Reducing Marine Plastics in the East Asian Seas Region Project
funded by the
Ministry of Oceans and Fisheries (MOF) of the Republic of Korea

PROPOSED PILOT PROJECT IN
TANDAG CITY, SURIGAO DEL SUR

Boosting Plastic Waste Diversion through Innovative Product Repurposing

PROJECT PROPOSAL SUMMARY

PROJECT TITLE	**Boosting Plastic Waste Diversion through Innovative Product Repurposing** (Establishment of a Plastic Waste Processing Facility)	
SUBMITTED BY	Tandag City	November 2024

Location	Tandag City Ecological Park, Barangay San Jose, Tandag City
Background	With over 2 million tons of plastics generated annually, the six central barangays along Tandag's main tributary contribute an estimated 80% to 90% of ocean-bound plastics (OBPs). Addressing this pressing issue requires a comprehensive plastic recycling facility as a pivotal solution. .
Objectives	increasing diversion rate by improving Plastic Waste Management • Establishment of a Plastic Waste Processing Facility • Purchase and installation of necessary pieces of equipment
Resources	The procurement and installation of the equipment for the plastic waste processing facility shall be financed from the ODA project. The site, and the building alongside the maintenance, operations, and sustainability of the project shall come from the LGU of Tandag.
Budgetary Requirement	The pilot project is estimated to be around 15M PhP (including the installation, and procurement of equipment)
Timeline	The project intervention is aimed to be implemented and installed, including a feasibility study, within two years.
Monitoring and Reporting	As one of the Project Sites of the ODA-PEMSEA project in the Philippines on Reducing Marine Plastics in the East Asian Seas Region, regular reporting and updates shall be provided to the Project Team, Funding Agency and the Philippine Government.

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I. INTRODUCTION

Tandag City, the capital of Surigao del Sur in the Caraga region, is a fifth-class city on Mindanao Island's northeastern coast, facing the Philippine Sea. It is known for its natural beauty, cultural heritage, and strategic location. The city includes 21 barangays, six of which are urban and coastal, serving as centers for trade and tourism.

Tandag's geography features abundant water bodies that support its ecology and economy. The Tandag River and other rivers, creeks, and springs sustain mangroves, biodiversity, and agricultural and fishing activities while helping manage flood risks in low-lying areas.

Popular attractions in Tandag include its beaches, mangrove forests, and nearby islands. The city balances gradual urbanization with preserving its natural charm. Its economy thrives on fishing, agriculture, and tourism, with its seafood and inviting atmosphere drawing visitors.

In terms of environmental management, Tandag City adheres to the Ecological Solid Waste Management Act of 2000 (RA 9003), emphasizing waste segregation into biodegradable, residual, recyclable, and special categories. The city has implemented a systematic waste collection process and currently establishing a sanitary landfill for responsible handling of residual waste. Local efforts also include public clean-ups, targeted especially at addressing the prevalence of plastic waste in coastal barangays, which poses risks to marine ecosystems. Tandag collaborates with environmental agencies to enhance its environmental stewardship and aligns its programs with national conservation policies. These initiatives not only address solid waste management but also support broader environmental and marine conservation.

While Tandag City has made strides in managing solid waste, challenges remain in waste recovery and processing, particularly for plastics. To address this, the city plans to establish a comprehensive plastic waste processing facility. This facility aims to convert plastic waste into valuable products, showcasing sustainable and innovative waste management solutions. With this initiative, Tandag is preparing to advance its plastic recycling efforts, leveraging improved equipment and technology to enhance efficiency and reduce environmental impact. This marks a significant step forward in the city’s commitment to a cleaner and more sustainable future.

II. PROJECT DESCRIPTION

A. Project Background

The proposed pilot project seeks to tackle the city's critical plastic waste problem, with over 2 million tons generated annually. An IEC program will be launched, targeting the six central barangays along Tandag's main tributary. These areas contribute an estimated 80% to 90% of ocean-bound plastics (OBP), currently treated as residuals but holding significant recycling potential.

At present, most of this waste is temporarily stored at the Residual Containment Area (RCA), with recyclable materials, such as PET bottles, sold directly. Other types of plastic waste remain either awaiting the completion of the sanitary landfill (SLF) or the establishment of a plastic recycling facility. Thus, a comprehensive plastic recycling facility is the cornerstone solution to effectively addressing this pressing issue. Additionally, the LGU has an existing site adjacent to the RCA inside the ESWM Ecological Park, that can be utilized to house the recycling facility. The LGU is allocating a budget of ₱10 million for the construction of the building for the facility.

The City has implemented several ordinances to enhance its waste management system These include City Ordinance No. 11 (2017), also known as the Ecological Solid Waste Management Code of Tandag City, which imposes fines and penalties for violations of its provisions. This was amended by City Ordinance No. 01 (2020), which updated the code to include more comprehensive requirements and regulations for effective solid waste management.

Additionally, Resolution No. 130 (2021) authorized the City Mayor to sign a Memorandum of Agreement (MoA) with the 21 barangays to implement the Solid Waste Management System under Republic Act No. 9003, ensuring compliance at the barangay level and strengthening local efforts to manage waste responsibly.

1. Issued Ordinances Related to Waste Management

City Ordinance No. 11 (2017) Ecological Solid Waste Management Code of Tandag City	Provides fines and penalties for violations on the main provisions of the city ordinance
City Ordinance No. 01 (2020) Amended Ecological Solid Waste Management Code of Tandag City	Tandag City Ecological Solid Waste Management Code of 2020, as amended. Contains necessary requirements and regulations to effectively implement SWM.
Resolution No. 130 (Series of 2021) Implementation of the Solid Waste Management System under the Republic Act No. 9003	Authorizes City Mayor to sign a Memorandum of Agreement (MoA) with the 21 barangay local government units (BLGU) for the implementation of the SWM System under the Republic Act No. 9003 at the barangay level

2. Existing Facilities and Available Equipment and Vehicles for Waste Management

Tandag City has established various facilities and resources to ensure efficient solid waste management operations. The city government operates three garbage compactor trucks and two dump trucks to manage waste collection. Seven collection teams, each consisting of two waste collectors, oversee the collection process across the city.

A key facility in Tandag's waste management system is the ESWM Ecological Park (Ecopark), located in Barangay San Jose. This facility temporarily serves as the final disposal site for waste from urban barangays until the construction of the city's sanitary landfill is completed. The Ecopark includes a biodegradable shed for processing organic waste, a Residual Containment Area (RCA) for residual waste, septic vaults for special waste containment, and a centralized Material Recovery Facility (MRF) for storing recyclable materials. These facilities collectively support the city's efforts to manage and process waste efficiently.

3. Existing Programs and Partnerships

Maintaining environmental sustainability in Tandag City is bolstered by the active participation of various stakeholders. Collaborative efforts among civic groups contribute additional technical and financial resources, facilitate the sharing of best practices in solid waste management (SWM), and enhance public awareness. A notable community-based organization (CBO) in the city is the Motherly Association for River Initiatives Towards Environmental Sustainability (MARITES). This group actively engages in environmental activities led by the City Environment and Natural Resources Office (ENRO) and operates recycling-related livelihood projects. To date, each of the 6 Coastal Barangays have already established MARITES. Furthermore, NGOs and civil society groups regularly participate in river clean-ups and other environmental initiatives, reinforcing collective efforts to protect and preserve Tandag's natural resources.

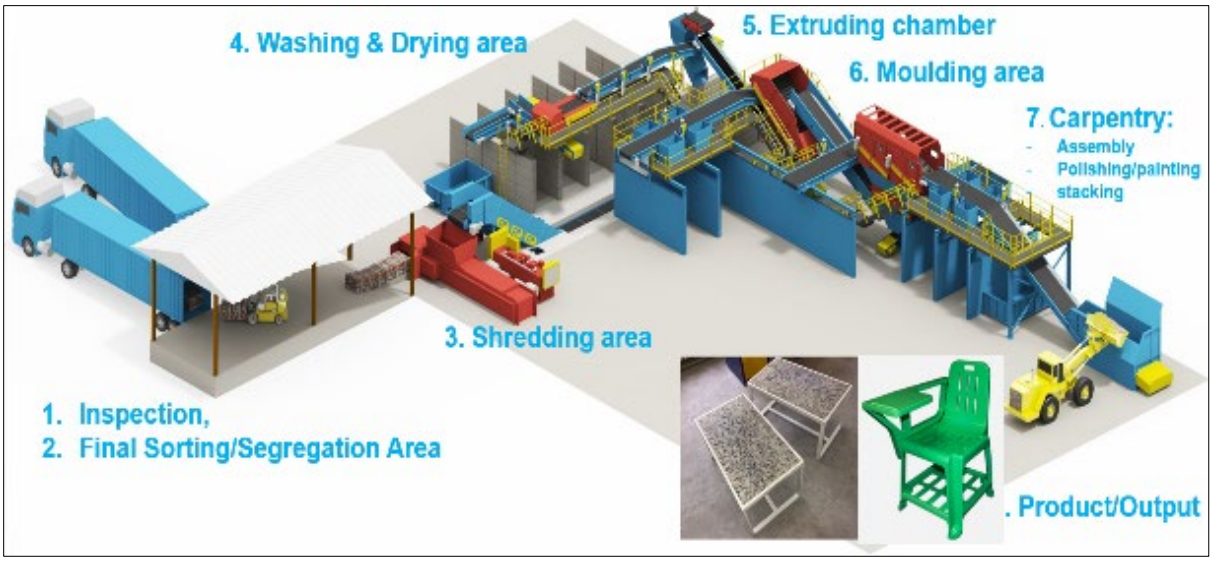
Recycling and Waste Processing Businesses such as the junkshops are also in collaboration with the LGU and MARITES and help them manage the collection, processing, and sale of recyclable materials. Moreover, these junk shops, together with the informal waste sector and other recycling facilities in the city are also recognized as essential actors, particularly in waste diversion. The LGU has also organized a group called the "*basureros*," where barangay coordinators and interested residents can directly participate in the recycling and composting programs of the city.

B. The Proposed Pilot Project

1. *Budgetary Requirement and Proposed Location of the Facility*

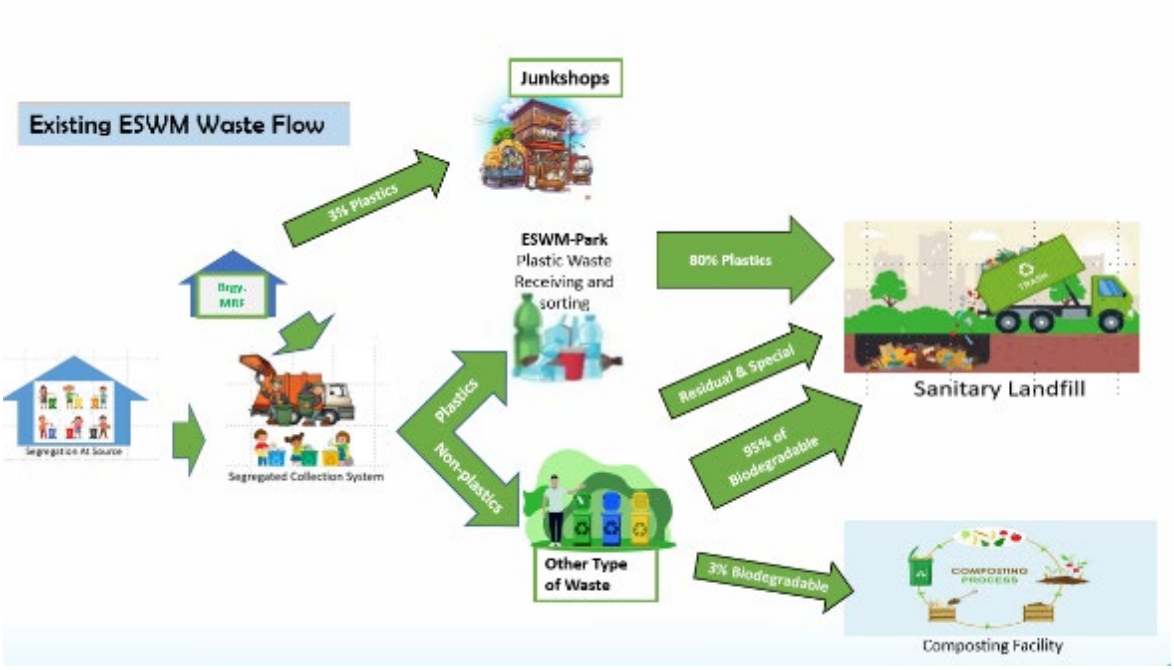
Based on similar facilities in the country, the estimated cost for a complete Plastic Recycling Facility is approximately 15 million PhP, though this figure may vary depending on the required capacity and specific equipment. This estimate does not include the cost of the land or building to house the facility.

The facility will be located at the Tandag City Ecological Park in Barangay San Jose and will focus on processing plastic waste into reusable and marketable products such as chairs, eco-bricks, and other innovative materials. As outlined in the diagram below, the facility will include essential equipment for sorting, shredding, washing and drying, extruding, molding, and polishing.

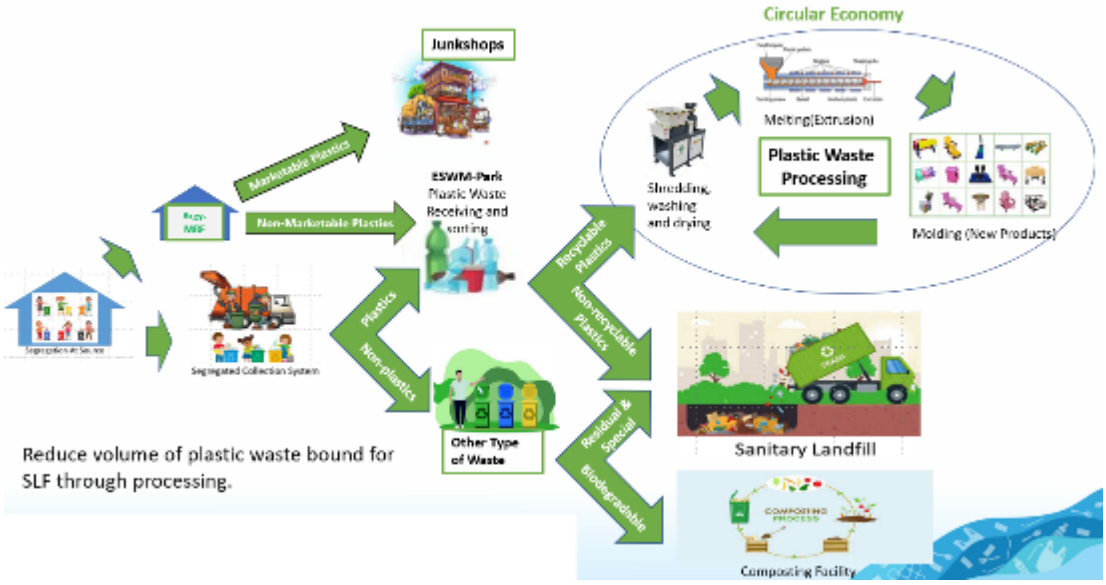


2. *<u>Current Waste Flow in Tandag</u>*

It is anticipated that once the facility becomes operational, the city's waste flow will drastically improve, as a substantial portion of plastic waste will be processed rather than ending up in the sanitary landfill (SLF). This will extend the lifespan of the SLF and contribute to environmental preservation by reducing land and marine pollution.



3. *<u>Expected Waste Flow After Establishment of the Facility</u>*



The facility will feature designated areas for sorting, processing, and storing waste, equipped with modern machinery to handle segregated plastics and package finished products.

C. Timeline

It is estimated that the project can be put up within two years. However, before implementation, crucial steps or stages have to be undertaken which may include the following:

1. *Feasibility Study and Design:*
   The conduct of a feasibility study is crucial for this type of project to assess the technical, environmental, and economic viability of the facility. The study will also identify if the location designated by the LGU would be suitable for the facility. The design and layout would also be necessary to optimize processing operations.

2. *Training and Capacity Building:*
   Equipping local workers with the skills to operate and maintain the recycling facility. This includes workshops on technology and equipment use and waste management best practices for staff and community stakeholders.

3. *Public Engagement and Awareness:*
   Launching awareness campaigns to educate the public on the importance of segregating plastics and contributing to the facility's success. Partnerships with schools, local organizations, and barangay councils will promote waste collection drives and encourage community participation.

4. *Integration with Existing Waste Systems:*
   Aligning the facility's operations with the city's current waste management system, ensuring seamless collection and processing. Urban barangays will be key contributors to the supply of plastic waste, supported by existing collection teams or by utilizing the MARITES.

D. Co-Financing Arrangements

The LGU of Tandag is willing to provide co-financing as indicated in the table below to ensure the successful implementation of the project.

SOURCE OF FUNDS	**PROGRAM/ACTIVITY**	**AMOUNT /YEAR** PHP
The LGUs counterpart for this project shall come from its	➢ Maintenance and Operation of the Plastic Recycling Facility	6M

annual Allotment on Environmental Projects (from the 20% Development Fund)	➢ IEC Component of the project ➢ Allowance for segregators and sorters ➢ Provision of manpower • Mechanic / Maintenance • Machine Operators - Receiving and Baling Machine; Crusher / Shredder; Washer and Dryer; Extruder and Molder; Carpenter, Polisher and Painter	
Income from fees and penalties vary every year.		Range - 50K to 70K
Bulk waste fees		12k to 15K
Supplementary Budget 2025	➢ Construction of a building for the Plastic Recycling Facility	10M (one-time source)
Note: The LGU shall ensure that the budget for the maintenance and operation of the facility shall be incorporated annually into its regular environmental program.		

III. BENEFITS OF THE PROJECT

Aside from the significant waste reduction and diverting a large portion of plastic waste from landfills and water bodies, once the facility is operational, it will help improve waste management efficiency. The recycling facility would streamline waste processing, enabling the LGU to handle the increasing volume of waste more effectively and alleviate pressure on the existing disposal site.

More localized impacts on the other hand are expected to benefit the environment, economy, and community significantly. Here are some of those benefits:

1. *Environmental Benefits:*

   The installation of a plastic recycling facility in Tandag City is expected to significantly reduce plastic waste, ensuring that a large portion is processed rather than ending up in sanitary landfills or waterways. The LGU estimates that from the .15T/day plastic waste being processed and diverted, once the facility is operationalized, an additional 1.T/day of plastic waste can be processed and diverted.

   The current and estimated waste diversion of the City is shown in the table below:

	Tons/day	**Tons/Year**
a. Total Mixed Waste Generation	9.2 Tons/day	2,841.48 Tons/yr.
b. Total Plastic Waste Generation	1.714 Tons/day	625.79 Tons/yr.

c. **Current Amount of Plastic** Waste Diverted (Through the existing facilities and other initiatives	0.15 Ton/day (just the average per day) ~estimated	39.3 Tons/yr . (0.15 ton/day x 262 weekdays for 2024) ~estimated
d. **Target/Estimated Additional** Amount of plastic waste to be diverted through the project (meaning once the project is implemented or operationalized)	≤ 1 ton/day	≤ 262 Tons/yr.
e. **Total Amount** of plastic to be diverted once the project is implemented (	≤ 1.15 ton/day	≤ 301.3 Tons/yr.

Therefore:

Current Plastic Waste Diversion = 8.75% tons/day
Target Plastic Waste Diversion = 58.34% ton/day
Total Percentage of Plastic Waste Diversion after the project implementation = 67.09%

This reduction will mitigate both marine and land pollution, also, by transforming plastics into reusable materials, the facility will lower the demand for virgin plastic production, conserving natural resources and reducing energy consumption.

2. Economic Benefits:

The project is poised to deliver significant economic benefits by creating jobs in waste collection, sorting, and processing, while formalizing roles for informal waste pickers. It is estimated that for the facility alone, at least 12 workers shall be added. The production of recycled plastic products, such as eco-bricks, has the potential to generate revenue that can sustain operations or fund further environmental initiatives. Additionally, the facility may attract investments from environmental organizations and private sector partners, fostering collaborations that enhance its capabilities and long-term sustainability.

3. Community and Social Benefits:

Through IECs and workshops related to the operationalization of the facility, collaboration among barangays, in waste collection drives and recycling initiatives can be strengthened. Beyond local benefits, the facility's operations can serve as a model for sustainability practices in the Caraga region, encouraging similar initiatives in other cities. Furthermore, it holds educational value as schools and community groups can use it for tours and activities, nurturing environmental awareness and responsibility among younger generations.

IV. BARRIER ANALYSIS

The establishment of a plastic recycling facility in Tandag City may face several key barriers which may include the following:

1. *Financial Challenges:* Collaborate with development agencies, environmental NGOs, and private sector partners to secure other available funds and investments. The facility can also focus on producing high-demand recycled products such as eco-bricks or pellets that can easily be sold and generate consistent income to sustain operations and cover costs.

2. *Technical Constraints:* In order to avoid technical difficulty, it is a must that the LGU also invest in training programs for local workers to operate and maintain the facility effectively, and continuously conduct workshops on advanced recycling techniques.

3. *Low Public Participation:* A comprehensive IEC to inform the residents should accompany the implementation of the project. This should inform the public about the importance of recycling and proper waste segregation, emphasizing the facility's benefits to the community. Ensure the involvement of the barangay councils, schools, and local organizations in waste collection drives and recycling efforts to foster a sense of ownership and cooperation.

4. *Market Limitations:* This may come as part of the long-term plan, but it is important to continuously partner with industries and businesses to create demand for recycled materials and explore regional markets to expand sales opportunities. At the same time, raising awareness about the benefits of using recycled goods to build consumer interest and encourage adoption can also form part of the IEC program.

5. *Equity Concerns:* Integrate volunteer groups, e.g. MARITES into the formal system through continuous training and employment opportunities at the facility and make sure that they have access to the economic and social benefits of the project.

In addition, below are some specific risks that have to be addressed prior to project implementation**:**

Risk	***Mitigation Measures***
Possible delays in the issuance of supporting ordinances to support implementation	The national law such as RA 9003 and RA 11898 will serve as bases for the implementation of the project and can be used for the initial campaign and information dissemination.
The identified capacity of the intervention may not be sufficient to address the targeted outputs.	A feasibility study will be done to evaluate the viability of the project intervention including the technical, financial, legal, and market considerations.

Manpower requirements or the team capability may not be sufficient to implement and maintain the project	Capabilities and staffing requirements shall be included in the FS, and proper and sufficient training will also be provided.
Not gaining the expected support from the different stakeholders and identified organizations	Representatives of various groups/stakeholders will be kept updated by involving them in project activities. MOA shall also be undertaken to solicit not only individual but institutional support from these organizations.
Changes in the political climate may affect the operations.	Long-term plans shall be put in place including budgetary allocations and possibly be supported by SB Resolutions or the like.

By addressing these barriers systematically and fostering collaboration among stakeholders, Tandag City can establish a successful and sustainable plastic recycling facility that benefits the environment, economy, and community.

V. PROJECT MONITORING

To ensure the successful implementation and impact evaluation of the proposed intervention, it is essential to establish a localized project management team or structure. This team should include representatives from the different offices of the LGU and other local authorities as well as non-governmental partners from the community. Such a structure will oversee the proper installation, operationalization, and ongoing performance assessment of the initiative, ensuring that objectives are met and any necessary adjustments are made efficiently.

VI. SUSTAINABILITY AND CONCLUSION

The sustainability of Tandag City's plastic recycling facility depends on several critical factors tailored to its specific context. A consistent supply of recyclable materials is essential, requiring active community participation in waste segregation and adherence to effective waste management practices. Efficient operations using energy-saving and cost-effective technologies are equally vital to reduce operational costs and environmental impact.

Support from local and regional governments through policies, funding, and incentives will reinforce the facility’s foundation by ensuring reliable waste streams and proper disposal practices. Additionally, fostering strong market demand for recycled products will provide financial stability and opportunities for reinvestment.

The facility's long-term success will be measured by its environmental impact, including reductions in plastic pollution, greenhouse gas emissions, and harm to coastal and marine ecosystems. By integrating financial and environmental sustainability, it can serve as a regional model for fostering a circular economy and positioning Tandag City as a leader in waste management and recycling.

This project is expected to significantly improve environmental conditions in Tandag City, particularly in coastal communities, by promoting cleaner and safer water bodies for both human and marine life. It will also create new economic opportunities, such as green jobs from recycled products, stimulating local economic growth. Public awareness and community engagement in environmental conservation will be heightened, fostering a culture of sustainability. Enhanced waste management practices, including segregation, recycling, and reduced plastic use, will lower marine and aquatic pollution, easing pressure on ecosystems and resources.