareness
Output 1.7 - Monitoring and Evaluation on the Use of the Program

RECOMMENDATION 2: STREAMLINING AND HARMONIZING ORDINANCES

Output 2.1 - Identify inconsistencies
Output 2.2 - Develop Harmonization Framework
Output 2.3 - Develop Harmonized Policies and Standards
Output 2.4 - Training Programs
Output 2.5 - IEC Campaign
Output 2.6 - Continuous Monitoring

RECOMMENDATION 3: ESTABLISHMENT OF CITY ENVIRONMENT AND NATURAL RESOURCES OFFICE (CENRO) UNDER A NEWLY FORMED DEPARTMENT OF MANILA CITY

Output 3.1 - Create the CENRO
Output 3.2 - Develop Operational Guidelines and Policies
Output 3.3 - Submit the Plan to the Council
Output 3.4 - Mayor's Approval
Output 3.5 - Hiring of Personnel
Output 3.6 - Capacity Building and Training
Output 3.7 - Stakeholder Engagement and Collaboration
Output 3.8 - Monitoring and Evaluation

RECOMMENDATION 4: DEVELOPING AWARENESS ENGAGEMENT AND BEHAVIOURAL CHANGE

Output 4.1 - Public Awareness Campaigns
Output 4.2 - Community Engagement Initiatives
Output 4.3 - Provision of Technology and Infrastructure
Output 4.4 - Educational Programs in Schools and Businesses

RECOMMENDATION 5: FORMALISATION AND INSTITUTIONALIZATION OF INFORMAL GROUPS IN MANILA CITY

Output 5.1 - Profiling of Informal Waste Management Groups
Output 5.2 - Organizing Informal Groups
Output 5.3 - Capacity Building and Training
Output 5.4 - Legal Registration and Support
Output 5.5 - Establish Partnerships with the LGU Manila
Output 5.6 - Develop Sustainable Funding Mechanisms
Output 5.7 - Integrate into the City's Waste Management System
Output 5.8 - Establish and Institutionalise Partnerships with other Formal Institutions bot Public and Private

RECOMMENDATION 6: ESTABLISHMENT OF A DEDICATED WASTE SORTING AND TRANSFER STATION FOR MANILA-WIDE PLASTIC WASTE SORTING, RECYCLING & RECOVERY

Output 6.1 - Conduct Feasibility Study and Site Selection
Output 6.2 - Design and Planning
Output 6.3 - Secure Funding and Approvals
Output 6.4 - Construction and Installation
Output 6.5 - Staff Recruitment and Training
Output 6.6 - Operational Launch and Monitoring

RECOMMENDATION 7: ASSESSMENT OF THE ADEQUACY, EFFICIENCY AND EFFECTIVENESS OF THE CITY'S MRFS AND DEVELOPING A BUDGETARY AND IMPLEMENTATION PLAN

Output 7.1 - Assessment of Current City's MRFs
Output 7.2 - Conduct Feasibility Study and Site Selection
Output 7.3 - Design and Planning
Output 7.4 - Secure Funding and Approvals
Output 7.5 - Construction and Installation
Output 7.6 - Staff Recruitment and Training
Output 7.7 - Operational Launch and Monitoring

RECOMMENDATION 8: STUDY AND INSTALL MECHANIZED AND AUTOMATED EQUIPMENT AND SYSTEMS TO CAPTURE MARINE LITTER

Output 8.1 - Conduct Feasibility Study and Technology Assessment
Output 8.2 - Design and Planning
Output 8.3 - Stakeholders Consultations
Output 8.4 - Institutional Implementation Arrangement
Output 8.5 - Secure Funding and Approvals
Output 8.6 - Procurement and Installation
Output 8.7 - Staff Recruitment and Training
Output 8.8 - Operational Launch and Monitoring

RECOMMENDATION 9: CONDUCT A PILOT STUDY ON BARANGAY CLUSTERING IN MANILA CITY FOR THE ESTABLISHMENT OF ADDITIONAL MRFS

Output 9.1 - Assessment and Selection of Pilot Areas
Output 9.2 - Resource Allocation and Planning
Output 9.3 - Securing Approval from the City Mayor
Output 9.4 - Designed and Constructed MRF
Output 9.5 - Community Engagement and Training
Output 9.6 - Monitoring and Evaluation

Figure 7: Logical Framework

6.2. Interrelationship of Recommendations

The interrelationship of each opportunity in the logframe is crucial to achieving a holistic understanding of the project's goals, implementation strategies, and expected outcomes. Each recommendation is interconnected and contributes to the overall success of the project as outlined below:

1. Recommendation #1: Capturing and Monitoring Data for Better Plastic Waste Management

- Support for all recommendations: Accurate data collection and management provide a solid foundation for decision-making, strategy development, and performance evaluation across all recommendations. This data ensures that efforts are targeted and effective.
- Integration with technology and infrastructure (recommendation 7 and 8): The data supports the assessment of existing MRFs and the deployment of technology-based equipment for capturing marine litter, ensuring these innovations are data-driven and impactful.

2. Recommendation #2: Streamlining and Harmonizing Ordinances

- Regulatory foundation: A unified regulatory framework ensures consistency in waste management practices, enhancing the effectiveness of all initiatives by providing clear guidelines and compliance measures.
- Facilitation of community engagement (recommendation 4 and 5): Clear regulations help in community education and engagement efforts, ensuring that residents and informal groups understand and comply with waste management practices.
- Support for infrastructure projects (recommendation 3 and 6): Regulations provide the necessary legal framework to establish and operate new waste management facilities and transfer stations.

3. Recommendation #3: Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City

- Coordination role: CENRO will oversee the implementation and coordination of all recommendations, ensuring integrated efforts and efficient resource allocation.
- Support for community and informal groups (recommendation 4 and 5): CENRO can facilitate training and formalization processes, ensuring that community members and informal groups are well-integrated into the waste management system.
- Infrastructure and technology (recommendation 6, 7, 8): CENRO will manage and oversee the development of new infrastructure and the deployment of advanced technologies, ensuring alignment with city-wide goals.

4. Recommendation #4: Developing Awareness, Engagement, and Behavioral Change

- Community support for regulations and infrastructure (recommendation 2, 3, and 6): Educated and engaged communities are more likely to support and comply with new regulations and use new infrastructure effectively.
- Facilitation of informal group integration (recommendation 5): Awareness campaigns can help formalize and institutionalize informal groups by educating them about their roles and benefits.
- Data utilization (recommendation 1): Public awareness campaigns can use data insights to target specific behaviors and areas that need improvement.

5. Recommendation #5: Formalization and Institutionalization of Informal Groups in Manila City

- Support for data and infrastructure (recommendation 1 and 3): Informal groups, once formalized, can provide valuable data and support the infrastructure by participating in waste collection and recycling processes.
- Enhanced compliance and engagement (recommendation 2 and 4): Formalization ensures that informal groups are aware of and comply with regulations and are engaged in the city's waste management efforts.
- Contribution to recycling efforts (recommendation 6 and 7): Formalized groups can play a significant role in the operation of dedicated transfer stations and the improvement of MRFs.

6. Recommendation #6: Establishment of a Dedicated Waste Sorting Transfer Station for Manila-Wide Plastic Waste Sorting, Recycling and Recovery

- Data-Driven planning (recommendation 1): The establishment and operation of the transfer station rely on accurate data to optimize location, capacity, and operations.
- Regulatory compliance (recommendation 2): The transfer station must operate within the regulatory framework established by streamlined ordinances.
- Community and informal group involvement (recommendation 4 and 5): Successful operation requires community support and the integration of informal waste collectors.
- Technology integration (recommendation 8): Advanced equipment and systems from recommendation 8 can enhance the efficiency and effectiveness of the transfer station.

7. Recommendation #7: Assessment of the Adequacy, Efficiency and Effectiveness of the City's MRF and Developing a Budgetary and Implementation Plan

- Informed by data (recommendation 1): Assessments are based on data collected, ensuring that evaluations are accurate and actionable.
- Support for regulatory framework (recommendation 2): Recommendations for improvements must align with the city's regulatory framework.
- Community and informal group engagement (recommendation 4 and 5): Involving communities and informal groups in the assessment process can provide valuable insights and foster a sense of ownership.
- Integration with new infrastructure (recommendation 6 and 8): Assessment findings can guide the development of new transfer stations and the implementation of new technologies.

8. Recommendation #8: Study and Install Mechanized and Automated Equipment and Systems to Capture Marine Litter

- Data-Driven deployment (recommendation 1): Technology deployment is informed by data on waste hotspots and litter patterns.
- Regulatory support (recommendation 2): Ensuring that new technologies comply with regulatory standards.
- Community and informal group participation (recommendation 4 and 5): Engaging communities in the use and maintenance of technology ensures its effective utilization.
- Infrastructure integration (recommendation 3, 6, and 7): New technologies must be integrated with existing and new infrastructure for maximum impact.

9. **Recommendation #9: Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs**

- Informed by data (recommendation 1): The pilot study uses data to identify optimal locations and strategies for clustering.
- Regulatory alignment (recommendation 2): Ensuring that clustering efforts comply with city ordinances.
- Supported by CENRO (recommendation 3): Coordination and oversight by CENRO ensure the pilot study is well-managed.
- Community engagement (recommendation 4 and 5): Successful clustering requires active participation and support from local communities and informal groups.
- Integration with existing and new infrastructure (recommendation 6 and 7): Clustering must align with the city's waste management infrastructure, including transfer stations and MRFs.
- Use of technology (recommendation 8): Incorporating advanced technology can enhance the efficiency and effectiveness of the clustering efforts.

The timing of each RECOM's implementation is carefully coordinated to build upon each other for better synergies and alignment. This can be gleaned from figure 8.

The individual recommendation logframe of recommendations 1 to 9 are presented in the Annex K

6.3. Recommendations and strategic activities implementation planning

Table 2: Recommendations and strategic activities implementation planning

Recommendation	Timeline for Recommendation	Strategic Activities to implement	Timeline for strategic Activities
R#1: Capturing and Monitoring Data for Better Plastic Waste Management	>36 Months total, with regular conduct of IEC and monitoring and evaluation	1.1 Establish centralized Data Management System	20 months
		1.2 Develop User Manual for the CDMS.	6 months
		1.3 Presentation to Manila City concerned offices for feedback (LGU Manila City Unit Heads and Staff), Regulatory Agencies, affected businesses, academic institutions, and civil society/NGOs.	2 months
		1.4 Finalize CDMS and submit to the City Mayor for approval and adoption.	6 months
		1.5 Personnel Training on the new CDMS.	6 months
		1.6 Information, Education, and Communication for Public Awareness.	6 months, ongoing
		1.7 Monitoring and evaluation on the use of the program	ongoing
R#2: Streamlining and Harmonizing Ordinances	>21 Months total, with regular conduct of IEC and monitoring and evaluation	2.1 Conduct a detailed analysis to identify inconsistencies and gaps in existing ordinances and standards	3 months
		2.2 Develop Harmonization Framework	3 months
		2.3 Develop the harmonized policies and standards and present them to the Manila City Council for discussions and solicit feedback.	3 months
		2.4 Conduct Training Programs for Local Authorities on the Updated Ordinances by developing and implementing comprehensive training programs for local authorities on the updated ordinances	6 months

Recommendation	Timeline for Recommendation	Strategic Activities to implement	Timeline for strategic Activities
		2.5 Launch an Information, Education, and Communication (IEC) campaign to promote awareness of the updated ordinances	6 months, ongoing
		2.6 Conduct Continuous Monitoring of the New Ordinance Implementation	ongoing
R#3: Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City	>30 months total, with regular conduct of stakeholder engagement, and monitoring and evaluation	3.1 Creation of the CENRO	6 to 8 months
		3.2 Develop Operations Policies and Guidelines	4 months
		3.3 Submit the plan to the Council for a comprehensive review of the required budget and resource allocations, and the timeline prior to endorsement to the City Mayor for approval and adoption.	4 months
		3.4 Obtain Mayor's Approval	2 months
		3.5 Hiring of personnel	6 months
		3.6 Capacity building and training programs for division staff and other relevant stakeholders will be implemented.	6 months
		3.7 Stakeholder Engagement and Collaboration	Ongoing
		3.8 Monitoring and Evaluation	Ongoing
R#4: Developing Awareness Engagement and Behavioral Change	>22 months total	4.1 Public Awareness Campaigns	6 months
		4.2 Community Engagement Initiatives	8 months
		4.3 Provision of Technology and Infrastructure	4 months
		4.4 Educational Programs in Schools, Universities, and Businesses	6 months
R#5: Formalization and	12 Months total, with	5.1 Profiling of Environmental-Related Informal Groups	2 months

Recommendation	Timeline for Recommendation	Strategic Activities to implement	Timeline for strategic Activities
Institutionalization of Informal Groups in Manila City	continuous support	5.2 Organizing Informal Groups	3 months
		5.3 Capacity Building and Training	3 months
		5.4 Legal Registration and Support	4 months
		5.5 Establish Partnerships with the LGU Manila and other formal institutions	3 months
		5.6 Develop Sustainable Funding Mechanisms	4 months
		5.7 Integrate into City's Waste Management System	5 months
		5.8 Establish and institutionalize partnerships with other formal institutions both public and private	6 months
R#6: Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Waste Sorting, Recycling and Recovery	31 Months total, with continuous support	6.1 Conduct Feasibility Study and Site Selection	4 months
		6.2 Design and Planning	6 months
		6.3 Secure Funding and Approvals	8 months
		6.4 Construction and Installation	12 months
		6.5 Staff Recruitment and Training	3 months
		6.6 Operational Launch and Monitoring	3 months
R#7: Assessment of the Adequacy, Efficiency and Effectiveness of the City's MRFs and Developing a Budgetary and Implementation Plan	32 Months	7.1 Assessment of the Current City MRF.	1 month
		7.2 Conduct Feasibility Study and Site Selection	4 months
		7.3 Detailed Design and Planning	6 months
		7.4 Secure Funding and Approvals	8 months
		7.5 Construction and Installation	12 months

Recommendation	Timeline for Recommendation	Strategic Activities to implement	Timeline for strategic Activities
		7.6 Staff Recruitment and Training	3 months
		7.7 Handover, Operational Launching and Monitoring	3 months
R#8: Study and Install Mechanized and Automated Equipment and Systems to Capture Marine Litter	37 months	8.1 Conduct Feasibility Study and Technology Assessment	6 months
		8.2 Design and Planning	6 months
		8.3 Stakeholder's Consultation	1 month
		8.4 Institutional Framework Development	2 months
		8.5 Secure Funding and Approvals	8 months
		8.6 Procurement and Installation	8 months
		8.7 Staff Recruitment and Training	3 months
		8.8 Operational Launch and Monitoring	3 months
R#9: Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs	>25 Months total, with regular conduct of community engagement, and monitoring and evaluation	9.1 Assessment and Selection of the Pilot area	6 months
		9.2 Resource Allocation and Planning	6 months
		9.3 Securing Approval from the City Mayor	2 months
		9.4 Design and Construction of MRF	12 months
		9.5 Community Engagement and Training	3 months, ongoing
		9.6 Monitoring and Evaluation	Ongoing

6.4. Recommendation implementation timelines

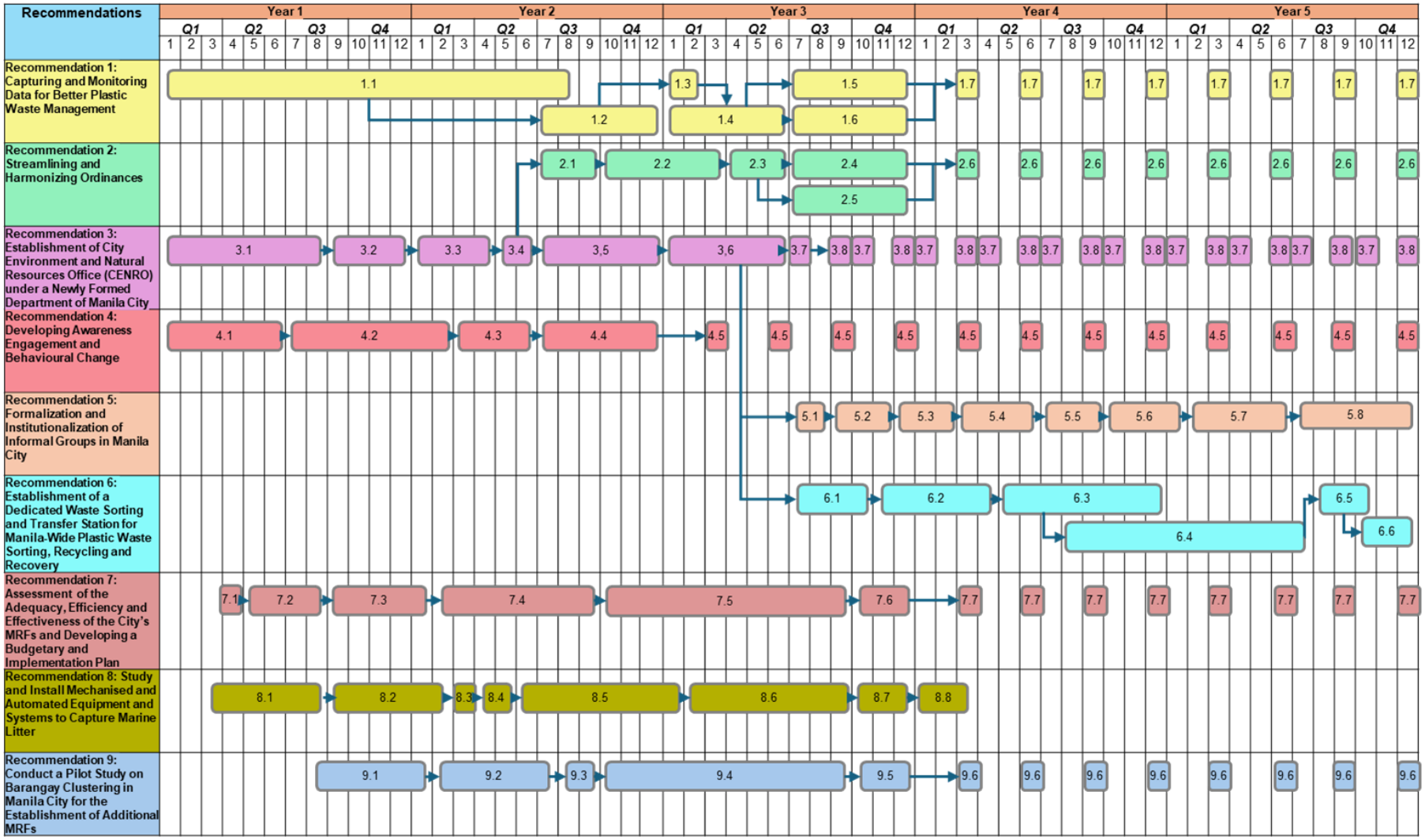


Figure 8: Recommendation implementation timelines

7. Annexes

- Annex A - Opportunities Developed to Address Identified Challenges for MSW System in Manila City
- Annex B - Recommendation #1 - Capturing and Monitoring Data for Better Plastic Waste Management
- Annex C - Recommendation #2 - Streamlining and Harmonizing Ordinances
- Annex D - Recommendation #3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City
- Annex E - Recommendation #4 - Developing Awareness Engagement and Behavioral Change
- Annex F - Recommendation #5 - Formalization and Institutionalization of Informal Groups in Manila City
- Annex G - Recommendation #6 - Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Waste Sorting, Recycling and Recovery
- Annex H - Recommendation #7 Assessment of the Adequacy, Efficiency and Effectiveness of the City's MRFs and Developing a Budgetary and Implementation Plan
- Annex I - Recommendation #8 - Study and Install Mechanized and Automated Equipment and Systems to Capture Marine Litter
- Annex J - Recommendation #9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs
- Annex K - Logframe of Recommendations

7.2. Annex A - Opportunities Developed to Address Identified Challenges for MSW System in Manila City

Opportunity	Challenges targeted	Recommendations	Impact of opportunity if implemented
#1 Strengthening the existing policies and ordinances to implement and improve solid waste management and plastic waste management in the city	• **Waste Mismanage** • **Regulatory** • **Plastic Waste Market** • **Coordination and Collaboration**	• R#1 - Capturing and Monitoring Data for Better Plastic Waste Management • R#2 - Streamlining and Harmonizing Ordinances • R#3 - Establishment of City Environment and Natural Resource (CENRO) • R#5 - Formalization and Institutionalization of Informal Groups in Manila City • R#9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs	• Reduction of use of plastics • Reduction of Plastic Waste generation in the city • Reduce the mismanaged Plastics Waste • Involvement of stakeholders
#2 Improving the service level of waste management through financial support and mechanisms	• **Infrastructure and Operations** • **Plastic Waste Market** • **Waste Mismanagement** • **Financial Support** • **Regulatory** • **Coordination and Collaboration**	• R#1 - Capturing and Monitoring Data for Better Plastic Waste Management • R#2 - Streamlining and Harmonizing Ordinances • R#3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City • R#8 - Study and Install Mechanized and Automated Equipment and Systems to Capture Marine Litter • R#9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs	• Improve quality of collection, diversion, and recovery activities of the city • Improve revenue streams from sales of recyclables • Better coverage and higher rates of collection in the city • Reduce amount of plastic waste uncollected • Increase amount of materials for recycling collected • Improve working conditions • Improve monitoring of waste management data
#3 Empower the informal sector and create more value in the plastic waste market of Manila City	• **Infrastructure and Operations** • **Plastic Waste Market** • **Waste Mismanagement** • **Financial Support** • **Regulatory**	• R#2 - Streamlining and Harmonizing Ordinances • R#3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City • R#4 - Developing Awareness Engagement and Behavioral Change	• Improve PW Collection for Recycling • Improve PW diversion • Improve revenue and conditions of the informal sector workers • Increase value in the plastic waste market

Opportunity	Challenges targeted	Recommendations	Impact of opportunity if implemented
	• **Practices and Behavior** • **Coordination and Collaboration**	• R#5 - Formalization and Institutionalization of Informal Groups in Manila City	• Reduce the mismanaged plastic waste • Collaboration between involved stakeholders • Improve working conditions of informal workers
#4 Divert plastic waste coming to Navotas SLF and expand its lifespan	• **Infrastructure and Operations** • **Plastic Waste Market** • **Waste Mismanagement** • **Financial Support** • **Regulatory** • **Coordination and Collaboration**	• R#1 - Capturing and Monitoring Data for Better Plastic Waste Management • R#2 - Streamlining and Harmonizing Ordinances • R#3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City • R#6 - Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Waste Sorting, Recycling and Recovery • R#7 - Assessment of the Adequacy, Efficiency and Effectiveness of the City's MRFs and Developing a Budgetary and Implementation Plan • R#9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRFs	• Extend the lifespan of the landfill • Reduce the mismanaged Plastics Waste • Create value in the plastic waste chain
#5 Bridging the knowledge gap: training, information, education, and communication as catalysts for change	• **Waste Mismanagement** • **Regulatory** • **Practices and Behavior** • **Coordination and Collaboration**	• R#1 - Capturing and Monitoring Data for Better Plastic Waste Management • R#2 - Streamlining and Harmonizing Ordinances • R#3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City • R#4 - Developing Awareness Engagement and Behavioral Change • R#5 - Formalization and Institutionalization of Informal Groups in Manila City	• Improvement of practices and behaviors related to plastics and waste • Collaboration between communities and the city • Involvement of stakeholders • Reduce the mismanaged Plastics Waste

7.3. Annex B - Recommendation #1 - Capturing and Monitoring Data for Better Plastic Waste Management

Description	
Assumption	No electronic document management system exists, or there is an absence of a centralized platform for existing data collection systems.
Objective	To establish a comprehensive and systematic approach towards the collection and analysis of plastic waste data, enabling accurate tracking and management of plastic waste within Manila City. Specifically, compliance to EPR Law on plastic generation, collection, recovery, diversion, and offsets initiatives. Accurate data is vital for effective plastic waste management. Manila's existing systems are fragmented and outdated, leading to inefficiencies as described in Section 2.3.1, Lack of Common Monitoring Platform and Digitalization of Data. An advanced data management system is essential for ensuring the accurate collection, storage, and analysis of large volumes of data and streamline data integration from multiple sources, enabling reliable decision-making and effective resource allocation.
Solutions Proposed	To achieve the objective of capturing and monitoring plastic waste data, a strategic approach encompassing the establishment of a centralized data management system is essential. This approach is briefly described below: 1A. Centralized Data Management System (CDMS): Review existing data management platforms within the region and identify data gaps. If not available, develop or adapt a new centralized data management system for waste tracking. This system will serve as the core repository for all plastic waste data collected across the city. It will integrate data from various sources, such as waste collection points, recycling centers, processing facilities, transfer stations, and disposal sites providing a comprehensive view of plastic waste flow. The system will be designed to support data analytics, enabling detailed analysis and reporting. The implementation will involve selecting appropriate technology, setting up the infrastructure, and establishing protocols for data entry, storage, and retrieval. 1B. Develop User Manual for the CDMS. A detailed User Manual for the new CDMS will be developed to provide comprehensive guidelines on operating the system, including instructions on data entry, system navigation, and troubleshooting common issues. The manual will be designed to ensure that all users, regardless of their technical expertise, can effectively utilize the system. It will also include best practices for data management, tips for maximizing system efficiency, and contact information for technical support. 1C. Feedback presentation to relevant Manila City offices (LGU Manila City Unit Heads and Staff), Regulatory Agencies, affected businesses, academic institutions, and civil society/NGOs. This process will seek inputs and suggestions from key stakeholders to ensure the system meets the needs of all parties involved. It will provide an opportunity to discuss the system's features, functionality, and implementation plan. Feedback gathered will be used to refine the CDMS, ensuring it is user-centric and effective in addressing the city's plastic waste management challenges. 1D. Finalize CDMS and submit to the City Mayor for approval and adoption.

	The feedback will be incorporated to finalize the CDMS prior to submission to the City Mayor for approval and adoption. The finalized system will be documented and prepared for formal submission to the City Mayor. Approval from the City Mayor is essential for formal adoption and implementation, ensuring the system receives the necessary support and resources for successful deployment. 1E. Personnel Training on the new CDMS. A comprehensive training program for local authorities and personnel on the new CDMS will be developed and implemented. The training programs will be designed to ensure all relevant personnel are proficient in using the CDMS. This will include hands-on workshops, tutorials, and practical sessions covering system navigation, data entry procedures, and troubleshooting. Training will also emphasize best practices for data accuracy, system maintenance, and effective utilization of data analytics features. On-going support and refresher training sessions will be provided to maintain high competency levels among users. 1F. Information, Education, and Communication for Public Awareness. An Information, Education, and Communication (IEC) campaign will be launched to promote awareness of the new CDMS and its benefits. The IEC campaign will involve creating and distributing informational materials, organizing community meetings, and utilizing various media channels to educate the public, businesses, and stakeholders about the CDMS. The campaign will highlight the importance of plastic waste management, explain how the CDMS works, and encourage community participation in waste reduction efforts. Public consultations and interactive sessions will be held to address questions, gather public input, and build community support. 1G. Monitoring and evaluation on the use of the program. A monitoring system will be established for continuous monitoring and evaluation of the CDMS implementation and usage. This will involve setting up key performance indicators (KPIs), conducting regular audits, and collecting feedback from users to assess the system's effectiveness. The evaluation will cover data accuracy, user satisfaction, system performance, and the impact on waste management practices. Based on the findings, necessary adjustments and improvements will be made to enhance the system's functionality and ensure its long-term success.
Expected Outcomes	**Accurate and Comprehensive Plastic Waste Data:** A centralized repository that offers a complete and detailed view of plastic waste within the city. • 50% of the total population per barangay subscribed to the CDMS at the end of 1st year • 80% of the total population per barangay subscribed to the CDMS at the end of 2nd year • 100% of the total population per barangay subscribed to the CDMS at the end of 3rd year **Improved Plastic Waste Management Strategies:** Data-driven strategies based on reliable and timely data. • 40% recovery of plastic waste at the end of 2024 • 50% recovery of plastic waste at the end of 2025 • 60% recovery of plastic waste at the end of 2026

	Enhanced Monitoring and Reporting Capabilities: Real-time monitoring and comprehensive reporting on plastic waste management. ● 40% overdue submission at the end of 1st year ● 20% overdue submission at the end of 2nd year ● 0% overdue submission at the end of 3rd year
Strategic Activities / Stakeholders	

Strategic Activities to implement
 	
> 36 months
	1A. <u>Establish a Centralized Data Management System (20 months)</u>
	● Review and assess existing DMS and/or study available existing platforms and existing infrastructure: and collect detailed requirements from all stakeholders, including data types, sources, processing needs, and reporting requirements. (3 months).
	● Assessment of PW data to be collected (3 months).
	  ○ Identification of the data points needed to be collected and analyzed (PW generation, Composition of PW in MSW, PW collected, PW disposed at Landfill, PW pollution)
	  ○ Identification of the manner of data capture
	  ○ Identification of stakeholders that own or possess the data identified
	● Technology Selection: Identify and select the appropriate technology for the data management system (i.e., mobile app, QR code, data hub, data recovery and management) based on scalability, security, ease of use, integration capabilities, and cost. Present to the management the selected platform for their approval. (6 months)
	  ○ Create GIS layers for waste collection routes, materials recovery facilities, hotspots, and disposal sites.
	  ○ Acquire satellite and aerial imagery for areas of interest.
	  ○ Apply image processing techniques to detect and quantify plastic waste, integrating this data with GIS.
	● Infrastructure Setup and development of implementation plan: Install and configure the necessary hardware and software. Develop a detailed implementation plan, including timelines, milestones, and resource allocation. (6 months)
	● Protocol Development: Establish data entry, storage, and retrieval protocols. (2 months)
	● System Integration: Integrate data sources (includes existing data if available) and ensure seamless data flow into the system. (3 months)
	
	1B. <u>Develop User Manual for the CDMS (6 months)</u>
	● Content Creation: Draft comprehensive guidelines and procedures for system use and test run the system. (3 months).
	● Beta Test of CDMS and finalized version integrating the feedback. (3 months).
	
	1C. <u>Feedback Presentation to relevant Manila City Offices and other stakeholders (2 months)</u>
	● Preparation of Presentation Materials: Develop presentation slides, handouts (Draft User Manual), and feedback forms. (1 month).
	● Stakeholder Meetings: Conduct meetings and collect feedback from all key stakeholders. (1 month).
	
	1D. <u>Finalize CDMS and User Manual and submit to the City Council for Mayor's Approval and Adoption (6 months)</u>
	● Pilot Testing: Implement the CDMS in a controlled environment to test its functionality and performance. (4 months).
	● Incorporate Feedback: Revise the CDMS and UM based on stakeholder input. (1 month).
	● Submission and Approval: Submit the finalized system to the City Mayor and obtain formal approval. (1 month).

	1E. Personnel Training on the New CDMS (6 months) ● Training Program Development: Develop training materials and curriculum for administrator, data analyst, and user. (3 months). ● Conduct Training Sessions: organize and execute training workshops for personnel including data reporting using mobile apps that can collect and analyze data on generation, collection, and recovery. (3 months). 1F. IEC for Public Awareness (6 months, ongoing) ● Campaign Planning: Develop campaign strategy and materials. ● Implementation (ongoing): Launch and execute the IEC campaign for users (i.e., residents, locators, Producer's Responsibility organizations (PROs), Obliged enterprises (OEs)) through various channels. 1G. Monitoring and Evaluation on the Use of the Program (ongoing) ● Establish Monitoring Framework: Define KPIs and monitoring protocols. ● Regular Audits and Feedback Collection (ongoing): Conduct periodic audits and gather user feedback to assess system performance and impact.
Stakeholders to be Involved	● **Government Agencies:** LGU Manila and other LGUs, environmental agencies, and regulatory bodies who are responsible for policy enforcement and oversight of waste management practices. ● **Waste Management Companies:** Firms responsible for waste collection, processing, recycling, transportation and disposal, and other key players in the operational aspects of waste management and data collection. ● **Technology Providers:** Companies providing the technology for data management and monitoring systems. They are essential for the implementation and maintenance of the data management and monitoring infrastructure. ● **Community organizations:** Local community groups and NGOs focused on environmental issues. They can provide grassroots support, awareness, and community engagement in waste management efforts. ● **Academic Institutions, researchers and experts in waste management and environmental science**. They can offer data-driven insights, innovative approaches, and validation of the data management strategies. ● **General Public:** Barangay officials of Manila City.
Cost Estimate	**Total:** $370,000 - $800,000 **Developing CDMS and approvals (1A-1D):** $260k - 500k **Training, IEC and monitoring (1E-1G):** $110k - 300k

7.4. Annex C - Recommendation #2 - Streamlining and Harmonizing Ordinances

Description	
Assumption	Manila City is willing to review and assess its existing policies and ordinances to align with the Extended Producer Responsibility Law and other commitment (i.e., NPOA-ML, CPOA-ML, Plastic Smart Cities, among others)
Objective	To standardize and harmonize ordinances across different regulatory (local and national) platforms, ensuring consistency, eliminating redundancy on implementing roles, closing of gaps and grey areas in the regulations The objective is to establish a unified and consistent regulatory framework that addresses inconsistencies and gaps across various regulatory platforms. By standardizing ordinances, this initiative aims to ensure coherence and eliminate conflicts, thereby simplifying enforcement and enhancing compliance. A harmonized framework will provide clear guidelines for both regulators and those being regulated, leading to improved understanding and application of the ordinances.
Solutions Proposed	To achieve the objective of streamlining and harmonizing ordinances, a strategic approach encompassing thorough analysis, comprehensive framework development, and targeted training programs is essential. This approach will include the: 2A. Identify inconsistencies and gaps in existing ordinances and standards. This step involves a comprehensive review of all current ordinances to pinpoint areas where regulations conflict, overlap, or leave gaps. The analysis should include consultations with key stakeholders such as regulatory bodies of concerned LGUs. The findings from this analysis will provide a clear picture of where inconsistencies exist and highlight specific areas that require harmonization. 2B. Develop Harmonization Framework The harmonization framework will serve as a blueprint for standardizing ordinances. It will integrate best practices from various existing regulations, ensuring they are adaptable to different regulatory contexts while maintaining consistency. This framework will be developed in collaboration with legal experts, policy analysts, and stakeholders to ensure it is comprehensive and practical. The framework will include clear guidelines for ordinance alignment, procedures for updating regulations, and mechanisms for ongoing review and improvement. 2C. Develop the harmonized policies and standards and present them to the Manila City Council for discussions and solicit feedback. This step involves drafting the harmonized ordinances based on the developed framework and presenting them to the Council for review. Engaging with the council will provide an opportunity to discuss the proposed harmonization, solicit feedback, and make necessary adjustments to ensure the policies are practical and supported. 2D. Conduct Training Programs for Local Authorities on the Updated Ordinances by developing and implementing comprehensive training programs for local authorities on the updated ordinances. Effective harmonization requires that local authorities fully understand and correctly apply the new standards. Training programs will be designed to educate enforcement personnel on the nuances of the harmonized ordinances, ensuring consistent application across all jurisdictions. These programs will include workshops, seminars, and practical training sessions that cover the details of the updated ordinances, enforcement strategies, and best practices. Additionally, the training should include reflections on how the new ordinances might affect socio-economically vulnerable groups, particularly informal waste workers, to ensure that the implementation does not disproportionately impact these populations and to identify areas for support, if necessary. Ongoing support and resources should be

	solicited and provided to local authorities to help them adapt to the new regulatory framework and address any challenges that arise during implementation. 2E. Launch an Information, Education, and Communication (IEC) campaign to promote awareness of the updated ordinances This campaign will involve creating and disseminating informational materials about the new ordinances to ensure that the public, businesses, and other stakeholders are aware of the changes. The campaign will utilize various media channels to reach a broad audience and will include public consultations to address any questions or concerns. 2F. Conduct Continuous Monitoring of the New Ordinance Implementation. Continuous monitoring will help track compliance, identify any issues with the new regulations, and assess their effectiveness. This will involve setting up reporting mechanisms, regular audits, and periodic reviews to ensure that the ordinances are being implemented as intended and to make any necessary adjustments.
Expected Outcomes	**Consistent Regulatory Framework:** Establishment of a unified regulatory framework that is consistent across all platforms. ● Draft formulated code for the unified framework at the end of 1st year ● Presentation and submission (including public hearing) of the unified code for approval of the City Council at the end of 2nd year ● Adoption and enactment of the city code at the end of 3rd year **Define Roles and Responsibilities:** Local authorities will be capacitated, have a better grasp of the ordinances, leading to more effective implementation. ● 80% of the total barangays are enforcing the code at the end of 1st year ● 100% of the total barangays are enforcing the code at the end of 2nd year ● 100% of the newly elected barangay officials are enforcing the code at the end of 3rd year **Enhanced Compliance:** A harmonized framework will lead to better regulatory compliance across the city, reducing the likelihood of violations due to individual interpretation of the code. ● Establish baseline on the compliance to the code at the end of 1st year ● Increase by 20% on baseline compliance to the code at the end of 2nd year ● 100% compliance to the code at the end of 3rd year
Strategic Activities / Stakeholders	
Strategic Activities to implement > 21 months	2A. Identify Inconsistencies (3 months) ● Assemble a team of legal experts, policy analysts, and enforcement officers. ● Conduct a comprehensive review of existing ordinances. ● Identify and document inconsistencies and gaps (i.e., current vs targets/commitment of the city) 2B. Develop Harmonization Framework (3 months) ● Formulate a detailed harmonization strategy based on best practices (i.e., success stories on plastic management, green procurement policies) ● Draft the framework and circulate it for feedback among key stakeholders. ● Finalize the framework after incorporating feedback. 2C. Develop Harmonized Policies and Standards (3 months) ● Draft harmonized policies and standards. ● Present to the Manila City Council for discussions. ● Solicit and incorporate feedback. 2D. Training Programs (6 months) ● Design training modules tailored to the needs of local authorities. ● Conduct training sessions and workshops. ● Evaluate the effectiveness of the training on a regular basis and make necessary adjustments. 2E. IEC Campaign (6 months, ongoing)

	● Develop informational materials about the new ordinances. ● Launch the campaign through various media channels. ● Conduct public consultations on a regular basis to address current and emerging concerns. 2F. <u>Continuous Monitoring (ongoing)</u> ● Set up systems to track compliance and effectiveness. ● Conduct regular audits and reviews. ● Make necessary adjustments based on monitoring results.
Stakeholders to be Involved	● **Local Government Units** and regulatory bodies responsible for policy enforcement. These LGUs will implement and enforce the harmonized ordinances. ● **Manila City Council** to provide feedback on the policies and standards introduced ● **Metro Manila Development Authority** is the key decision-making body for the region. Their support and approval are crucial for the harmonization process. ● **Business Community:** Representatives from sectors affected by the ordinances such as the food and beverage, personal hygiene, tourism and manufacturing sectors. Ensures the ordinances are practical and do not hinder business operations. ● **Civil Society:** NGOs, community leaders, and activists. Provides grassroots perspectives and mobilizes public support. ● **Academic and Research Institutions:** Experts and researchers offer data-driven insights and innovative approaches to policy formulation. ● **Barangay Officials** to be engaged through public consultations. ensures community understanding and support for the new regulations.
Cost Estimate	**Total:** $460,000 - $1,100,000 **Assessment and development of framework, policies and standards (2A-2C):** $150k - 300k **Training, IEC campaign and monitoring (2D-2F):** $310k - 800k depending on scale of campaign

7.5. Annex D - Recommendation #3 - Establishment of City Environment and Natural Resources Office (CENRO) under a Newly Formed Department of Manila City

Description	
Assumption	During the consultation meeting, Manila City is planning to establish a City Environment and Natural Resources Office (CENRO), under a new Department that would focus on solid waste management. Based on the information gathered, this proposal is under the third hearing of the City Council. In Metro Manila, Manila City is the only city with no CENRO.
Objective	To establish a separate department within the proposed Environment and Natural Resources Office (CENRO) of Manila City dedicated to addressing the city's growing environmental concerns such as related to plastic waste management. The CENRO (as planned by Manila City will transition from the Department of Public Services) will leverage advanced strategies and innovative technologies for the comprehensive management of solid waste (including plastic waste), including collection, segregation, recycling, and disposal. The goal is to transform Manila's approach to environmental management through development and implementation of data-driven methodologies and sustainable practices, ensuring effective and long-term solutions to the city's plastic waste challenges.
Solutions Proposed	To achieve the objective, conceptual development of the functions of the division and the staffing patterns including the division's organizational relationship with other divisions in the CENRO, other departments and with LGU management. operational guidelines, capacity building, and stakeholder engagement are essential. This approach includes the following key steps: 3A. <u>Creation of the CENRO</u> An organizational study of the new CENRO office will be pursued to determine the functions and responsibilities of divisions and sections in CENRO; and identify how the CENRO's functions will be formulated to avoid overlap of functions and responsibilities with other divisions and sections within the Department. The organizational structure will be defined, including the functions of each division staff. The CENRO will be tasked with overseeing all aspects of solid waste management, from operations policy development to implementation and monitoring. This will include management study of the structure, the development of position classification and qualification of potential staffs and preparation of budgets to be submitted to Department of Budget and Management (DBM) for approval and allocation of a Plantilla position; interim staff appointments initially as casuals or on a Job-order modality, allocation of resources, and establishment of initial operational protocols. 3B. <u>Develop Operations Policies and Guidelines.</u> The detailed guidelines and policies for plastic waste management will be formulated. Operations policies and guidelines will be developed to provide a clear framework for the division's activities. These will cover areas such as plastic waste collection, segregation, recycling, disposal, and public education. The guidelines will be created in collaboration with the CENRO Department Head, other division, section and concerned unit heads within CENRO, legal experts, the Administrative, Budget and Finance departments, and other City Hall's Departments. The structure of the CENRO will be defined, including the roles and responsibilities of each team member. It will be tasked with overseeing all aspects of plastic waste management, from policy development to implementation and monitoring. This will include the appointment of key personnel,

allocation of resources, and establishment of initial operational protocols.

3C. Submit the plan to the Council for a comprehensive review of the required budget and resource allocations, and the timeline prior to endorsement to the City Mayor for approval and adoption.

The plan will be reviewed to ensure it meets the necessary financial and operational requirements. The Council's review will ensure that the proposed department is feasible and well-supported, with adequate resources allocated for its establishment and operation.

3D. Obtain Mayor's Approval.

Obtain approval from the Mayor through an Executive Order or Department Order for its interim creation and an order for its submittal to the DBM for final approval of the organizational set-up of the Division.

The office of the Mayor will recommend approval of the establishment of the new CENRO, providing the necessary legal and administrative support for its creation and operation as well as support for its final approval by DBM

3E. Hiring of Personnel

Hiring skilled personnel and equipping them with comprehensive training are imperative to the success of this initiative.

3F. Capacity Building and Training

Capacity building and training programs for division staff and other relevant stakeholders will be implemented.

Comprehensive training programs will be developed to ensure that division staff and other stakeholders are equipped with the necessary skills and knowledge. This will include training on plastic waste management best practices, data collection and analysis, and community engagement strategies. Ongoing professional development opportunities will also be provided to keep staff updated on new technologies and methodologies.

3G. Stakeholder Engagement and Collaboration

Engagement and collaboration with key stakeholders, including government agencies, private sector, NGOs, CSOs and the community will be carried out.

Effective plastic waste management requires collaboration with a wide range of stakeholders. Regular meetings, workshops, and consultations will be held to gather input, foster collegial partnerships, and ensure that the division's initiatives are aligned with the needs, demands and expectations of the community. This engagement will also help in mobilizing resources and gaining support for various initiatives.

3H. Monitoring and Evaluation

A Monitoring and Evaluation System will be established to assess the effectiveness of the CENRO's initiatives.

A system for continuous monitoring and evaluation will be put in place to track the progress and impact of the division's activities including staff performance. This will involve setting key performance indicators (KPIs), conducting regular audits, and compiling progress reports. Feedback from these evaluations will be used to make necessary adjustments and improvements.

Expected Outcomes	**Clear and Appropriate Policies and Guidelines** ● 100% roll-out of the CENRO's mandate including the enforcement of the unified code in the 1st year ● Set performance targets (i.e., unified code compliance) in the 2nd year ● Institutionalization of Monitoring and Evaluation (M&E) system in the 3rd year **Enhanced organizational Capacity and Staff improved competency** ● 80% of the total personnel of CENRO are trained at the end of 1st year ● 100% of the total personnel of CENRO are trained at the end of 2nd year ● 100% of the of the newly deputized personnel of CENRO are trained at the end of 3rd year **Strong Stakeholder Collaboration** ● Inventory of existing PROs, OEs, and POs in Manila in the 1st year ● 20% of the total PROs, OEs, and POs in Manila are engaged in the 2nd year ● 50% of the total PROs, OEs, and POs in Manila are engaged in the 3rd year **Efficient and Effective Plastic Waste Management** ● 40% recovery of plastic waste at the end of 2024 ● 50% recovery of plastic waste at the end of 2025 ● 60% recovery of plastic waste at the end of 2026
Strategic Activities / Stakeholders	
Strategic Activities to implement > 30 months	3A. <u>Create the CENRO (6 to 8 months)</u> ● Conduct an organizational study of CENRO and change title from DPS to CENRO ● Prepare staff positions classification and qualifications standards for an including budget for submittal and approval by DBM 3B. <u>Develop Operational Guidelines and Policies (4 months)</u> ● Policy Formulation: Develop guidelines and policies in collaboration with experts. (2 months) ● Stakeholder Review: Review and refine policies based on stakeholder feedback. (2 months) 3C. <u>Submit the Plan to the Council (4 months)</u> ● Preparation of Submission: Compile the plan with detailed budget and resource requirements. (2 months) ● Council Review and Feedback: Present the plan to the Council and incorporate feedback. (2 months) 3D. <u>Mayor's Approval (2 months)</u> ● Submission for Approval: Submit the plan to the Mayor's office. ● Approval and Issuance of Order: Obtain formal approval and issuance of an Executive or Department Order. 3E. <u>Hiring of personnel (6 months)</u> ● Development of TOR for personnel ● Advertisement and hiring of personnel 3F. <u>Capacity Building and Training (6 months)</u> ● Training Program Development: Create training materials and curriculum. ● Training Implementation: Conduct training sessions for department staff and stakeholders. 3G. <u>Stakeholder Engagement and Collaboration (ongoing)</u> ● Initial Stakeholder Meetings: organize meetings to gather input and foster collaboration. ● Ongoing Engagement (continuous): Regular consultations and workshops to maintain stakeholder involvement. 3H. <u>Monitoring and Evaluation (ongoing)</u> ● Framework Development: Establish KPIs and monitoring protocols.

	• Regular Audits and Reporting (continuous): Conduct audits and compile progress reports.
Stakeholders to be Involved	• **CENRO of Manila City** • **Various Department Heads of Manila City** • **Private Sector:** Businesses involved in plastic production, recycling, and waste management.
Cost Estimate	**Total:** $330,000 - $600,000 **Creation of CENRO and approvals (3A-3D):** $170k - 300k **Hiring of personnel, training and monitoring (3E-3H):** $160k - 300k

7.6. Annex E - Recommendation #4 - Developing Awareness Engagement and Behavioral Change

Description	
Assumption	There are existing IEC activities focusing on developing awareness and behavioral change of residents that need to be expanded and further improved. Women are key influencers at household and community level and a primary target of awareness and engagement campaigns.
Objective	Decrease plastic waste generation and improve waste management practices through comprehensive education and active participation. This will cultivate a culture of awareness, engagement, and behavioral change towards plastic usage and plastic waste management among residents, businesses, and other stakeholders in Manila City.
Solutions Proposed	4A. Public Awareness Campaigns Raising awareness about the environmental impact of plastic waste and educating the public on sustainable practices, such as avoiding single-use plastics, segregation and recycling. 4B. Community Engagement Initiatives Engaging the community in hands-on activities to provide practical guidance on segregating and recycling and fosters a sense of responsibility and collective effort towards plastic reduction. 4C. Provision of Technology and Infrastructure Providing the necessary infrastructure and technology to support the practical implementation of waste management practices. 4D. Educational Programs in Schools, Universities, and Businesses Integrating plastic reduction education into schools and businesses to ensure that the message reaches a broad audience and promotes long-term behavioral change. Solutions will be tailored to different segments of the population, reflecting their unique needs, challenges, and the best ways to engage them. As women play a pivotal role in promoting sustainable waste management practices, it is particularly important that they are fully involved in the design and implementation of these solutions and that these solutions meet their specific needs and requirements. The approach is that while women guide their communities and households and as a result, some activities will primarily engage women, the responsibility for awareness and behavioral change efforts is to be shared among all members of society and the burden of implementation does not fall solely on women.
Expected Outcomes	**Increased Public Awareness**: A well-informed public on the environmental impact of plastic waste and the importance of reducing plastic usage. ● Number of people (women/men/youth) reached by awareness raising campaigns within 3 years (by province). ● Based on the baseline, 50% of the residents (women/men/vulnerable groups) are aware and practicing in the 1st year ● 70% of the residents (women/men/vulnerable groups) are aware and practicing in the 2nd year ● 80% of the residents (women/men/vulnerable groups) are aware and practicing in the 3rd year ● 100% of the residents (women/men/vulnerable groups) are aware and practicing in the 4th year ● 100% sustained in the succeeding years **Enhanced Community Engagement**: Active participation of residents in waste management and plastic reduction initiatives. ● Number of people / share of residents (women / men / youth) engaged in community activities within 5 years

	• Based on the baseline, 50% of the residents (women/men/vulnerable groups) are participating in CENRO-driven plastic reduction initiatives in the 1st year • 70% of the residents (women/men/vulnerable groups) are participating in CENRO-driven plastic reduction initiatives in the 2nd year • 80% of the residents (women/men/vulnerable groups) are participating in CENRO-driven plastic reduction initiatives in the 3rd year • 100% of the residents (women/men/vulnerable groups) are participating in CENRO-driven plastic reduction initiatives in the 4th year • 100% sustained in the succeeding years **Improved Waste Management Infrastructure**: Better waste management through the provision of bins and efficient collection systems in hard-to-reach areas. • Increased numbers of areas with trash bins that are collected on a regular schedule within 5 years • Based on the baseline, 60% of the hard-to-reach areas are provided with bins and regular collection in the 1st year • 80% of the hard-to-reach areas are provided with bins and regular collection in the 2nd year • 100% of the hard-to-reach areas are provided with bins and regular collection in the 3rd year • 100% sustained in the succeeding years **Sustainable Practices in Businesses**: Integration of plastic reduction education and practices in businesses, promoting long-term behavioral change. • 50% of the existing businesses/organizations/schools have entered into a Memorandum of Agreement (MOA) on the implementation of waste reduction projects in Manila in the 1st year • 80% of the existing businesses/organizations/schools have entered into a Memorandum of Agreement (MOA) on the implementation of waste reduction projects in Manila in the 2nd year • 100% of the existing businesses/organizations/schools have entered into a Memorandum of Agreement (MOA) on the implementation of waste reduction projects in Manila in the 3rd year
Strategic Activities / Stakeholders	
Strategic Activities to implement >22 months	4A. <u>Public Awareness Campaigns (6 months)</u> • Develop multimedia campaigns (TV, radio, social media) highlighting the importance of plastic reduction and providing practical guidance on how to substitute single-use plastics in daily tasks and how to segregate plastic to maximize recycling potential. These campaigns will be tailored to different segments of the population, ensuring that the messages resonate with and are accessible to everyone, particularly women, considering their specific needs and challenges. • Organize community workshops and seminars on sustainable waste management practices, ensuring that timing, content, and outreach strategies are tailored to accommodate women's schedules and responsibilities, making it easier for them to participate. • Distribute educational materials (brochures, posters) in public spaces, schools, universities, and businesses, with content designed to be inclusive and relevant to various segments of the population. These materials will emphasize the importance of collective responsibility in waste management, ensuring that women, men, youth, and other groups are engaged. 4B. <u>Community Engagement Initiatives (8 months)</u> • Launch neighborhood clean-up drives and plastic collection events. These initiatives will specifically aim to engage men, youth, and other groups, alongside women, to share the responsibility for plastic reduction. • Establish local recycling and composting programs with community participation. • Create community-led monitoring and reporting systems for plastic waste. • Create community champions to increase outreach to different population segments (youth, elderly, women, people with disabilities, etc.) and raise awareness on plastic reduction and recycling. These champions will work together to ensure that the entire community is engaged. • Sensitize the community about the key role played by the informal waste sector 4C. Provision of Technology and Infrastructure (4 months)

	● Install differentiated bins and trash cans in public spaces and in areas not accessible by garbage trucks, placing them in locations that are convenient and safe for women, particularly women. ● Implement a collection system for these bins using smaller, more agile vehicles or manual collection methods. ● Develop (or adapt existing regionally available) mobile app for reporting overflowing bins and scheduling pickups, designed to be user-friendly and accessible to all segments of the population, including those less familiar with digital technology. Test mobile app through a targeted pilot before expanding to new areas. 4D. Educational Programs in Schools and Businesses (6 months) ● Develop curriculum modules on plastic pollution and sustainability for schools. ● Host talks on how to tackle plastic pollution by young changemakers, highlighting both male and female role models and ensuring that these talks are accessible and relevant to a diverse audience, encouraging collective action. ● Conduct training sessions and workshops for businesses on reducing plastic use and managing waste through segregation, with an emphasis on creating an inclusive environment that encourages participation from both men and women and addresses their specific challenges. ● Encourage schools and businesses to adopt plastic reduction policies and practices (refill water stations and differentiated waste bins).
Stakeholders Involved	● **Local Government Unit (LGU) Manila:** Facilitate the implementation of campaigns and programs and provide oversight. ● **Environmental Agencies, EMB DENR, DILG, DOH:** Support educational initiatives and provide expertise on sustainable practices. ● **Schools and Educational Institutions:** Integrate plastic reduction education into their curricula. ● **Businesses and Industry Groups:** Participate in training sessions and adopt plastic reduction practices. ● **Community organizations:** Lead and participate in engagement initiatives and monitor waste management practices. ● **Technology Providers:** Develop and supply the necessary infrastructure and technology for effective waste management.
Cost Estimate	**Total:** $900,000 - $1,200,000 **Public Awareness and Community Engagement (4A-4B):** $300k - 400k **Technology, infrastructure and educational programs (4C-4D):** $600k - 800k depending on scale of implementation

7.7. Annex F- Recommendation #5 - Formalization and Institutionalization of Informal Groups in Manila City

Description	
PHASE 1	**Formalizing the Informal Groups**
Assumption	There are existing informal groups in Metro Manila who make significant contributions to plastic reduction, but they remain undocumented and unorganized. Women comprise a considerable share of informal waste workers and are among the most vulnerable.
Objective	To organize and formalize informal waste management groups to enhance their legitimacy, structure, operational capacity, while also providing access to critical benefits such as health insurance and social security.
Solutions Proposed	5A. Profiling of Environmental-Related Informal Groups. Gaining a better understanding of the existing landscape and capabilities of informal waste management groups for effective formalization. 5B. Organizing Informal Groups. Supporting organization building, formulation and adoption of Constitution and By-laws; election of leaders/officers, aiming at gender-balanced representation. 5C. Legal Registration and Support. Assisting informal groups with legal registration to grant them the recognition and legitimacy needed to access resources, critical benefits, and collaborate with formal institutions, focusing on women. 5D. Capacity Building and Training. Providing training (i.e., health and safety, basic accounting) and resources (i.e., database, PPE, collection carts) to organized informal groups to equip them with the necessary skills and knowledge to operate formally. Special consideration and support should be given to the most vulnerable segments, particularly women, to ensure they can fully participate and benefit from these opportunities.
Expected Outcomes	• Organized Groups (with legal recognition): Baseline data includes disaggregation by gender with increasing female/vulnerable groups participation per year • Baseline on the informal waste management groups in the 1st year • 50% of the baseline are formalized in the 2nd year • 80% of the baseline are formalized in the 3rd year • 100% of the baseline are formalized in the 4th year • Enhanced Skills: • Baseline on the total members (disaggregated by gender) of the informal groups in the 1st year 50% of the baseline are trained and upskilled in the 2nd year 80% of the baseline are trained and upskilled in the 3rd year 100% of the baseline are trained and upskilled in the 4th year
Strategic Activities / Stakeholders	
Strategic Activities to implement 12 months	5A. Profiling of Informal Waste Management Groups (2 months) • Conduct a comprehensive survey and mapping of informal groups • Evaluate their current operations, challenges, and potential for formalization. Collect gender and key social markets (ethnicity, primary language, age, level of education, etc.) in mapping informal workers • Identify potential leaders, ensuring at least 30% female representation 5B. Organizing Informal Groups (3 months)

	● Identify appropriate ways to organize informal groups and suitable structures or organizations; ● Organize informal groups; ● Formulate, ratify and adopt Constitution and By-laws; ● Identify and agree on roles and responsibilities of leaders and members; ● Select leaders/officers, ensuring sufficient female representation in leadership positions. 5C. Capacity Building and Training (3 months) ● Develop and implement training programs on organizational management, financial literacy, health and safety, and waste management best practices, ensuring these programs are designed with women's needs in mind. This may involve adjusting the timing and location of training sessions to fit their schedules and providing options for separate training sessions as needed.; ● Provide resources and support for capacity building; ● Provide personal protective equipment fit to women's needs. 5D. Legal Registration and Support (4 months) ● Assist informal groups in the process of legal registration; ● Provide ongoing support and guidance to navigate legal and bureaucratic processes; ● Provide assistance to access health insurance and other social benefits.
Stakeholders to be Involved	● **LGU Manila City:** Oversee and facilitate the assessment, training, and registration processes; also monitor implementation of their organizational policies and guidelines; partnerships with formal institutions ● **HR and legal section of Manila City.** **Provide legal support and guidance for registration**. ● **Training Providers:** Develop and deliver training programs. ● **Informal groups and community organizations** participate in capacity-building programs and support the formalization process.
PHASE 2	**Institutionalization of Formalized Groups**
Assumption	The informal waste groups are already with legal recognition. In Phase 2, those existing formal groups are also included in the baseline.
Objective	To integrate the formalized waste management groups into the city's official waste management system, ensuring sustainability and effective collaboration.
Proposed Solutions	5E. Establish Partnerships with the LGU Manila and other formal institutions Formalized groups need to collaborate with LGUs to ensure integrated waste management. 5F. Develop Sustainable Funding Mechanisms Ensure financial sustainability for formalized groups since it is crucial for their long-term operation. 5G. Integrate into the City's Waste Management System. Full integration will enhance the efficiency and effectiveness of the city's waste management efforts. 5H. Establish and institutionalize partnerships with other formal institutions both public and private Ensuring collaboration is important to build plastic circularity capacity.
Expected Outcomes	**Enhanced Collaboration:** Strengthened partnerships between formalized groups and LGU of Manila ● 50% of the formal waste groups have entered into a Memorandum of Agreement (MOA) on the technical capacity building and adoption of better waste management practices in Manila in the 1st year ● 80% of the formal waste groups have entered into a Memorandum of Agreement (MOA) on the technical capacity building and adoption of better waste management practices in Manila in the 2nd year

	● 100% of the formal waste groups have entered into a Memorandum of Agreement (MOA) on the technical capacity building and adoption of better waste management practices in Manila in the 3rd year **Financial Sustainability:** ● **With existing revenue streams (i.e., junkshops)** ○ 50% of the formal waste groups have access to database on the plastic market in the 1st year ○ 80% of the formal waste groups have access to database on the plastic market in the 2nd year ○ 100% of the formal waste groups have access to database on the plastic market in the 3rd year ● **Without existing revenue streams (i.e., recycling organization, startups)** ○ 80% of the formal waste groups have financial literacy training in the 1st year ○ 100% of the formal waste groups have financial literacy training in the 2nd year ○ Interested formal waste groups will be linked with financial institutions and technical assistance for loans and grants in the 3rd year **Integrated Operations:** Effective integration of formalized groups into the city's waste management system, improving overall efficiency. ● 50% of the formal waste groups are deputized and accredited by CENRO in the 1st year ● 80% of the formal waste groups are deputized and accredited by CENRO in the 2nd year ● 100% of the formal waste groups are deputized and accredited by CENRO in the 3rd year
Strategic Activities / Stakeholders	
Strategic Activities 12 months	5E. Establish Partnerships with the LGU Manila (3 months) ● Develop formal agreements and partnerships between LGU and formalized groups. ● Create joint action plans for waste management and assess plan implementation. ● Organization of regular coordination meetings. 5F. Develop Sustainable Funding Mechanisms (4 months) ● Identify potential funding sources (e.g., grants, subsidies, and partnerships with private entities) and secure commitments. ● Establish financial management systems and training for group leaders. 5G. Integrate into City's Waste Management System (5 months) ● Update the city's waste management plans to include formalized groups. ● Develop coordination mechanisms for regular collaboration and communication. 5H. Establish and Institutionalize Partnerships with other Formal Institutions both Public and Private (6 months) ● Develop partnerships with both public and private institutions to support and enhance waste management efforts.
Stakeholders Involved	● **Local Government Unit Manila City** to facilitate partnerships, integration, and provide oversight. ● **Formalized Waste Management Groups** to participate actively in partnerships and operations. ● **Funding Agencies** to provide financial support and resources. ● **City Waste Management Department** to coordinate and integrate group activities into the city's waste management plans ● **Barangay Officials:** Facilitate local engagement, provide data, and support collaboration with the communities and the informal groups.
Cost Estimate	**Total:** $290,000 - $700,000 **Phase 1 (5A-5D):** $90k - 200k **Phase 2 (5E-5H):** $200k - 500k depending on range and number of partnerships pursued

7.8. Annex G - Recommendation #6 - Establishment of a Dedicated Waste Sorting and Transfer Station for Manila-Wide Plastic Waste Sorting, Recycling and Recovery

Description	
Assumption	The CENRO is already established and pre-feasibility study on the potential off-takers of plastic waste collected for recovery (Recycling, Energy, RDF, Disposal) and social acceptability is conducted. Have in place Memorandums of Understanding with off-takers and/or co-investors in the feasibility study stage of the project.
Objective	To establish a dedicated sorting & transfer station in Manila City for plastic recycling, which will streamline the management and recycling of plastic waste before transferring it to a disposal facility. This recommendation will also facilitate plastic diversion (i.e., waste-to-energy, recycling) away from the landfill. This initiative aims to reduce the volume of generated plastic waste and the overall volume of garbage that goes to the Landfill. This will promote sustainable waste management practices incorporating the circularity framework and enhance the efficiency of the recycling process.
Solutions Proposed	6A. Conduct Feasibility Study and Site Selection. A thorough feasibility study and careful site selection are essential to ensure the transfer station is strategically located and financially viable. 6B. Design and Planning. A well-designed transfer station is crucial for efficient operations and scalability. Planning ensures all aspects of the facility are considered, from layout to operational workflows. The facility should be designed with safety in mind and be fit-for -purpose. Fire safety should be emphasized for such a facility. Odor and other environmental controls should be considered. 6C. Secure Funding and Approvals. Obtaining financial resources and necessary regulatory approvals is essential for the successful construction and operation of the transfer station. 6D. Construction and Installation. Constructing the transfer station and installing the necessary equipment is the core phase of the project, turning plans into reality. 6E. Staff Recruitment and Training. Hiring skilled personnel and providing them with comprehensive training is critical for the efficient operation of the transfer station. Implement gender-responsive recruitment processes to encourage women and under-represented groups to apply. Aim at achieving a diverse workforce. This facility should be able to accept workers from the informal waste sector. 6F. Operational Launch and Monitoring. The launch phase involves starting operations and establishing monitoring systems to ensure the transfer station operates efficiently and meets its objectives.
Expected Outcomes	**Improved Waste Management Efficiency**: Streamlined sorting and processing of plastic waste, reducing transportation costs and improving recycling rates. ● Revenue generation from sale of recyclables and off-take of RDF from non-recyclable plastics. ● Reduced waste volume to the landfill (potential savings to the city by reduced haulage and tipping cost as a result of lower volumes sent to Navotas landfill)

	• Higher volume of plastic waste captured from sorting activity and diverted to recycling and other non-landfill bound solutions.
	  ○ Assessment of the waste management efficiency in the 1st year
	  ○ 20% efficiency improvement from baseline in the 2nd year in terms of plastic diversion
	  ○ 40% efficiency improvement from baseline or 100% efficiency sustained in the 3rd year in terms of plastic diversion
	
	Environmental Benefits and Enhanced Sustainability: Reduced landfill usage and decreased pollution, contributing to a cleaner environment. Promotion of sustainable waste management practices and support for the circular economy.
	• 40% waste diverted in the 1st year
	• 50% waste diverted in the 2nd year
	• 60% waste diverted in the 3rd year
	• 100% waste diverted or sustained in succeeding years
	
	Economic Opportunities: Job creation and revenue generation from the sorting and processing of recyclable materials.
	• **Job Creation**:
	  ○ Inventory of waste management workers (database) in the 1st year
	  ○ 10% increase of new workers in the 2nd year
	  ○ 20% increase of new workers in the 2nd year
	  ○ 30% increase of new workers in the 3rd year
	• **Revenue Generation**:
	  ○ Baseline revenue to be used is the 2024 under the waste management sector
	  ○ 10% increase in revenues in the 2nd year
	  ○ 20% increase in revenues in the 3rd year
	  ○ 30% increase in revenues in the 4th year

Strategic Activities / Stakeholders	
Strategic Activities to implement 31 Months total, with continuous support	6A. <u>Conduct Feasibility Study and Site Selection Duration: 4 months</u> • **Needs Assessment**: Conduct a needs assessment to determine the volume and types of plastic waste generated in Manila. • **Site Identification**: Identify potential sites for the transfer station, considering factors such as accessibility, proximity to major waste sources, social and environmental impact, and zoning regulations. • **Feasibility Analysis**: Perform a detailed feasibility study, including cost-benefit analysis, environmental impact assessment, and risk analysis. 6B. <u>Design and Planning: 6 months</u> • **Facility Design**: Develop inclusive architectural and engineering designs for the transfer station, ensuring it includes all necessary components such as sorting areas, loading docks, storage, administrative offices, and sex-disaggregated facilities. • **Technology Selection**: Choose appropriate sorting and processing technologies based on the types of plastic waste and desired output. • **Operational Plan**: Create an operational plan detailing workflow process, staffing requirements, maintenance schedules, and safety protocols. 6C. <u>Secure Funding and Approvals: 8 months</u> • **Funding Proposals**: Prepare and submit proposals to government agencies, international donors, and private investors to secure funding. • **Regulatory Approvals**: Obtain necessary permits and approvals from environmental, health, and zoning authorities. • **Public Consultations**: Engage with the community and stakeholders through public consultations to address concerns and gather support. 6D. <u>Construction and Installation: 12 months</u> • **Contracting**: Select and contract reputable construction firms and equipment suppliers through a competitive bidding process. • **Construction Management**: Oversee the construction process, ensuring it adheres to design specifications, timelines, and safety standards following inclusive infrastructure principles.

	• **Equipment Installation**: Install and test sorting and processing equipment, ensuring proper functionality and integration. 6E. Staff Recruitment and Training: 3 months • **Recruitment**: Hire management, technical, and operational staff with relevant expertise and experience. Implement gender-sensitive recruitment processes to encourage women and under-represented groups to apply. Aim at achieving a diverse workforce. • **Training Programs**: Develop and implement training programs covering equipment operation, safety procedures, quality control, and environmental regulations for all staff. 6F. Operational Launch and Monitoring: 3 months • **Operational Testing**: Conduct initial operational tests to ensure all systems and processes function correctly. • **Launch Operations**: Begin full-scale operations, managing and processing plastic waste prior disposal • **Performance Monitoring**: Implement monitoring systems to track performance metrics, identify issues, and ensure continuous improvement.
Stakeholders to be Involved	• **LGU Manila:** Provide regulatory oversight and support. • **Environmental Agencies:** Ensure compliance with environmental regulations and standards. • **Community Organizations:** Participate in site selection, public consultations, and awareness campaigns. • **Private Sector and Investors:** Provide funding and technological support. • **Construction Firms and Equipment Suppliers:** Handle construction and equipment installation. • **Educational and Training Institutions:** Develop and deliver training programs for staff.
Cost Estimate	**Total:** $19,100,000 - $30,700,000 **Assessment, Design, Planning and Funding (6A-6C):** $1m - 1.5m **Construction and Installation (6D):** $18m - 30m depending on results from feasibility and design phase, availability of land and operational design and capacity of waste sorting, shredding, baling and transfer station. This facility will include environmental controls and fire protection installations. **Training and Monitoring (6E-6F)**: $100k - 200k

7.9. Annex H - Recommendation #7 - Assessment of the Adequacy, Efficiency and Effectiveness of the City's MRF and Developing a Budgetary and Implementation Plan

Description	
Assumption	The centralized City MRF currently processes about 373 tonnes per year (~1,021 kg per day) of plastic waste, which accounts for only ~0.29% of the total plastic waste generated. In addition, the City MRF processes 365 tonnes per year (~1,000 kg per day) of biodegradable waste and 18 tonnes per year (~50 kg per day) of other recyclables, according to 2023 baseline data. The MRFs/MRS operated by the barangays also contribute to recovery but only process about 1,850 tonnes per year of recyclables. A significant gap remains, as the majority of recyclables generated by the city still end up in the sanitary landfill. It is important to assess the current City MRF to expand its coverage and operational capacity to accept a larger volume of recyclables. However, it should be noted that the City plans to establish another MRF on city-owned land. Therefore, if it is determined that the current City MRF cannot be expanded, it is recommended to proceed with establishing a new city MRF.
Objective	To assess the current city centralized MRF and determine if it is feasible for expansion or to establish another City Material Recovery Facilities (MRF) to enhance waste sorting and recycling capabilities. This initiative aims to improve the efficiency of waste management processes, reduce the environmental impact of waste, and promote sustainable recycling practices. The establishment of additional MRFs is essential for improving the capacity for sorting and recycling of waste materials in Manila. This facility will provide the necessary infrastructure to handle increased waste volumes, cover barangays with no materials recovery facilities (MRF) and materials recovery systems (MRS), support the city's recycling goals, and reduce the burden on landfills. Enhanced waste sorting capabilities will also enable more efficient recovery of valuable materials, contributing to a circular economy and reducing environmental pollution.
Solutions Proposed	7A. <u>Assessment of the Current City's MRF</u> A comprehensive assessment of the current operation and capacity of the City MRF should be conducted to determine the viability for expansion/rehabilitation or to establish and construct new MRF in the city. 7B. <u>Conduct Feasibility Study and Site Selection</u> A comprehensive feasibility study and careful site selection are essential to ensure that the new MRF is strategically located and financially viable. 7C. <u>Detailed Design and Planning</u> A well-designed MRF is crucial for efficient operations and possible expansion of more MRFs in other barangays. Planning ensures all technical specifications of the facility are considered, from preliminary and detailed designs stages to operational workflows. 7D. <u>Secure Funding and Approvals</u> Obtaining the necessary approvals and financial resources are essential to the successful construction and operation and maintenance of the MRF. 7E. <u>Construction and Installation</u> Construction and installation of the necessary equipment are the core phases of the project. These

	transform plans into reality. 7F. Staff Recruitment and Training Hiring qualified personnel and providing them with comprehensive training are critical in the efficient operation of the MRF along with the development of the training modules and operations manual for the MRF. Implement gender-responsive recruitment processes to encourage women and vulnerable groups to apply. Aim at achieving a diverse workforce. Informal waste collectors may be engaged for the operations of the MRF. 7G. Handover, Operational Launching and Monitoring The completed MRF will be handed over to the legal operator. Launching of the MRF signifies commencement of operations including pilot testing. Likewise, establishing monitoring systems to ensure the MRFs operate efficiently and meet their objectives. Obtain actionable insights and data from the pilot study to guide the expansion of MRFs to other barangays.
Expected Outcomes	**Enhanced Waste Sorting and Recycling.** Improved capabilities to sort and recycle waste, reducing landfill usage and promoting sustainability. ● Assessment of the sorting and recycling efficiency of the existing MRF in the 1st year ● 10% efficiency improvement from baseline, if achievable, otherwise, construct the new MRF in the 2nd year ● 40% efficiency improvement from baseline, if achievable, otherwise, construct the new MRF in the 3rd year **Economic Benefits.** Job creation and revenue generation from the recycling of valuable materials. ● **Job Creation:** ○ Inventory of the current MRF personnel (database) in the in the 1st year ○ 10% increase of new workers to align with targets in the 2nd year (including personnel of the new MRF, if applicable) ○ 20% increase of new workers to align with targets in the 3rd year (including personnel of the new MRF, if applicable) ○ 30% increase of new workers in the 4th year (including personnel of the new MRF, if applicable) ● **Revenue Generation:** ○ Baseline revenue to be used is the 2024 data from the existing MRF ○ 10% increase in revenues by additional recycled products revenue stream in the 2nd year (including revenues of the new MRF, if applicable) ○ 20% increase in revenues by additional recycled products revenue stream in the 3rd year (including revenues of the new MRF, if applicable) ○ 30% increase in revenues by additional recycled products revenue stream in the 4th year (including revenues of the new MRF, if applicable) **Environmental Impact.** Reduced pollution, waste ending up to the disposal site and environmental degradation through better waste management practices. Promotion of sustainable waste management practices and support for the circular economy. ● 40% waste diverted in the existing MRF in the 1st year ● 50% waste diverted in the 2nd year (including waste diversion from the new MRF, if applicable) ● 60% waste diverted in the 3rd year (including waste diversion from the new MRF, if applicable) ● 100% waste diverted or sustained in succeeding years (including waste diversion from the new MRF, if applicable)
Strategic Activities / Stakeholders	

Strategic Activities to implement 32 months	7A. Assessment of Current City's MRF (1 month) ● **MRF Assessment**: Conduct assessment and data validation in the City's MRF to determine its coverage, current capacity, and available resources and manpower, and other relevant data 7B. Conduct Feasibility Study and Site Selection (4 months) ● **Needs Assessment**: Conduct a needs assessment to determine the volume and types of waste generated in different areas of Manila. This includes analysis of current waste generation data and projecting future trends. ● **Site Identification**: Identify potential sites for the MRFs, considering factors such as accessibility, proximity to major waste sources, environmental impact, and zoning regulations. Evaluate the suitability of each site based on logistical efficiency, environmental sustainability, and community acceptance. ● **Feasibility Analysis**: Perform a detailed feasibility study, including cost-benefit analysis, environmental and social impact assessment, and risk analysis. This study will provide a comprehensive understanding of the technical, financial, environmental, social and operational implications of establishing the MRFs. ● **Identification and Coordination with Donor Agencies**: Identify potential donor agencies as funding sources such as UN Habitat, WWF, ADB, and private investors. Engage with these agencies to secure preliminary support and alignment with their funding criteria. ● **Feasibility Study Report**: Indicate the findings to the comprehensive feasibility study report. Present the FS report to CENRO Manila City or DPS and other concerned offices for feedback and integration. 7C. Design and Planning (6 months) ● **Facility Design**: Develop architectural and engineering designs for the MRFs, ensuring they include all necessary components such as sorting areas, processing lines, storage, sex-disaggregated facilities and administrative offices. The design should prioritize efficiency, safety, and scaling up. ● **Technology Selection**: Choose appropriate sorting and processing technologies based on the types of waste and desired output. Evaluate different technologies for their efficiency, cost-effectiveness, and environmental impact. ● **Operational Plan**: Create an operational plan detailing workflow process, staffing requirements, maintenance schedules, and safety protocols. This plan should ensure smooth operations, compliance with regulations, and high safety standards. ● **Cost Estimation**: Develop a detailed cost estimate for the construction and operation of the MRFs. 7D. Secure Funding and Approvals (8 months) ● **Funding Proposals**: Prepare and submit proposals to identified funding sources such as UN Habitat, WWF, ADB, and private investors to secure funding. Highlight the environmental and socio- economic benefits of the MRFs to attract investments. ● **Regulatory Approvals**: Obtain necessary permits and approvals from environmental, health, and zoning authorities. Ensure compliance with all regulatory requirements and address any concerns raised during the approval process. ● **Public Consultations**: Engage with the community and stakeholders through meaningful public consultations to address concerns, gather support and commitment to safeguard and upkeep the MRFs. Ensure women and vulnerable groups participate in consultations and are fully engaged. Communicate the benefits and positive impact of the MRFs operations to gain public trust and approval. 7E. Construction and Installation (12 months) ● **Contracting**: Select and contract reputable construction firms and equipment suppliers through a competitive bidding process. Ensure contractors have a proven track record of delivering high-quality projects on time and within budget. ● **Construction Management**: Oversee the construction process, ensuring it adheres to design specifications, timelines, and safety standards following inclusive infrastructure principles. Regularly monitor progress and address any issues that arise promptly.

	• **Equipment Installation**: Install and test sorting and processing equipment, ensuring proper functionality and integration. Conduct thorough testing and calibration to ensure all equipment operates efficiently and meets performance standards 7F. Staff Recruitment and Training (3 months) • **Recruitment**: Hire management, technical, and operational staff with relevant expertise and experience. Focus on recruiting individuals with a strong background in waste management and recycling operations. Implement gender-responsive recruitment processes to encourage women and vulnerable groups to apply. Aim at achieving a diverse workforce • **Training Programs**: Develop and implement training programs covering equipment operation, health and safety procedures, quality control, and environmental regulations. Ensure staff are well-versed in the operational protocols and safety standards of the MRFs. 7G. Operational Launch and Monitoring (3 months) • **Operational Testing**: Conduct initial operational tests/ pilot testing to ensure all systems and processes function correctly. Identify and address any issues before the full-scale launch. • **Launch Operations**: Begin full-scale operations, managing and processing waste. Implement the operational plan and monitor the facility's performance closely. • **Performance Monitoring**: Implement monitoring systems to track performance metrics, identify issues, and ensure continuous improvement. Regularly review operational data to optimize processes and enhance efficiency.
Stakeholders to be Involved	• **LGU Manila**: Provide permits and approval, regulatory oversight and support. • **Environmental Agencies (**EMB-DENR): Ensure compliance with environmental regulations and standards. • **Community Organizations**: Participate in site selection, public consultations, and awareness campaigns. • **Private Sector and Investors**: Provide funding and technological support. • **Construction Firms and Equipment Suppliers**: Handle construction and equipment installation. • **Educational and Training Institutions**: Develop and deliver training programs for staff.
Cost Estimate	**Total:** $1,200,000 - $3,250,000 **Assessment, Design, Planning and Funding (7A-7D):** $130k-200k **Construction and Installation (7E):** $1m-$3m depending on results from feasibility and design phase, adequacy of expansion of existing site and land purchasing options. **Training and Monitoring (7F-7G)**: $70k - 150k

7.10. Annex I - Recommendation #8 - Study and Install Mechanized and Automated Equipment and Systems to Capture Marine Litter

Description	
Assumption	There are existing initiatives to manage marine litter under t8he Blue Carbon economy of Department of Environment and Natural Resources (DENR) where DPS of Manila participated. There are existing databases of technologies that can be accessed by the city. The City is seeking ways to use mechanized and automated traps to capture and remove plastic waste leakage from upstream sources.
Objective	To implement state-of-the-art and technology-based equipment and systems to effectively capture and manage marine litter in Manila's coastal and marine environments. This initiative aims to reduce marine pollution, protect marine ecosystems, and enhance the overall environmental health of the region. Marine litter poses a significant threat to marine life, ecosystems, and human health. Implementing technology-based solutions for capturing marine litter will help mitigate these impacts, promote cleaner coastal environments, and support sustainable marine resource management. By investing in advanced equipment and systems, Manila can lead the way in innovative marine pollution control, ensuring that the city's waterways remain clean and healthy. This also aligns with global environmental goals and can attract support from international environmental organizations.
Solutions Proposed	8A. Conduct Feasibility Study and Technology Assessment A comprehensive feasibility study and technology assessment are essential to identify the most effective and suitable technology-based solutions for capturing marine litter. Understanding the local marine environment, the types of litter present, and the best technologies available will ensure the success of this initiative. 8B. Design and Planning Detailed design and planning ensure that the selected technologies are effectively integrated into the existing marine litter management framework. This phase is necessary for addressing site-specific challenges and ensuring operational efficiency. 8C. Stakeholders Consultations Engaging a diverse group of stakeholders through consultations ensures that their insights, concerns, and support are integrated into the project, fostering collaboration and buy-in from all relevant parties. 8D. Institutional Framework Development Developing an institutional framework will define the roles and responsibilities of all stakeholders involved in the project. This ensures that there is clear accountability, coordination, and effective management of the project throughout its lifecycle. 8E. Secure Funding and Approvals Securing financial resources and necessary regulatory approvals demands adequate funding and must be compliant with all legal requirements. 8F. Procurement and Installation Procuring and installing the selected technology-based systems is a critical step in deploying effective marine litter capture solutions. This phase ensures that the necessary equipment is acquired and properly set up for operation.

	8G. Staff Recruitment and Training Recruiting skilled personnel and providing comprehensive training ensures the effective operation and maintenance of the new systems. This phase is crucial for building a capable workforce to manage the technology. Use gender-responsive procurement practices to encourage women and vulnerable groups to apply. Aim for a diverse pool of candidates. 8H. Operational Launch and Monitoring The launch phase involves starting operations and establishing monitoring systems to ensure the technology-based systems function effectively. Continuous monitoring and evaluation are key to achieving the project's objectives and making necessary adjustments.
Expected Outcomes	**Compliance to CPOA-ML targets**: Adoption of NPOA-ML targets • Baseline plastic leakage established in 2024 • 100% recovery of plastic leakage by 2025 (CPOA-ML Annex C – CPOA-ML MERV System) • 100% sustained in the succeeding years
Strategic Activities / Stakeholders	
Strategic Activities to implement 37 months	8A. Conduct Feasibility Study and Technology Assessment (6 months) • **Needs Assessment**: Conduct a needs assessment to determine the volume and types of marine litter in Manila's coastal and marine areas. This includes collecting data on the sources and distribution of marine litter and identifying hotspots where litter accumulation is highest. Coordination with other agencies like DPWH, MMDA and PPA is necessary to determine their initiatives, plans and programs with regard to plastic waste management and technology plans. • **Technology Review**: Review existing technology-based solutions for capturing marine litter, including barriers, booms, skimmers, and autonomous drones. Assess their effectiveness, costs, and environmental impact. Compare different technologies based on their operational efficiency, ease of maintenance, and suitability for local conditions. • **Feasibility Analysis**: Perform a detailed feasibility study, including cost-benefit analysis, environmental impact assessment, and risk analysis. Evaluate the potential challenges and limitations of implementing each technology and recommend the most viable options. • **Stakeholder Engagement**: Engage with stakeholders, including local communities, environmental NGOs, and maritime authorities, to gather insights and build support for the proposed solutions. Ensure women and vulnerable groups are fully represented and engaged. 8B. Design and Planning (6 months) • **Technology Design**: Develop detailed designs for the selected technology-based systems, ensuring they are tailored to the specific conditions of Manila's coastal and marine environments. This includes designing the layout, specifications, and installation procedures for each system. • **Integration Plan**: Create an integration plan detailing how the new technologies will be incorporated into the current marine litter management practices. This plan should address logistical aspects, coordination with existing waste management systems, and integration with ongoing clean-up efforts. • **Operational Plan**: Develop an operational plan covering deployment, maintenance, monitoring, and data collection processes. The plan should outline standard operating procedures, roles and responsibilities, and contingency measures for potential issues. • **Community Involvement**: Involve local communities in the planning process to ensure their needs and concerns are addressed and to foster community ownership of the project, including feedback from women groups, youths and other under-represented groups (people with disabilities, ethnic minorities in the community). 8C. Stakeholders Consultation (1 month) Once FS is completed, a stakeholder's consultation or conference shall be conducted to present the project and solicit feedback from the stakeholders. This will be integrated in the technology design.

- **Organize Consultation Meetings**: Schedule and organize consultation meetings with various stakeholders, including local government units, environmental NGOs, community groups, and industry representatives. Ensure women and vulnerable groups are fully represented and engaged.
- **Present Project Plans**: Present the project plans, including the feasibility study findings, proposed technologies, and integration plans, to stakeholders to gather their feedback and suggestions.
- **Feedback Integration**: Collect feedback from stakeholders and integrate their suggestions into the final project design to address any concerns and improve the project's acceptance and effectiveness.
- **Continuous Engagement**: Establish a framework for continuous stakeholder engagement throughout the project's implementation to ensure ongoing support and collaboration

8D. Institutional Implementation Arrangement (2 months)

Prepare the institutional framework for the implementation of the project defining the roles and responsibilities of the stakeholders to be involved.

- **Role Definition**: Define the specific roles and responsibilities of each stakeholder, including government agencies, NGOs, private sector partners, and community organizations. Ensure that all parties understand their duties and how they contribute to the project's success.
- **Establish Governance Structures**: Set up governance structures such as steering committees, working groups, and advisory boards to oversee the project's implementation and ensure effective decision-making. Ensure women and vulnerable groups are represented, including in decision-making positions.
- **Develop Policies and Procedures**: Create policies and procedures to guide the project's implementation, including guidelines for coordination, communication, resource allocation, and conflict resolution. Ensure that these policies promote transparency, accountability, and inclusivity.
- **Capacity Building**: Provide training and capacity-building programs for stakeholders to ensure they have the necessary skills and knowledge to fulfill their roles effectively.
- **Monitoring and Evaluation Framework**: Develop a monitoring and evaluation framework to track the progress of the project, assess its impact, and identify areas for improvement. This framework should include key performance indicators (KPIs), reporting mechanisms, and regular review processes.
- **Institutional Integration**: Integrate the project into existing institutional structures and processes to ensure sustainability and continuity beyond the project's initial implementation phase

8E. Secure Funding and Approvals (8 months)

- **Funding Proposals**: Prepare and submit funding proposals to government agencies, international organizations (e.g., UN Habitat, WWF), and private investors. Highlight the environmental and economic benefits of the project to attract investments. Include detailed budgets, timelines, and expected outcomes in the proposals.
- Obtain necessary permits and approvals from environmental, maritime, and health authorities. Ensure that all regulatory requirements are met, including environmental impact assessments, safety regulations, and maritime operation permits.
- **Public Consultations**: Engage with the community and stakeholders through public consultations to gather support and address concerns. Organize public meetings, workshops, and information sessions to explain the project, its benefits, and how it will be implemented. Ensure women and vulnerable groups are fully represented and engaged.

8F. Procurement and Installation (8 months)

- **Contracting**: Select and contract reputable suppliers and service providers through a competitive bidding process. Ensure that the selected contractors have a proven track record of delivering high-quality equipment and services.
- **Equipment Procurement**: Purchase the necessary equipment and technology-based systems. This includes barriers, booms, skimmers, autonomous drones, and other relevant technologies.

	• **Installation**: Oversee the installation of the equipment, ensuring it is correctly deployed and integrated. Conduct site preparations, install the systems according to the design specifications, and perform initial tests to ensure functionality. • **Training for Installation Crew**: Provide specialized training for the installation crew to ensure they are knowledgeable about the equipment and the correct installation procedures. 8G. Staff Recruitment and Training (3 months) • **Recruitment**: Hire technical and operational staff with expertise in marine systems and technology. Focus on individuals with experience in waste management, marine operations, and technology maintenance. Use gender-responsive procurement practices to encourage women and vulnerable groups to apply. Aim for a diverse pool of candidates. • **Training Programs**: Develop and implement training programs covering equipment operation, maintenance procedures, safety protocols, and data management. Provide hands-on training sessions, workshops, and certification courses to ensure staff are fully equipped to handle their responsibilities. • **Ongoing Support and Development**: Establish a continuous professional development program to keep staff updated on new technologies, best practices, and any changes in operational procedures. 8H. Operational Launch and Monitoring (3 months) • **Operational Testing**: Conduct initial operational tests to ensure all systems and processes function correctly. Simulate various operational scenarios to identify and address potential issues before full-scale deployment. • **Launch Operations**: Begin full-scale operations, deploying the equipment to capture marine litter. Implement the operational plan and start regular monitoring and data collection activities. • **Performance Monitoring**: Implement monitoring systems to track performance metrics, identify issues, and ensure continuous improvement. Use data analytics to assess the effectiveness of the systems, identify trends, and make data-driven decisions for optimizing operations. • **Reporting and Feedback Mechanisms**: Establish reporting mechanisms to regularly update stakeholders on the progress and performance of the project. Gather feedback from staff, community members, and other stakeholders to make necessary improvements.
Stakeholders to be involved	**Local Government Units (LGUs):** • Manila City Government • Barangay officials in coastal areas **Government Agencies:** • Department of Environment and Natural Resources (DENR) • Department of Public Works and Highways (DPWH) • Metropolitan Manila Development Authority (MMDA) • Philippine Ports Authority (PPA) • Maritime Industry Authority (MARINA) • Philippine Coast Guard **Non-Governmental Organizations (NGOs):** • Environmental NGOs focused on marine conservation • Community-based environmental organizations **Private Sector:** • Companies specializing in marine technology and waste management • Private investors and funding agencies **International Organizations:** • United Nations Habitat (UN Habitat) • World Wildlife Fund (WWF) • Asian Development Bank (ADB) • World Bank **Academic Institutions:** • Universities and research institutions with marine science and environmental programs **Community Organizations:** • Fishermen's associations • Coastal community groups

	Technology Providers: • Suppliers of barriers, booms, skimmers, and autonomous drones **Regulatory Bodies:** • Environmental and maritime regulatory authorities **Media:** • Local and national media for awareness and dissemination of project progress
Cost Estimate	**Total:** $1,740,000 - $3,500,000 **Assessment, Planning and Funding (8A-8E):** $140k-200k **Procurement and Installation (8F):** $1.5m-$3m depending on the scale and type of marine capture systems proposed during the assessment phase. Assumed low range to be five basic boom systems installed on esteros, high range options include consideration for bubble barriers and other high-tech solutions on the Pasig. **Training and Monitoring (8G-8H)**: $100k - 300k

7.11. Annex J - Recommendation #9 - Conduct a Pilot Study on Barangay Clustering in Manila City for the Establishment of Additional MRF

Description	
Assumption	Current policies do not include clustering of MRFs (i.e., each barangay must have its own MRF – RA 9003). There are only 10 operational barangay MRF out of 896 barangays in the city. The city has 1 centralized MRF. Since Manila City has limited open areas for the installation of MRF, it has fallen short in its compliance.
Objective	To assess the feasibility and effectiveness of establishing additional MRFs through barangay clustering in Manila City, given the limitations in space and resources. Manila City is divided into 6 districts comprising 896 barangays. There are 10 operational MRFs in only 4 districts of Manila City. By law, each barangay should have its own MRF, however, due to limited space and resources, the barangays cannot build their own MRF. One option is to cluster those barangays without an MRF and build an MRF in these clustered barangays as a Pilot Study.
Solutions Proposed	9A. Assessment and Selection of the Pilot area To ensure the pilot study is feasible and effective, it's important to select the most suitable barangays for clustering. This involves identifying barangays with common characteristics that facilitate efficient waste management operations. 9B. Resource Allocation and Planning Proper planning and allocation of resources are essential to the successful implementation and sustainability of the MRF. 9C. Securing Approval from the City Mayor Securing the necessary approvals ensures that the project has the legal and administrative backing required for successful implementation. 9D. Design and Construction of MRF The MRF should meet the DENR specification and requirements as well as the specific needs of clustered barangays, ensuring operational efficiency. 9E. Community Engagement and Training Successful operation and sustainability of the MRF depends also on community commitment and involvement with proper training. 9F. Monitoring and Evaluation Continuous monitoring and evaluation to assess the pilot study's effectiveness, identify challenges, and make necessary adjustments will provide inputs in scaling up the program. Demonstrate cost-effective waste management solutions through barangay clustering.
Expected Outcomes	**Improved Waste Management:** Enhanced waste segregation, collection, and recycling in pilot clustered barangays. ● Assessment of the segregation, collection, and recycling efficiency per barangay in the 1st year ● 10% efficiency improvement from baseline

	● 40% efficiency improvement from baseline **Regulatory Compliance:** Achieve compliance with waste management regulations by establishing MRF in clustered barangays. ● Conduct feasibility study on clustering (identify clustered MRF locations, preliminary engineering design) in the 1st year ● Preparation of detailed engineering design in the 2nd year ● Construction, installation, and handover of clustered MRF in the 3rd year ● Sustained MRF functionality in succeeding years
Strategic Activities to implement > 25 months	9A. Assessment and Selection of Pilot Areas (6 months): ● Prepare an **inventory** of those barangays with and without MRF. ● **Develop Selection Criteria:** Establish criteria for selecting pilot clustered barangays, focusing on population density, waste generation volume, geographical proximity, and community readiness. ● **Data Collection and Analysis:** Gather and analyze data from all 896 barangays to identify an optimal cluster for the pilot study. Available space in each barangay in terms of area, land ownership and generated waste are important. ● **Stakeholder Consultation:** Conduct consultations with barangay officials and community representatives to validate data and select pilot areas. Ensure that women and vulnerable groups are engaged and consulted. 9B. Resource Allocation and Planning (6 months): ● **Budget Planning:** Create a detailed budget covering the construction, equipment, operation, and maintenance of the MRF. ● **Resource Mapping:** Identify and allocate necessary resources, including funding sources, construction materials, and human resources. ● **Project Planning:** Develop a comprehensive project plan outlining timelines, milestones, and risk management strategies. 9C. Securing Approval from the City Mayor (2 months): ● Present the project proposal to the City Council for endorsement and **approval of the Mayor**. 9D. Design and Construction of MRF (12 months): ● **Design Development:** Collaborate with urban planners and architects to design an MRF tailored to the needs to serve clusters of barangays. ● **Procurement Process:** Conduct a transparent bidding process to select qualified construction firms for the MRF project. ● **Construction Monitoring:** Oversee the construction process to ensure adherence to design specifications, budget, and timelines. 9E. Community Engagement and Training (3 months): ● **Awareness Campaigns:** Implement information sessions and distribute educational materials to inform residents about the benefits and operations of MRF. Identify appropriate channels to reach under-represented groups. ● **Training Programs:** Develop and conduct training sessions for local waste management personnel and volunteers on MRF operations, maintenance, and safety protocols. ● **Feedback Mechanisms:** Establish channels for community feedback to address concerns and improve MRF operations. 9F. Monitoring and Evaluation (ongoing): ● **Performance Monitoring:** Set up monitoring systems to track key performance metrics such as waste processed, recycling rates, and operational efficiency. ● **Periodic Evaluations:** Conduct regular evaluations to assess the pilot study's effectiveness, identify challenges, and document best practices. ● **Reporting:** Prepare and disseminate comprehensive reports to stakeholders, detailing the pilot study's outcomes, lessons learned, and recommendations for scaling up the initiative.
Stakeholders to be Involved	● **Government Agencies:** ○ Department of Environment and Natural Resources (DENR) ○ Metropolitan Manila Development Authority (MMDA) ○ The Department of the Interior and Local Government (DILG)

	• **Manila City Local Government Unit (LGU):** Oversee project planning and implementation, provide funding, and ensure regulatory compliance. • **Barangay Officials:** Facilitate local engagement, provide data, and support MRF operations. • **Urban Planning and Construction Firms:** Design and construct the MRFs. • **Local Community Representatives:** Offer insights, support community engagement, and provide feedback. • **Environmental NGOs:** Assist with community education and advocacy for sustainable waste management practices. • **Waste Management Experts:** Provide technical expertise and training for MRF operations.
Cost Estimate	**Total:** $2,970,000 - $4,200,000 **Assessment and Planning (9A-9C):** $70-100k **Design and Construction (9D):** $2.8m-$4m depending on MRF size and scale as well as land purchasing options to be determined in the assessment and planning stage. **Training and Monitoring (9E-9F)**: $100k

7.12. Annex K - Logframe of Recommendations

RECOMMENDATION 1. CAPTURING AND MONITORING DATA FOR BETTER PLASTIC WASTE MANAGEMENT					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
	Existence of a centralized repository, Percentage of population per barangay subscribed to CDMS	No centralized repository, 0%	Repository established by end of Year 1, 50% by end of Year 1, 80% by end of Year 2, 100% by end of Year 3	Project reports, system logs, Subscription records, surveys	Timely funding and resource allocation, Effective community engagement, sustained interest
Outcome 2 Improved Plastic Waste Management Strategies: Data-driven strategies based on reliable and timely data.	Percentage of plastic waste recovery	Baseline to be established	40% by end of 2024, 50% by end of 2025, 60% by end of 2026	Waste management reports, recovery data	Accurate and timely data availability, effective strategy implementation
Outcome 3 Enhanced Monitoring and Reporting Capabilities: Real-time monitoring and comprehensive reporting on plastic waste management.	Percentage of overdue submissions	100%	40% by end of Year 1, 20% by end of Year 2, 0% by end of Year 3	Monitoring system logs, submission records	System reliability, timely data input
Output 1.1 Establish a Centralized Data Management System (CDMS)					
Activity 1.1.1 Review and assess existing DMS and collect requirements	Number of reviews and assessments conducted	No review conducted	within 3 months	Review reports and requirement documents	Stakeholder cooperation
Activity 1.1.2 Assessment of Plastic Waste data to be collected	Assessment report completed	No assessment conducted	within 3 months	Assessment documentation	Access to relevant data

Activity 1.1.3 Technology Selection: Identify and select the appropriate technology for the data management system based on scalability, security, ease of use, integration capabilities, and cost. Present to the management the selected platform for their approval.	Selection and approval of appropriate technology	No technology selected	Within 6 months	Technology assessment reports, approval documents	Available technologies meet all requirements; budget constraints
	GIS layers created	0	End: GIS integrated with data system	GIS Reports, System Documentation	Accurate GIS data
	Imagery acquired and processed	None	End: Imagery integrated with GIS	Imagery Acquisition Reports	Imagery availability
Activity 1.1.4 Infrastructure Setup and development of implementation plan: Install and configure the necessary hardware and software. Develop a detailed implementation plan, including timelines, milestones, and resource allocation.	Percentage of infrastructure setup completed; Comprehensive implementation plan developed	0%	6 months	System development reports, user testing results	Adequate funding and technical expertise available; potential delays in technology procurement
Activity 1.1.5 Protocol Development: Establish data entry, storage, and retrieval protocols.	Number of data points identified and assessed	0	2 months	Assessment reports, data inventory documents	Availability of accurate historical data; cooperation from stakeholders
Activity 1.1.6 System Integration: Integrate data sources and ensure seamless data flow into the system.	Percentage of infrastructure setup completed; Comprehensive implementation plan developed	0% setup; No plan	simultaneous with 1.1.4	Setup progress reports, implementation plan document	No major technical issues; all necessary resources available
Output 1.2 Develop User Manual for the CDMS					
Activity 1.2.1 Develop User Manual (UM) for the CDMS	Completion of comprehensive user manual Beta testing completed	No manual	within 6 months	User manual document, user feedback	Changes in system functionality may require manual updates

Output 1.3 Feedback Presentation to Relevant Manila City Offices and other Stakeholders					
Activity 1.3.1 Presentation to Manila City Concerned Offices for Feedback	presentation materials developed; Number of presentations given; Amount of feedback received	0 presentations; No feedback	2 months	Presentation materials, feedback reports	Stakeholder availability; potential for conflicting feedback
Output 1.4 Finalize CDMS and User Manual and submit to the City Council for Mayor's Approval and Adoption					
Activity 1.4.1 Finalize CDMS and User Manual and submit to the City Council for Mayor's Approval and Adoption	CDMS and Manual finalized	No User Manual	Within 6 months End: Approval obtained	Submission Reports	Approval process compliance
Output 1.5 Personnel Training on the New CDMS					
Activity 1.5.1 Training Program Development: Develop training materials and curriculum for administrator, data analyst, and user.	Number of training modules developed	0 modules	50% of modules developed by 2 months, 100% by end of 3 months	Training materials, curriculum documents	Training needs may evolve as system development progresses
Activity 1.5.2 Conduct Training Sessions: Organize and execute training workshops for personnel including data reporting using mobile apps that can collect and analyze data on generation, collection, and recovery. 3 mo.	Number of personnel trained	0 personnel trained	50% of target personnel trained by end of 2 months, 100% by end of 3 months	Training attendance records, post-training assessments	Staff availability for training; varying levels of technical proficiency
Output 1.6 IEC for Public Awareness					
Activity 1.6.1 Campaign Planning: Develop campaign strategy and materials.	Completion of campaign strategy and materials	No strategy or materials	Strategy 2 months, materials created by end of 6 months	Campaign strategy document, sample materials	Budget for material production; alignment with overall project goals

Activity 1.6.2 Implementation: Launch and execute the IEC campaign for users through various channels.	Number of IEC activities conducted; Reach of campaign	0 activities; 0 reach	Ongoing implementation with increasing reach throughout project	Campaign reports, engagement metrics	Public receptiveness to campaign; potential need for strategy adjustment
	IEC campaign implemented	No campaign implemented	Ongoing: Public awareness increased	Campaign Reports	Public engagement
Output 1.7 Monitoring and Evaluation on the Use of the Program					
Activity 1.7.1 Establish Monitoring Framework: Define KPIs and monitoring protocols.	Number of KPIs defined; Monitoring protocols established	0 KPIs; No protocols	Framework established by end of 2 months, refined by end of 4 months	Monitoring framework document, KPI list	KPIs accurately reflect project success; data availability for monitoring
Activity 1.7.2 Regular Audits and Feedback Collection: Conduct periodic audits and gather user feedback to assess system performance and impact.	Frequency of audits; Amount of user feedback collected	No audits; No feedback	Quarterly audits; Continuous feedback collection	Audit reports, feedback analysis documents	User willingness to provide feedback; resources for regular audits

RECOMMENDATION 2. STREAMLINING AND HARMONIZING ORDINANCES					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1 Consistent Regulatory Framework: Establishment of a unified regulatory framework that is consistent across all platforms.	Existence of a unified regulatory framework	No unified framework	Draft formulated code by end of Year 1; Approval by City Council by end of Year 2; Adoption by end of Year 3	Draft documents, City Council records	City Council approval process; stakeholder engagement
Outcome 2 Defined Roles and Responsibilities: Local authorities have a better grasp of the ordinances leading to more effective implementation.	Percentage of barangays enforcing the code	0%	80% enforcement by end of Year 1; 100% by end of Year 2; Sustained enforcement by new officials by end of Year 2	Barangay reports, enforcement records	Effective training and engagement
Outcome 3 Enhanced Compliance: A harmonized framework leads to better regulatory compliance across the city.	Baseline compliance to the code	To be established	20% increase by end of Year 1; 100% compliance by end of Year 2	Compliance reports, audit results	Accurate baseline data; continuous monitoring
Output 2.1 Identify inconsistencies					
Activity 2.1.1 Assemble a team of legal experts, policy analysts, and enforcement officers.	Team assembled	No team	Team assembled in 1 month	Team composition documents	Availability of experts
Activity 2.1.2 Conduct a comprehensive review of existing ordinances.	Review completed	No review	Review completed in 2 months	Review reports	Cooperation from all departments

Activity 2.1.3 Identify and document inconsistencies and gaps.	Inconsistencies and gaps documented	No documentation	Documentation completed in 1 month	Documentation records	Accurate identification of gaps
Output 2.2 Develop Harmonization Framework					
Activity 2.2.1 Formulate a detailed harmonization strategy.	Strategy formulated	No strategy	Strategy formulated in 1 month	Strategy documents	Adoption of best practices
Activity 2.2.2 Draft the framework and circulate it for feedback.	Feedback collected	No draft	Feedback collected in 1 month	Feedback reports	Active participation from stakeholders
Activity 2.2.3 Finalize the framework after incorporating feedback.	Final framework	No final framework	Framework finalized in 1 month	Final framework documents	Comprehensive feedback integration
Output 2.3 Develop Harmonized Policies and Standards					
Activity 2.3.1 Draft harmonized policies and standards.	Draft policies and standards	No drafts	Draft completed in 2 months	Draft documents	Alignment with best practices
Activity 2.3.2 Present to the Manila City Council for discussions.	Presentation completed	No presentations	Presentation completed in 1 month	Presentation records	Council's availability
Activity 2.3.3 Solicit and incorporate feedback.	Feedback incorporated	No feedback	Feedback incorporated in 1 month	Feedback reports	Active stakeholder participation
Output 2.4 Training Programs					
Activity 2.4.1 Design training modules tailored to the needs of local authorities.	Training modules developed	No modules	Modules developed in 3 months	Training materials	Accurate identification of training needs
Activity 2.4.2 Conduct training sessions and workshops.	Number of participants trained	0 participants	Training sessions completed in 3 months	Attendance records, post-training assessments	Participant availability

Activity 2.4.3 Evaluate the effectiveness of the training on a regular basis and make necessary adjustments.	Evaluation reports, adjustments made	No evaluations	Regular evaluations conducted, adjustments made as needed	Evaluation reports, feedback documents	Continuous feedback collection, willingness to adjust
Output 2.5 IEC Campaign					
Activity 2.5.1 Develop informational materials about the new ordinances.	Materials developed	No materials	Materials developed in 2 months	IEC materials	Effective communication strategy
Activity 2.5.2 Launch the campaign through various media channels.	Campaign launched	No campaign	Campaign launched in 4 months	Media reports, public feedback	Broad media reach
Activity 2.5.3 Conduct public consultations on a regular basis to address current and emerging concerns.	Number of public consultations conducted; feedback collected	0 consultations; no feedback	Regular consultations conducted; feedback addressed promptly	Consultation reports; feedback analysis documents	Public willingness to participate; resources for organizing consultations
Output 2.6 Continuous Monitoring					
Activity 2.6.1 Set up systems to track compliance and effectiveness.	Monitoring system established	No system	System established in 2 months	Monitoring system reports	Availability of resources
Activity 2.6.2 Conduct regular audits and reviews.	Frequency of audits	No audits	Quarterly audits conducted	Audit reports	Resources for regular audits
Activity 2.6.3 Make necessary adjustments based on monitoring results.	Number of adjustments made; effectiveness of adjustments	No adjustments made	Adjustments made as needed based on monitoring results	Monitoring reports; adjustment implementation records	Timely identification of issues; availability of resources for adjustments

RECOMMENDATION 3. ESTABLISHMENT OF CITY ENVIRONMENT AND NATURAL RESOURCES OFFICE (CENRO) UNDER A NEWLY FORMED DEPARTMENT OF MANILA CITY					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1 Clear and Appropriate Policies and Guidelines: 100% roll-out of the CENRO's mandate including the enforcement of the unified code.	Percentage roll-out of CENRO's mandate	0%	100% by end of Year 1; Set performance targets in the 2nd year; Institutionalization of Monitoring and Evaluation (M&E) system in the 3rd year	Roll-out reports, enforcement records	City Council approval, effective communication
Outcome 2 Enhanced Organizational Capacity and Staff Competency: Improved competency of CENRO staff.	Percentage of CENRO personnel trained	0%	80% by end of Year 1; 100% by end of Year 2; 100% of newly deputized by end of Year 3	Training attendance records, competency assessments	Availability of training resources, staff participation
Outcome 3 Strong Stakeholder Collaboration: Engagement of PROs, OEs, and POs in Manila.	Percentage of PROs, OEs, and POs engaged	0%	Inventory in Year 1; 20% engaged by Year 2; 50% engaged by Year 3	Stakeholder engagement reports, collaboration records	Stakeholder willingness, effective outreach
Outcome 4 Efficient and Effective Plastic Waste Management: Improved plastic waste recovery rates.	Percentage of plastic waste recovered	Baseline to be established	40% by end of 2024; 50% by end of 2025; 60% by end of 2026	Waste management reports, recovery data	Accurate data collection, effective recovery strategies
Output 3.1 Create the CENRO					
Activity 3.1.1 Conduct an organizational study of CENRO	Organizational study completed	No study	Study completed in 2 months	Study reports	Cooperation from departments, availability of data

and change title from DPS to CENRO.					
Activity 3.1.2 Prepare staff positions, classification, and qualifications standards for approval by DBM.	Staff positions and standards prepared	No positions/standards	Standards prepared in 4 months	Documentation of positions and standards	Approval by DBM, adequate budget allocation
Output 3.2 Develop Operational Guidelines and Policies (4 months)					
Activity 3.2.1 Policy Formulation: Develop guidelines and policies in collaboration with experts.	Policies developed	No policies	Policies developed in 2 months	Policy documents	Effective collaboration with experts
Activity 3.2.2 Stakeholder Review: Review and refine policies based on stakeholder feedback.	Feedback incorporated	No feedback	Feedback incorporated in 2 months	Review reports, feedback documents	Active stakeholder participation
Output 3.3 Submit the Plan to the Council					
Activity 3.3.1 Preparation of Submission: Compile the plan with detailed budget and resource requirements.	Plan prepared	No plan	Plan prepared in 2 months	Plan documents, budget reports	Accurate budgeting, detailed resource requirements
Activity 3.3.2 Council Review and Feedback: Present the plan to the Council and incorporate feedback.	Plan reviewed and feedback incorporated	No review	Review and incorporation completed in 2 months	Council meeting minutes, feedback reports	Council's availability, constructive feedback
Output 3.4 Mayor's Approval					
Activity 3.4.1 Submission for Approval: Submit the plan to the Mayor's office.	Plan submitted	No submission	Plan submitted in 1 month	Submission records	Acceptance by Mayor's office
Activity 3.4.2 Approval and Issuance of Order: Obtain formal	Approval obtained	No approval	Approval obtained in 1 month	Approval documents, issued order	Mayor's office approval

approval and issuance of an Executive or Department Order.					
Output 3.5 Hiring of Personnel					
Activity 3.5.1 Development of TOR for personnel.	TOR developed	No TOR	TOR developed in 1 month	TOR documents	Accurate role definition, availability of funds
Activity 3.5.2 Advertisement and hiring of personnel.	Number of personnel hired	0 personnel	Personnel hired in 5 months	Hiring records, employment contracts	Effective recruitment process
Output 3.6 Capacity Building and Training					
Activity 3.6.1 Training Program Development: Create training materials and curriculum.	Training materials developed	No materials	Materials developed in 2 months	Training documents	Availability of training resources
Activity 3.6.2 Training Implementation: Conduct training sessions for department staff and stakeholders.	Number of training sessions conducted	0 sessions	Training conducted in 4 months	Training attendance records, feedback reports	Staff availability, effective training
Output 3.7 Stakeholder Engagement and Collaboration					
Activity 3.7.1 Initial Stakeholder Meetings: Organize meetings to gather input and foster collaboration.	Number of meetings held	No meetings	Initial meetings held in 2 months	Meeting minutes, attendance records	Stakeholder willingness to participate
Activity 3.7.2 Ongoing Engagement: Regular consultations and workshops to maintain stakeholder involvement.	Number of consultations/workshops	No consultations	Ongoing consultations and workshops	Engagement records, feedback reports	Continuous stakeholder interest
Output 3.8 Monitoring and Evaluation					

Activity 3.8.1 Framework Development: Establish KPIs and monitoring protocols.	Framework established	No framework	Framework established in 2 months	Monitoring framework documents	Accurate KPI definition, effective protocols
Activity 3.8.2 Regular Audits and Reporting: Conduct audits and compile progress reports.	Number of audits conducted, reports compiled	No audits/reports	Quarterly audits and reports	Audit reports, progress documents	Availability of audit resources

RECOMMENDATION 4: DEVELOPING AWARENESS ENGAGEMENT AND BEHAVIOURAL CHANGE					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1 Increased Public Awareness: Number of people (women/men/youth) reached by awareness raising campaigns.	Percentage of residents aware and practicing	Baseline to be established	50% by Year 1; 70% by Year 2; 80% by Year 3; 100% by Year 4	Campaign reports, surveys	Effective campaign implementation, public receptiveness
Outcome 2 Enhanced Community Engagement: Active participation of residents in waste management and plastic reduction initiatives.	Percentage of residents participating	Baseline to be established	50% by Year 1; 70% by Year 2; 80% by Year 3; 100% by Year 4	Participation records, engagement reports	Effective community engagement, sustained interest
Outcome 3 Improved Waste Management Infrastructure: Better waste management through provision of bins and efficient collection systems.	Percentage of hard-to-reach areas with bins and regular collection	Baseline to be established	60% by Year 1; 80% by Year 2; 100% by Year 3	Waste collection reports, infrastructure audits	Adequate funding, effective implementation
Outcome 4 Sustainable Practices in Businesses: Integration of plastic reduction education and practices in businesses.	Percentage of businesses with MOAs on waste reduction	Baseline to be established	50% by Year 1; 80% by Year 2; 100% by Year 3	MOA records, business reports	Business participation, effective policy implementation
Output 4.1 Public Awareness Campaigns					
Activity 4.1.1 Develop multimedia campaigns (TV, radio, social media).	Number of campaigns developed	No campaigns	Campaigns developed in 2 months	Campaign materials, media reports	Effective media strategy
Activity 4.1.2 Organize community workshops and seminars.	Number of workshops/seminars held	No workshops/seminars	Workshops/seminars held in 2 months	Attendance records, feedback forms	Community interest and participation

Activity 4.1.3 Distribute educational materials in public spaces, schools, and businesses.	Number of materials distributed	No materials	Materials distributed in 2 months	Distribution records, feedback	Effective distribution channels
Output 4.2 Community Engagement Initiatives					
Activity 4.2.1 Launch neighborhood clean-up drives and plastic collection events.	Number of clean-up drives/events held	No drives/events	Drives/events held in 4 months	Event reports, participation records	Community participation
Activity 4.2.2 Establish local recycling and composting programs.	Number of programs established	No programs	Programs established in 4 months	Program reports, participation records	Effective program implementation
Activity 4.2.3 Create community-led monitoring and reporting systems.	Monitoring and reporting systems created	No systems	Systems created in 4 months	System documentation, monitoring reports	Community willingness to participate
Activity 4.2.4 Create community champions to increase outreach to different population segments (youth, elderly, women, people with disabilities, etc.) and raise awareness on plastic reduction and recycling.	Number of community champions created; outreach activities conducted	No community champions	Community champions created and outreach activities conducted within 4 months	Outreach reports, participation records	Community willingness to participate; effective selection and training of champions
Output 4.3 Provision of Technology and Infrastructure					
Activity 4.3.1 Install differentiated bins and trash cans in public spaces.	Number of bins installed	No bins	Bins installed in 2 months	Installation reports, bin inventory	Adequate funding and resources
Activity 4.3.2 Implement a collection system for these bins.	Collection system implemented	No system	System implemented in 2 months	Collection reports, system logs	Effective collection strategy
Activity 4.3.3 Develop a mobile app for reporting overflowing bins and scheduling pickups.	Mobile app developed and launched	No app	App developed and launched in 4 months	App usage logs, user feedback	Effective app development and adoption
Output 4.4 Educational Programs in Schools and Businesses					

Activity 4.4.1 Develop curriculum modules on plastic pollution and sustainability.	Curriculum modules developed	No modules	Modules developed in 2 months	Curriculum documents, feedback forms	Effective curriculum design
Activity 4.4.2 Host talks on tackling plastic pollution by young changemakers.	Number of talks hosted	No talks	Talks hosted in 2 months	Event reports, attendance records	Availability of speakers, audience interest
Activity 4.4.3 Conduct training sessions and workshops for businesses.	Number of training sessions/workshops held	No sessions/workshops	Sessions/workshops held in 2 months	Attendance records, feedback forms	Business participation, effective training
Activity 4.4.4 Encourage schools and businesses to adopt plastic reduction policies and practices (refill water stations and differentiated waste bins).	Number of schools and businesses adopting policies	No policies adopted	Policies adopted in 6 months	Adoption reports, feedback forms	Willingness of schools and businesses to participate; availability of resources

RECOMMENDATION 5: FORMALISATION AND INSTITUTIONALISATION OF INFORMAL GROUPS IN MANILA CITY					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1 Organized Groups with Legal Recognition: Increase in female/vulnerable groups participation.	Percentage of informal groups formalized	Baseline data collected in Year 1	50% formalized by Year 2; 80% by Year 3; 100% by Year 4	Legal registration records, group reports	Willingness of informal groups to formalize; effective support mechanisms
Outcome 2 Enhanced Skills: Training and upskilling of informal group members.	Percentage of members trained and upskilled	Baseline data collected in Year 1	50% trained by Year 2; 80% by Year 3; 100% by Year 4	Training attendance records, competency assessments	Availability of training resources; member participation
Output 5.1 Profiling of Informal Waste Management Groups					
Activity 5.1.1 Conduct a comprehensive survey and mapping of informal groups.	Number of groups surveyed and mapped	No survey/mapping conducted	Survey and mapping completed in 2 months	Survey reports, mapping documents	Cooperation from informal groups
Activity 5.1.2 Evaluate current operations, challenges, and potential for formalization.	Evaluation reports	No evaluation conducted	Evaluation completed in 2 months	Evaluation reports	Accurate data collection, effective analysis
Activity 5.1.3 Identify potential leaders ensuring at least 30% female representation.	Percentage of female leaders identified	No leaders identified	Leaders identified in 2 months	Leadership identification reports	Willingness of members to take on leadership roles
Output 5.2 Organizing Informal Groups					
Activity 5.2.1 Identify appropriate ways to organize informal groups and suitable structures or organizations	Organization strategies	No groups organized	Ways to organize are identified	Organization reports, group records	Member participation and cooperation
Activity 5.2.1 Organize informal groups.	Number of groups organized	No groups organized	Groups organized in 3 months	Organization reports, group records	Member participation and cooperation

Activity 5.2.2 Formulate, ratify, and adopt Constitution and By-laws.	Number of groups with adopted Constitution and By-laws	No Constitution and By-laws	Constitution and By-laws adopted in 3 months	Ratification documents, group records	Effective formulation and ratification process
Activity 5.2.3 Identify and agree on roles and responsibilities of leaders and members.	Roles and responsibilities agreed upon	No agreed roles/responsibilities	Agreement reached in 3 months	Role and responsibility documents	Clear communication and member consensus
Activity 5.2.4 Select leaders/officers ensuring sufficient female representation.	Percentage of female leaders selected	No leaders selected	Leaders selected in 3 months	Selection reports, group records	Fair selection process, member cooperation
Output 5.3 Capacity Building and Training					
Activity 5.3.1 Develop and implement training programs on organizational management, financial literacy, health and safety, and waste management best practices.	Number of training programs developed and implemented	No training programs	Training programs developed and implemented in 3 months	Training materials, attendance records	Availability of training resources, member participation
Activity 5.3.2 Provide resources and support for capacity building.	Resources and support provided	No resources/support provided	Resources and support provided in 3 months	Resource allocation records, support reports	Adequate funding and resources
Activity 5.3.3 Provide personal protective equipment fit to women's needs.	Number of PPEs provided	No PPEs provided	PPEs provided in 3 months	Distribution records, feedback forms	Availability of appropriate PPEs
Output 5.4 Legal Registration and Support					
Activity 5.4.1 Assist informal groups in the process of legal registration.	Number of groups legally registered	No groups registered	Groups registered in 4 months	Registration documents, legal support records	Effective legal support, cooperation from groups
Activity 5.4.2 Provide ongoing support and guidance to navigate legal and bureaucratic processes.	Ongoing support provided	No ongoing support	Support provided in 4 months	Support reports, feedback forms	Continuous availability of support resources
Activity 5.4.3 Provide assistance to access health insurance and other social benefits.	Ongoing support provided	No ongoing support	Support provided in 4 months	Support reports, feedback forms	Continuous availability of support resources
Output 5.5 Establish Partnerships with the LGU Manila					
Activity 5.5.1 Develop formal agreements and partnerships between LGU and formalized groups.	Number of formal agreements/partnerships developed	No agreements/partnerships	Formal agreements and partnerships developed in 3 months	Agreement documents, partnership reports	LGU's willingness to collaborate; effective communication

Activity 5.5.2 Create joint action plans for waste management and assess plan implementation.	Number of joint action plans created	No joint action plans	Joint action plans created in 3 months	Action plan documents, assessment reports	Effective coordination; timely implementation
Activity 5.5.3 Organization of regular coordination meetings.	Number of coordination meetings held	No coordination meetings	Coordination meetings held within 3 months	Meeting minutes, attendance records	Consistent participation; productive discussions
Output 5.6 Develop Sustainable Funding Mechanisms					
Activity 5.6.1 Identify potential funding sources and secure commitments.	Number of funding sources identified and commitments secured	No funding sources	Funding sources identified and commitments secured in 4 months	Funding agreements, commitment letters	Availability of funding sources; successful negotiations
Activity 5.6.2 Establish financial management systems and training for group leaders.	Number of financial management systems established and leaders trained	No financial management systems	Financial management systems established, and leaders trained in 4 months	Financial system records, training attendance	Availability of financial experts; effective training
Output 5.7 Integrate into City's Waste Management System					
Activity 5.7.1 Update the city's waste management plans to include formalized groups.	Updated waste management plans	Current plans do not include formalized groups	Updated plans in 5 months	Updated plan documents, city records	Cooperation from city officials; effective integration
Activity 5.7.2 Develop coordination mechanisms for regular collaboration and communication.	Number of coordination mechanisms developed	No coordination mechanisms	Coordination mechanisms developed in 5 months	Mechanism documents, communication logs	Consistent communication; effective collaboration
Output 5.8 Establish and institutionalize partnerships with other formal institutions both public and private					
Activity 5.8.1 Develop partnerships with both public and private institutions to support and enhance waste management efforts.	Number of partnerships developed	No partnerships	Partnerships developed in 6 months	Partnership agreements, collaboration reports	Willingness of institutions to partner; mutual benefits identified

RECOMMENDATION 6: ESTABLISHMENT OF A DEDICATED WASTE SORTING AND TRANSFER STATION FOR MANILA-WIDE PLASTIC WASTE SORTING, RECYCLING AND RECOVERY					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1 Improved Waste Management Efficiency: Streamlined sorting and processing of plastic waste, reducing transportation costs and improving recycling rates.	Waste management efficiency	No baseline established	10% efficiency improvement by Year 2; 40% by Year 3; 100% sustained	Efficiency assessment reports	Effective implementation and monitoring
Outcome 2 Environmental Benefits and Enhanced Sustainability: Reduced landfill usage and decreased pollution contributing to a cleaner environment. Promotion of sustainable waste management practices and support for the circular economy.	Percentage of waste diverted	No baseline established	40% waste diverted by Year 1; 50% by Year 2; 60% by Year 3; 100% sustained	Waste diversion reports, environmental assessments	Effective waste management practices
Outcome 3 Economic Opportunities: Job creation and revenue generation from the sorting and processing of recyclable materials.	Job creation and revenue generation	No baseline established	10% increase in jobs and revenue by Year 2; 20% by Year 3; 30% by Year 4	Employment records, revenue reports	Economic stability, effective business model
Output 6.1 Conduct Feasibility Study and Site Selection					
Activity 6.1.1 Needs Assessment: Conduct a needs assessment to determine the volume and time of plastic waste	Assessment completed, volume and timing data collected	No assessment conducted	Assessment completed in 3 months	Needs assessment report, data analysis documents	Accurate data collection, cooperation from stakeholders

Activity 6.1.2 Site Identification: Identify potential sites for the transfer station, considering factors such as accessibility,	Number of potential sites identified and evaluated	No sites identified	Potential sites identified and evaluated in 3 months	Site identification report, evaluation documents	Availability of suitable sites, adherence to regulations
Activity 6.1.3 Feasibility Analysis: Perform a detailed feasibility study, including cost-benefit analysis, environmental impact assessment, and risk analysis.	Feasibility study completed, including cost-benefit analysis, environmental impact assessment, and risk analysis	No feasibility study conducted	Feasibility study completed in 3 months	Feasibility study report, analysis documents	Accurate data collection, comprehensive analysis
Output 6.2 Design and Planning					
Activity 6.2.1 Facility Design: Develop inclusive architectural and engineering designs for the transfer station.	Design documents completed	No designs available	Designs completed in 6 months	Architectural plans, design documents	Effective design process, stakeholder input
Activity 6.2.2 Technology Selection: Choose appropriate sorting and processing technologies.	Technology selected	No technology selected	Technology selected in 3 months	Technology assessment reports	Availability of suitable technologies
Activity 6.2.3 Operational Plan: Create an operational plan detailing workflow processes, staffing requirements, maintenance schedules, and safety protocols.	Operational plan completed	No operational plan	Plan completed in 3 months	Operational plan documents	Comprehensive planning, stakeholder involvement
Output 6.3 Secure Funding and Approvals					
Activity 6.3.1 Funding Proposals: Prepare and submit funding proposals to secure financial support.	Funding proposals submitted	No proposals submitted	Proposals submitted in 3 months	Proposal documents, funding agreements	Availability of funding sources, effective proposal writing

Activity 6.3.2 Regulatory Approvals: Obtain necessary permits and approvals from relevant authorities.	Permits and approvals secured	No permits/approvals secured	Permits and approvals secured in 3 months	Permit documents, approval records	Timely processing by authorities
Activity 6.3.3 Public Consultations: Engage with the community and stakeholders through public consultations.	Number of public consultations held	No consultations held	Consultations held in 3 months	Consultation records, stakeholder feedback	Community support, effective communication
Output 6.4 Construction and Installation					
Activity 6.4.1 Contracting: Select and contract reputable construction firms and equipment suppliers through a competitive bidding process.	Contracts awarded	No contracts awarded	Contracts awarded in 3 months	Contract documents, bidding records	Competitive bidding process, availability of contractors
Activity 6.4.2 Construction Management: Oversee the construction process, ensuring it adheres to design specifications, timelines, and safety standards following inclusive infrastructure principles.	Construction progress and completion	No construction started	Construction completed in 12 months	Construction reports, site inspection records	Effective project management, adherence to timelines
Activity 6.4.3 Equipment Installation: Install and test sorting and processing equipment, ensuring proper functionality and integration.	Equipment installed and tested	No equipment installed	Equipment installed and tested in 3 months	Installation reports, testing documents	Availability of equipment, proper installation
Output 6.5 Staff Recruitment and Training					
Activity 6.5.1 Recruitment: Hire management, technical, and operational staff.	Number of staff hired	No staff hired	Staff hired in 3 months	Employment records, recruitment reports	Availability of qualified candidates

Activity 6.5.2 Training Programs: Develop and implement training programs covering equipment operation, safety procedures, quality control, and environmental regulations.	Number of training programs implemented	No training programs	Training programs implemented in 3 months	Training attendance records, competency assessments	Availability of trainers, staff participation
Output 6.6 Operational Launch and Monitoring					
Activity 6.6.1 Operational Testing: Conduct initial operational tests to ensure all systems and processes function correctly.	Successful operational tests	No operational tests conducted	Tests completed in 1 month	Testing reports, operational logs	Identification and resolution of issues
Activity 6.6.2 Launch Operations: Begin full-scale operations, managing and processing plastic waste prior disposal	Full-scale operations launched	No operations launched	Operations launched in 2 months	Operational reports, waste processing data	Effective implementation, continuous monitoring
Activity 6.6.3 Performance Monitoring: Implement monitoring systems to track performance metrics, identify issues, and ensure continuous improvement.	Monitoring systems implemented; performance metrics tracked	No monitoring systems	Monitoring systems implemented in 1 month	Monitoring reports, performance data	Accurate data collection, effective monitoring

RECOMMENDATION 7: ASSESSMENT OF THE ADEQUACY, EFFICIENCY AND EFFECTIVENESS OF THE CITY'S MRF AND DEVELOPING A BUDGETARY AND IMPLEMENTATION PLAN					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1 Enhanced Waste Sorting and Recycling: Improved capabilities to sort and recycle waste, reducing landfill usage and promoting sustainability.	Sorting and recycling efficiency	No baseline established	10% efficiency improvement by Year 2; 40% by Year 3; 100% sustained	Efficiency assessment reports	Effective implementation and monitoring
Outcome 2 Economic Benefits: Job creation and revenue generation from the recycling of valuable materials.	Job creation and revenue generation	No baseline established	10% increase in jobs and revenue by Year 2; 20% by Year 3; 30% by Year 4	Employment records, revenue reports	Economic stability, effective business model
Outcome 3 Environmental Impact: Reduced pollution, waste ending up in disposal sites, and environmental degradation through better waste management practices.	Percentage of waste diverted	No baseline established	40% waste diverted by Year 1; 50% by Year 2; 60% by Year 3; 100% sustained	Waste diversion reports, environmental assessments	Effective waste management practices
Output 7.1 Assessment of Current City's MRF					
Activity 7.1.1 Conduct MRF assessment to determine its current coverage, operations, capacity, and available resources and manpower, and other relevant data	Assessment completed	No assessment conducted	Assessment completed in 1 month	Solid waste management plan, MRF layout, monitoring reports	Availability of data for current operation of the MRF and built-in drawings
Output 7.2 Conduct Feasibility Study and Site Selection					

Activity 7.2.1 Conduct a needs assessment to determine the volume and time of plastic waste	Assessment completed, volume and timing data collected	No assessment conducted	Assessment completed in 3 months	Needs assessment report, data analysis documents	Accurate data collection, cooperation from stakeholders
Activity 7.2.2 Identify potential sites for the MRFs, considering factors such as accessibility, proximity to major waste sources, environmental impact, and zoning regulations.	Number of potential sites identified and evaluated	No sites identified	Potential sites identified and evaluated in 4 months	Site identification report, evaluation documents	Availability of suitable sites, adherence to regulations
Activity 7.2.3 Perform a detailed feasibility study, including cost-benefit analysis, environmental impact assessment, and risk analysis.	Feasibility study completed, including cost-benefit analysis, environmental impact assessment, and risk analysis	No feasibility study conducted	Feasibility study completed in 4 months	Feasibility study report, analysis documents	Accurate data collection, comprehensive analysis
Activity 7.2.4 Identify potential donor agencies and engage with them to secure preliminary support.	Number of donor agencies identified and engaged	No donor agencies identified	Donor agencies identified and engaged in 4 months	Engagement reports, funding agreements	Availability of donors, alignment with funding criteria
Activity 7.2.5 Feasibility Study Report: Indicate the findings in the comprehensive feasibility study report. Present the FS report to CENRO Manila City or DPS and other concerned offices for feedback and integration.	Feasibility study report completed and presented; feedback integrated	No feasibility study report presented	Report completed and presented in 2 months; feedback integrated in 1 month	Feasibility study report, meeting minutes, feedback documents	Timely feedback from concerned offices, comprehensive report
Output 7.3. Design and Planning					

Activity 7.3.1 Develop architectural and engineering designs for the MRFs.	Design documents completed	No designs available	Designs completed in 6 months	Architectural plans, design documents	Effective design process, stakeholder input
Activity 7.3.2 Choose appropriate sorting and processing technologies.	Technology selected	No technology selected	Technology selected in 3 months	Technology assessment reports	Availability of suitable technologies
Activity 7.3.3 Create an operational plan detailing workflow processes, staffing requirements, maintenance schedules, and safety protocols.	Operational plan completed	No operational plan	Plan completed in 3 months	Operational plan documents	Comprehensive planning, stakeholder involvement
Activity 7.3.4 Cost Estimation: Develop a detailed cost estimate for the construction and operation of the MRFs.	Detailed cost estimate completed	No cost estimate available	Cost estimate completed in 2 months	Cost estimation report, budget documents	Accurate data collection, comprehensive analysis
Output 7.4 Secure Funding and Approvals					
Activity 7.4.1 Funding Proposals: Prepare and submit funding proposals to secure financial support.	Funding proposals submitted	No proposals submitted	Proposals submitted in 3 months	Proposal documents, funding agreements	Availability of funding sources, effective proposal writing
Activity 7.4.2 Regulatory Approvals: Obtain necessary permits and approvals from relevant authorities.	Permits and approvals secured	No permits/approvals secured	Permits and approvals secured in 3 months	Permit documents, approval records	Timely processing by authorities
Activity 7.4.3 Public Consultations: Engage with the community and stakeholders through public consultations.	Number of public consultations held	No consultations held	Consultations held in 3 months	Consultation records, stakeholder feedback	Community support, effective communication
Output 7.5 Construction and Installation					

Activity 7.5.1 Contracting: Select and contract reputable construction firms and equipment suppliers.	Contracts awarded	No contracts awarded	Contracts awarded in 3 months	Contract documents, bidding records	Competitive bidding process, availability of contractors
Activity 7.5.2 Construction Management: Oversee the construction process.	Construction progress and completion	No construction started	Construction completed within 12 months	Construction reports, site inspection records	Effective project management, adherence to timelines
Activity 7.5.3 Equipment Installation: Install and test sorting and processing equipment.	Equipment installed and tested	No equipment installed	Equipment installed and tested in 3 months	Installation reports, testing documents	Availability of equipment, proper installation
Output 7.6 Staff Recruitment and Training					
Activity 7.6.1 Recruitment: Hire management, technical, and operational staff.	Number of staff hired	No staff hired	Staff hired in 3 months	Employment records, recruitment reports	Availability of qualified candidates
Activity 7.6.2 Training Programs: Develop and implement training programs covering equipment operation, safety procedures, quality control, and environmental regulations.	Number of training programs implemented	No training programs	Training programs implemented in 3 months	Training attendance records, competency assessments	Availability of trainers, staff participation
Output 7.7 Operational Launch and Monitoring					
Activity 7.7.1 Operational Testing: Conduct initial operational tests to ensure all systems and processes function correctly.	Successful operational tests	No operational tests conducted	Tests completed in 1 month	Testing reports, operational logs	Identification and resolution of issues

Activity 7.7.2 Launch Operations: Begin full-scale operations, managing and processing plastic waste prior disposal	Full-scale operations launched	No operations launched	Operations launched in 2 months	Operational reports, waste processing data	Effective implementation, continuous monitoring
Activity 7.7.3 Performance Monitoring: Implement monitoring systems to track performance metrics, identify issues, and ensure continuous improvement.	Monitoring systems implemented; performance metrics tracked	No monitoring systems	Monitoring systems implemented in 1 month	Monitoring reports, performance data	Accurate data collection, effective monitoring

RECOMMENDATION 8: SECURE TECHNOLOGY-BASED EQUIPMENT AND SYSTEMS TO CAPTURE MARINE LITTER					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1 Compliance to CPOA-ML Targets	Adoption of NPOA-ML targets, baseline plastic leakage established, 100% recovery of plastic leakage	No baseline established	Baseline plastic leakage established in 2024; 100% recovery of plastic leakage by 2025; 100% sustained in succeeding years	CPOA-ML Annex C – CPOA-ML MERV System	Effective implementation and monitoring
Output 8.1: Conduct Feasibility Study and Technology Assessment					
Activity 8.1.1 Needs Assessment. Conduct needs assessment to determine volume and types of marine litter	Assessment completed; data collected	No assessment conducted	Assessment completed in 3 months	Needs assessment report, data analysis documents	Accurate data collection, stakeholder cooperation
Activity 8.1.2 Technology Review: Review existing technology-based solutions	Review completed; technologies evaluated	No review conducted	Review completed in 3 months in parallel with 8.1.1	Technology review report	Availability of suitable technologies
Activity 8.1.3 Feasibility Analysis: Perform feasibility study including cost-benefit analysis, environmental impact assessment, and risk analysis	Feasibility study completed	No feasibility study conducted	Study completed in 4 months	Feasibility study report	Comprehensive analysis
Activity 8.1.4 Stakeholder Engagement: Engage stakeholders for insights and support	Number of stakeholders engaged	No stakeholder engagement	Stakeholders engaged in 2 months in parallel with 8.1.3	Engagement reports	Stakeholder participation
Output 8.2. Design and Planning					

Activity 8.2.1 Technology Design: Develop detailed designs for the selected technology-based systems,	Design documents completed	No designs available	Designs completed in 6 months	Design documents	Effective design process, stakeholder input
Activity 8.2.2 Integration Plan: Create integration and operational plans	Plans completed	No plans available	Plans completed in 3 months	Integration and operational plan documents	Comprehensive planning, stakeholder involvement
Activity 8.2.3 Operational Plan: Develop an operational plan covering deployment, maintenance, monitoring, and data collection processes.	Operational plan completed	No operational plan	Plan completed in 3 months in parallel with 8.2.2	Operational plan documents	Effective coordination, resource availability
Activity 8.2.4 Community Involvement: Involve local communities in planning process	Number of community members involved	No community involvement	Community involvement in 2 months	Community feedback reports	Community support and participation
Output 8.3 Stakeholders Consultations					
Activity 8.3.1 Organize Consultation Meetings	Number of consultation meetings scheduled and organized	No meetings organized	Meetings scheduled and organized in 1 month	Meeting schedules, attendance records	Availability of stakeholders, effective scheduling
Activity 8.3.2 Present Project Plans: Present the project plans.	Number of presentations conducted; feedback collected	No presentations conducted	Presentations conducted and feedback collected in 1 month	Presentation materials, feedback forms	Stakeholder engagement, clear communication
Activity 8.3.3 Feedback Integration	Feedback integrated into final project design	No feedback integration	Feedback integrated in 1 month	Revised project design documents	Timely feedback from stakeholders
Activity 8.3.4: Continuous Engagement	Framework for continuous engagement established	No engagement framework	Engagement framework established in 1 month	Engagement framework documents	Ongoing stakeholder support
Output 8.4 Institutional Framework Development					

Activity 8.4.1: Role Definition: Define roles and responsibilities of stakeholders	Roles and responsibilities defined	No roles defined	Roles and responsibilities defined in 1 month	Role definition documents	Stakeholder agreement, clear communication
Activity 8.4.2: Establish Governance Structures: Establish governance structures	Governance structures established	No governance structures	Governance structures established in 1 month	Governance structure documents	Stakeholder cooperation, effective decision-making
Activity 8.4.3: Develop Policies and Procedures: Develop policies and procedures	Policies and procedures developed	No policies and procedures	Policies and procedures developed in 2 months	Policy documents, procedure manuals	Transparency, accountability, inclusivity
Activity 8.4.4: Capacity Building: Provide training and capacity-building programs for stakeholders	Training programs implemented	No training programs	Training programs implemented in 2 months	Training attendance records, competency assessments	Stakeholder participation, availability of trainers
Activity 8.4.5: Monitoring and Evaluation Framework: Develop monitoring and evaluation framework	Monitoring and evaluation framework developed	No framework developed	Framework developed in 2 months	Monitoring and evaluation plan, KPI reports	Accurate data collection, effective monitoring
Activity 8.4.6: Institutional Integration: Integrate the project into existing institutional structures	Integration plan developed	No integration plan	Integration plan developed in 2 months	Integration plan documents	Institutional support, continuity beyond project
Output 8.5 Secure Funding and Approvals					
Activity 8.5.1: Funding Proposals: Prepare and submit funding proposals	Number of funding proposals submitted	No proposals submitted	Proposals submitted in 3 months	Proposal documents, funding agreements	Availability of funding sources, effective proposal writing

Activity 8.5.2: Obtain necessary permits and approvals	Permits and approvals secured	No permits/approvals secured	Permits and approvals secured in 3 months	Permit documents, approval records	Timely processing by authorities
Activity 8.5.3: Public Consultations: Conduct public consultations	Number of public consultations held	No consultations held	Consultations held in 2 months	Consultation records, stakeholder feedback	Community support, effective communication
Output 8.6: Procurement and Installation					
Activity 8.6.1: Contracting. Select and contract reputable suppliers and service providers	Select and contract suppliers	Contracts awarded	No contracts awarded	Contracts awarded in 3 months	Competitive bidding process, availability of contractors
Activity 8.6.2: Equipment Procurement: Purchase necessary equipment and technology-based systems	Equipment purchased	No equipment purchased	Equipment purchased in 2 months	Purchase orders, equipment receipts	Availability of equipment, timely delivery
Activity 8.6.2: Installation: Install and test the equipment	Equipment installed and tested	No equipment installed	Equipment installed and tested in 3 months	Installation reports, testing documents	Proper installation, functional testing
Activity 8.6.3: Training for Installation Crew: Provide training for the installation crew	Training programs conducted	No training programs conducted	Training conducted in 1 month	Training attendance records, competency assessments	Availability of trainers, staff participation
Output 8.7 Staff Recruitment and Training					
Activity 8.7.1 Recruitment: Hire technical and operational staff	Number of staff hired	No staff hired	Staff hired in 3 months	Employment records, recruitment reports	Availability of qualified candidates
Activity 8.7.2 Training Programs: Develop and implement training programs	Number of training programs implemented	No training programs	Training programs implemented in 3 months	Training attendance records, competency assessments	Availability of trainers, staff participation

Activity 8.7.3 Provide hands-on training sessions and workshops	Number of training sessions and workshops conducted	No training sessions or workshops conducted	Training sessions and workshops conducted in 2 months in parallel with 1.7.2	Session attendance records, feedback forms	Engagement of staff, effective training methods
Activity 8.7.4 Ongoing Support and Development: Establish continuous professional development program	Continuous professional development program established	No continuous professional development program	Program established in 2 months in parallel with 1.7.3	Program documentation, participation records	Ongoing staff development, up-to-date skills
Output 8.8: Operational Launch and Monitoring					
Activity 8.8.1 Operational Testing: Conduct operational tests	Successful operational tests	No operational tests conducted	Tests completed in 1 month	Testing reports, operational logs	Identification and resolution of issues
Activity 8.8.2 Launch Operations: Begin full-scale operations	Full-scale operations launched	No operations launched	Operations launched in 2 months	Operational reports, waste processing data	Effective implementation, continuous monitoring
Activity 8.8.3 Performance Monitoring: Implement monitoring systems to track performance metrics	Monitoring systems implemented; performance metrics tracked	No monitoring systems	Monitoring systems implemented in 1 month	Monitoring reports, performance data	Accurate data collection, effective monitoring
Activity 8.8.4 Reporting and Feedback Mechanisms: Establish reporting and feedback mechanisms	Reporting mechanisms established; feedback collected	No reporting mechanisms	Reporting mechanisms established in 1 month	Reports, feedback forms	Stakeholder engagement, continuous improvement

RECOMMENDATION 9 - CONDUCT A CONDUCT A PILOT STUDY ON BARANGAY CLUSTERING IN MANILA CITY FOR THE ESTABLISHMENT OF ADDITIONAL MRF					
Expected Outcome/Output/Activity	**Indicators**	**Baseline**	**Targets**	**Monitoring & Verification**	**Assumptions**
Outcome 1: Improved Waste Management	Efficiency of waste segregation, collection, and recycling	No baseline established	10% efficiency improvement in Year 1, 40% improvement in Year 2	Efficiency assessment reports	Effective implementation and monitoring
Outcome 2: Regulatory Compliance	Compliance with waste management regulations	No baseline established	Feasibility study in Year 1, detailed design in Year 2, MRF construction in Year 3, Sustained MRF functionality in succeeding years	Regulatory compliance reports	Timely approvals and adequate resources
Output 9.1: Assessment and Selection of Pilot Areas					
Activity 9.1.1 Prepare inventory of barangays with and without MRF	Inventory completed	No inventory	Inventory completed in 2 months	Inventory report	Accurate data collection
Activity 9.1.2 Develop selection criteria	Criteria developed	No criteria	Criteria developed in 1 months	Criteria document	Clear and objective criteria
Activity 9.1.3 Data collection and analysis	Data collected and analyzed	No data collected	Data collected and analyzed in 2 months	Data analysis report	Accurate data collection and analysis
Activity 9.1.4 Conduct stakeholder consultations	Consultations conducted	No consultations	Consultations conducted in 1 months	Consultation records	Stakeholder engagement and support

Output 9.2: Resource Allocation and Planning					
Activity 9.2.1 Budget planning: Create a detailed budget covering the construction, equipment, operation, and maintenance of the MRF.	Budget plan completed	No budget plan	Budget plan completed in 3 months	Budget documents	Adequate funding
Activity 9.2.2 Resource mapping: Identify and allocate necessary resources, including funding sources, construction materials, and human resources.	Resources identified and allocated	No resource mapping	Resource mapping completed in 3 months	Resource mapping report	Availability of resources
Activity 9.2.3 Project planning: Develop a comprehensive project plan outlining timelines, milestones, and risk management strategies.	Project plan developed	No project plan	Project plan developed in 3 months in parallel with 9.2.2	Project plan document	Comprehensive planning
Output 9.3: Securing Approval from the City Mayor					
Activity 9.3.1 Present the project proposal to the City Council for endorsement and approval of the Mayor	Endorsement by City Council	No endorsement	Project proposal endorsed within 2 months	Council meeting minutes	Support from City Council
Output 9.4: Designed and Constructed MRF					
Activity 9.4.1 Design Development: Collaborate with urban planners and architects	Design development completion	None	Design completed	Design documents	Availability of qualified planners and architects

Activity 9.4.2 Procurement Process: Conduct procurement process	Selected construction firm	None	Procurement completed	Procurement records	Transparent bidding process
Activity 9.4.3 Construction Monitoring: Monitor construction process	Adherence to design specifications and timelines	None	Construction completed within 12 months	Monitoring reports	Effective project management
Output 9.5: Community Engagement and Training					
Activity 9.5.1 Awareness Campaigns: Implement information sessions and distribute educational materials to inform residents about the benefits and operations of MRF. Identify appropriate channels to reach under-represented groups.	Number of campaigns conducted	None	At least 5 campaigns within 3 months	Campaign materials	Community willingness to participate
Activity 9.5.2 Training Programs: Develop and conduct training sessions for local waste management personnel and volunteers on MRF operations, maintenance, and safety protocols.	Number of training sessions held	None	At least 3 sessions within 3 months in parallel with 9.5.1	Training attendance records	Availability of trainers and participants
Activity 9.5.3 Feedback Mechanisms: Establish channels for community feedback to address concerns and improve MRF operations	Number of feedback responses received	None	At least 50 responses within 3 months in parallel with 9.5.2	Feedback records	Community openness to provide feedback

Output 9.6: Monitoring and Evaluation					
Activity 9.6.1: Performance Monitoring: Set up monitoring systems to track key performance metrics such as waste processed, recycling rates, and operational efficiency.	Monitoring system in place	None	System established	Monitoring reports	Reliable data collection methods
Activity 9.6.2: Periodic Evaluations: Conduct regular evaluations to assess the pilot study's effectiveness, identify challenges, and document best practices.	Number of evaluations conducted	None	At least 2 evaluations	Evaluation reports	Commitment to continuous improvement
Activity 9.6.3: Reporting: Prepare and disseminate comprehensive reports to stakeholders, detailing the pilot study's outcomes, lessons learned, and recommendations for scaling up the initiative.	Number of reports prepared and disseminated	None	At least 2 reports	Report distribution records	Timely and accurate reporting