

South Asia Co-operative Environment Programme (SACEP) Plastic free Rivers and Seas for South Asia (P171269)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN FOR MATERIAL RECOVERY FACILITY

GRANTEE: ECO WASTE SOLUTIONS - BHUTAN

Environmental and Social Management Plan (ESMP)
Eco Waste Solution

1. Subproject Information

Subproject Activity Title:	Advancing waste management through scaling up the MRF at Wangdue by Eco waste solution
Estimated Cost:	119 980 USD
Start/Completion Date:	July 26, 2024 - March 31, 2025.

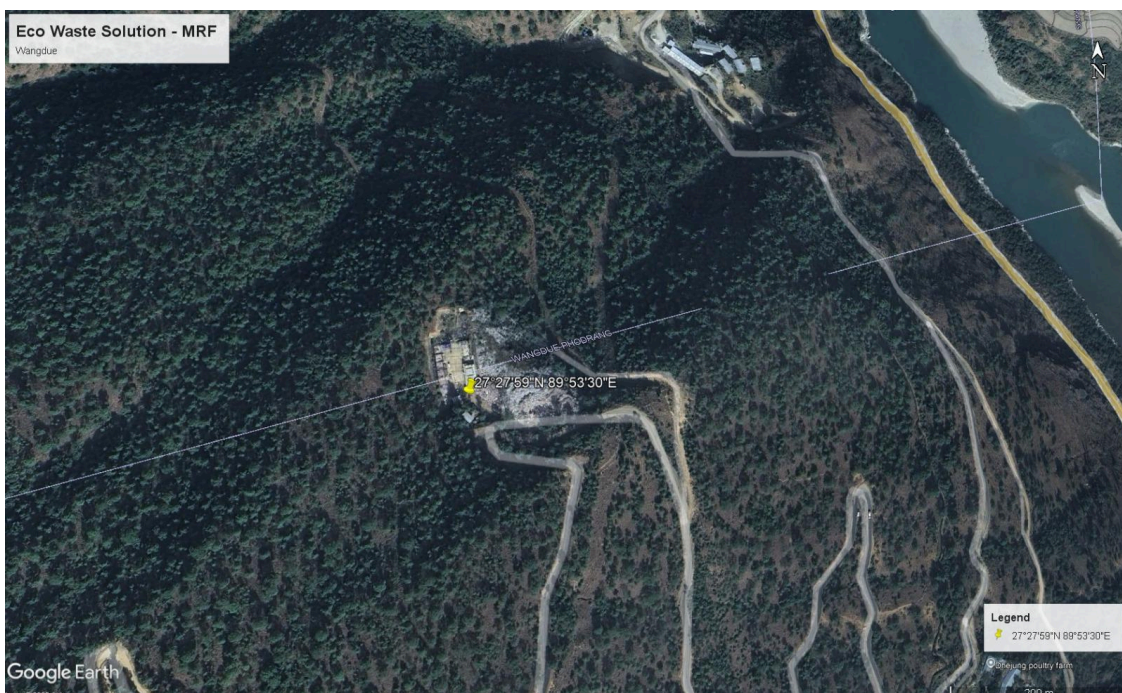
2. Site/Location Description

This sub-project focuses on scaling up the Material Recovery Facility (MRF) in Wangdue Phodrang, Bhutan, to tackle the urgent challenge of improper waste management. By establishing a facility to recover, sort, and divert recyclable municipal solid waste, the project aims to reduce the strain on landfills and promote sustainable waste management practices.

The MRF is strategically located at the Chamalaptsha landfill site, an area with minimal residential or community interference. The surrounding environment primarily consists of landfill operations with no residential presence nearby. The location is strategically chosen to reduce environmental and social impacts while enhancing waste recovery efficiency. Additionally, there are no environmentally sensitive areas or natural habitats nearby, as the land is already designated for waste management. Approximately 2 to 3 kilometers from the MRF, there is a small pig feed factory. The surrounding landscape is primarily dominated by *Pinus* spp., which form the predominant vegetation cover in the area.

The landfill site provides an ideal setting for the MRF's operations, aligning with Bhutan's sustainability efforts to improve waste management while minimizing environmental pollution. The facility plays a crucial role in diverting recyclable materials from the landfills, reducing the overall waste burden, and contributing to a more circular economy.

The Chamalaptsha landfill is well-equipped with essential infrastructure, including road access and electricity, provided by Bhutan Power Corporation (BPC). These existing facilities will support efficient MRF operations while minimizing the need for further development and reducing environmental impact.

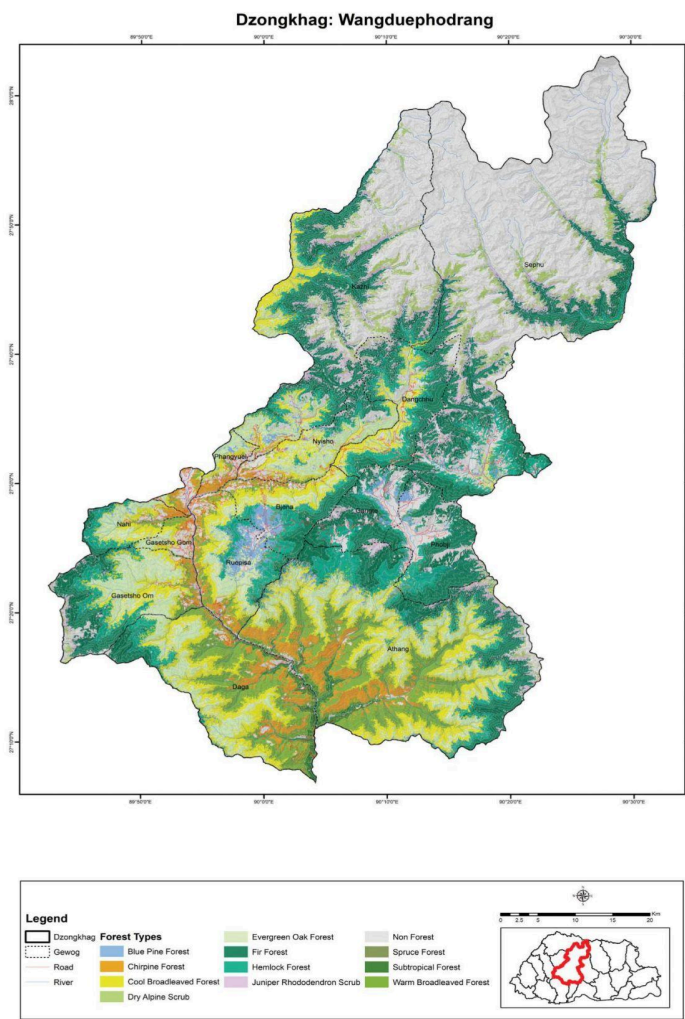
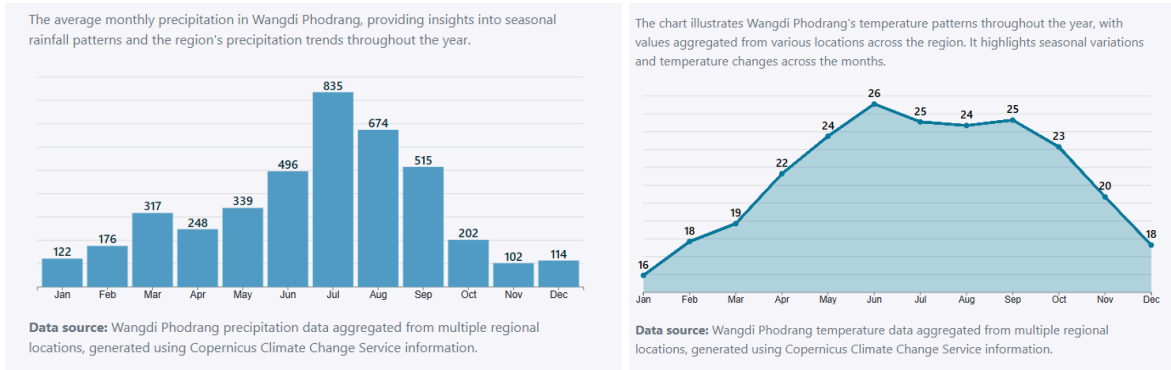


(The geographical coordinates for the location are 27°27'59"N 89°53'30"E)

[Map of the Project site](#)

The climate of Wangdi Phodrang where the location is situated, is characterized by significant seasonal variations. Temperatures drop to -16°C (4°F) in January, with an annual average of 11°C (52°F). The warmest month, June, reaches a maximum of 26°C (78°F), highlighting the transition from cold winters to warm summers.

Wangdi Phodrang exhibits distinct seasonal precipitation patterns, with higher rainfall during summer and drier conditions in winter. January records 122 mm of precipitation over 17 days, gradually increasing to 176 mm in February and 317 mm in March. Peak rainfall occurs in July (835 mm) and August (674 mm), coinciding with the monsoon season. Precipitation then declines, with 515 mm in September and 202 mm in October, reaching annual lows in November (102 mm) and December (114 mm). This variability significantly influences the region’s hydrology, agriculture, and water resource management.



According to the National Statistical Bureau's 2017 census, Wangdue Phodrang Dzongkhag has a population of 42,186 residents, comprising 17,884 females and 24,302 males.

Land Ownership

The proposed MRF site at Chamalaptsha landfill has been officially allocated by the National Land Commission (NLC) under a 10-year lease agreement, specifically for MRF operations (Attached in the annex).

3. Sub-Project Description and Activities

Currently, the existing MRF handles approximately 2 tons of waste per day, focusing on sorting and recycling municipal solid waste. With the project implementation, the facility aims to divert 80% of recyclable waste from landfills, significantly increasing its efficiency and capacity.

The existing infrastructure includes basic waste sorting and handling mechanisms. The project will focus on the upscaling and operationalization of the Material Recovery Facility (MRF) through the following key activities

- **Installation of Advanced Waste Processing Equipment:** The facility will be equipped with a hopper, baler, and conveyor system to enhance waste handling, sorting, and processing efficiency.
- **Workforce Training:** Personnel will receive specialized training in waste segregation, equipment operation, and occupational safety to ensure optimal facility performance.

Key Components of the Upscaled MRF will be

1. **Tipping Point:** The designated entry point for incoming waste, designed to optimize initial storage and facilitate systematic waste management.
2. **Dropper Mechanism:** A controlled feeding system that ensures a consistent and regulated flow of waste onto the conveyor belt for further processing.
3. **Conveyor Belt System:** The primary transportation mechanism within the MRF, responsible for the systematic movement of waste materials, enabling sequential sorting and classification.
4. **Segregation Sections:** Strategically positioned at 3-meter intervals along the conveyor belt, these sections allow trained personnel to conduct manual segregation of waste, ensuring precise categorization of recyclable materials.

The Material Recovery Facility (MRF) will employ a total of seven personnel, consisting of five women and two men. All project activities will be implemented by Eco Waste Solution as the lead implementing organization, with no additional implementing partners involved.

In addition to these interventions under the PLEASE project, a shelter will be constructed by the location owner to provide shade for the machinery.

ESMP Matrix: Risk and Impacts, Mitigation, Monitoring

Construction Stage - Construction of shelter - By the owner

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/Timing/Frequency	Responsibility	Parameter to be monitored	Methodology, including Location and Frequency	Responsibility	
Excessive noise and vibration from machinery leading to hearing loss, increased stress levels, and other health issues for workers and public nuisance	<ol style="list-style-type: none"> 1. Selection of less noisy equipment for construction 2. Maintenance of machinery at optimum conditions 3. Use of appropriate PPEs 4. Limiting construction activities to the daytime 5. Implement a Grievance Redress Mechanism/ Maintain a public complaint Box 	During the construction at the construction site	Contractor	Noise level Use of PPEs Machine maintenance records Number of grievances received regarding noise	Monthly site visit during the construction	Operation Manager - Eco waste solution Technical Expert-UNOPs	USD 1,200 (Selection of less noisy equipment/construction -0 Maintenance of machinery-500 PPEs-500 Implement GRM/public complaint box-USD 200)
Soil and water contamination, along with potential mosquito breeding, due to the generation of wastewater during construction	<ol style="list-style-type: none"> 1. Construction wastewater will be directed to a dedicated sedimentation pit to prevent soil and water contamination. 2. The sedimentation pit and surrounding areas will be cleaned daily to remove potential mosquito breeding sites 3. Drainage channels will be 	During the construction at the site	Contractor	Record of cleaning of pit Evidence of maintenance of channels Evidence for application of repellent	Monthly site visit during the construction	Operation Manager - Eco waste solution Technical Expert-UNOPs	USD 200 (Constructing sedimentation pit-200 Daily cleaning-100 Maintenance of drainage

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/Timing/Frequency	Responsibility	Parameter to be monitored	Methodology, including Location and Frequency	Responsibility	
	<p>maintained to ensure proper water flow and prevent stagnation</p> <p>4. Mosquito repellents and larvicides will be applied to stagnant water areas as needed</p>						<p>channels-120</p> <p>Application of mosquito repellents and larvicides-80)</p>
Solid waste Accumulation	<p>1. Construction waste will be sorted for reuse</p> <p>2. Any remaining waste will be removed from the site by the building contractor</p>	At the site throughout the construction	Contractor	Waste disposal records	Monthly site visit during the construction	<p>Operation Manager - Eco waste solution</p> <p>Technical Expert-UNOPs</p>	USD 100
Occupational Health and Safety (OHS) Risks for workers during construction, electrical wiring, and machinery setup	<p>1. Equip all workers with necessary personal protective equipment (PPE), including helmets, gloves, safety boots, goggles, and high-visibility vests to reduce the risk of physical injuries.</p> <p>2. Implement strict safety protocols for all electrical wiring activities.</p> <p>3. Ensure accessible first aid kits are available on-site.</p> <p>4. Provide proper sanitary facilities and access to safe drinking water.</p> <p>5. Offer adequate,</p>	During the construction activities at the site	Contractor	<p>Use of PPEs</p> <p>Availability of the First Aid box, Accident register</p> <p>Daily checking of water accumulated places and cleaning</p> <p>Recorded GRM</p>	Monthly site visit during the construction	<p>Operation Manager - Eco waste solution</p> <p>Technical Expert-UNOPs</p>	<p>USD 200</p> <p>(PPEs, first aid, etc -100)</p> <p>Sanitary and Workplace Cleanliness Facilities-50</p> <p>GRM-50)</p>

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/Timing/Frequency	Responsibility	Parameter to be monitored	Methodology, including Location and Frequency	Responsibility	
	<p>well-ventilated workspaces, clean eating areas, and separate sleeping areas (if necessary) for workers' comfort and well-being.</p> <p>6. Providing Workers GRM</p>						
Risks of Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) between Project workers; and between Project workers and local community members.	<p>1. Appoint a PSEA Focal Point at the site.</p> <p>2. Provide awareness training on recognizing, and preventing SEA/SH for</p> <p style="padding-left: 20px;">a) Project workers, and</p> <p style="padding-left: 20px;">b)affected communities.</p> <p>3. Provide training on the GRM, including for SEA/SH-related grievances to</p> <p style="padding-left: 20px;">a) Project workers</p> <p style="padding-left: 20px;">b)affected communities.</p> <p>4. Request all Project workers to sign a Code of Conduct (CoC) including instructions of SEA/SH prevention.</p> <p>5. Provide specific SEA/SH response mechanism as part</p> <p>6. The Project GRM, including referral to SEA/SH services,</p>	<p>Training and awareness will be conducted prior to commencement of work</p> <p>Implementation of Focal Points and signing of CoC at site during the construction period.</p>	Environmental and Social officer	<p>Number of training sessions provided to workers</p> <p>Number of awareness sessions provided to communities</p> <p>Number of training sessions on GRM provided to communities</p> <p>Percentage of workers that have signed the CoC</p>	<p>Monthly site visit during the construction</p>	<p>Operation Manager - Eco waste solution</p> <p>Technical Expert-UNOPs</p>	<p>USD 250</p> <p>(Training and Awareness-150</p> <p>Implementation of PSEA policy-100)</p>

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/Timing/Frequency	Responsibility	Parameter to be monitored	Methodology, including Location and Frequency	Responsibility	
	Worker.						
Risk of child labor and forced Labor	<ol style="list-style-type: none"> 1. Comply with the minimum age requirements of the Project (in 2. Compliance with national laws and ESS2) and document the age of workers upon hiring. 3. Verify the age of workers with communities where required. 4. Providing a worker's GRM. 	At the site, throughout construction	Contractor and Environmental and Social Officer	Number of workers' grievances filed Records of age verifications	Monthly site visit during the construction	Operation Manager - Eco waste solution Technical Expert-UNOPs	
Lack of awareness of a Grievance Redress Mechanism	<ol style="list-style-type: none"> 1. Create awareness of the Project GRM and its reporting channels, implemented by the PIU. 2. Provide an additional reporting channel through complaint boxes installed at the sub-project site. 3. Ensure that the contact details of the SEA/SH Focal Point are placed on notice boards in the project location. 4. Ensure that complaints received through the complaint boxes at the site 	Throughout the construction period at the site	Environmental and Social officer	Number of awareness sessions held Number of complaint boxes installed Number of SEA/SH Focal Points appointed Number of SEA/SH cases reported that receive referral services	Monthly site visit during the construction	Operation Manager - Eco waste solution Technical Expert-UNOPs	

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/Timing/Frequency	Responsibility	Parameter to be monitored	Methodology, including Location and Frequency	Responsibility	
	are handled appropriately or transferred to the Project GRM.						

Operational Stage - Scaling up MRF under the PLEASE project interventions

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/Timing/Frequency	Responsibility	Parameter to be monitored	Methodology, including Location & Frequency	Responsibility	
Noise generation during machines' operations may cause public nuisance and health implications to workers	<ol style="list-style-type: none"> Maintaining noise level at the boundary limit as per the National Standards Providing appropriate PPEs for the workers Selection of machines with less noise Timely maintenance of machinery 	<p>At MRF Facility, daily,</p> <p>During Machinery procurement</p>	Operations Manager - Eco Waste Solutions	<p>Noise level at the boundary</p> <p>Use of PPEs by workers</p> <p>Machine maintenance record</p>	Monthly site audits	<p>Operations Manager - Eco Waste Solutions</p> <p>Technical Expert-UNOPs Bhutan Country team</p>	<p>USD 100 (PPEs-100)</p>
Oil spillage from transport vehicles may lead to soil contamination and environmental damage.	<ol style="list-style-type: none"> Ensuring transport vehicles are regularly inspected and maintained to prevent leaks or spills. Use spill containment measures such as absorbent mats or trays during transport to capture any potential leaks. Keep spill kits readily available on-site for immediate response in case of a spill. 	At MRF Facility, during operations	Operations Manager - Eco Waste Solutions	<p>Vehicle maintenance records</p> <p>Availability of spill kits</p>	Monthly site audits	<p>Operations Manager - Eco Waste Solutions</p> <p>Technical Expert-UNOPs Bhutan Country team</p>	<p>USD 500 (maintenance of vehicles-250</p> <p>Spill containment measures-150</p> <p>emergency response readiness -100)</p>

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/ Timing/ Frequency	Responsibility	Parameter to be monitored	Methodology, including Location & Frequency	Responsibility	
Solid waste generation during the operations, and the risk of mosquito breeding sites surrounding environment	<ol style="list-style-type: none"> 1. Transfer organic and non-recyclable waste to designated disposal areas. 2. Conduct weekly inspections and monitoring at the MRF and its surrounding areas 3. Maintain cleanliness in and around the facility by ensuring proper waste disposal and drainage management. 4. Use appropriate smoke or fogging methods as needed 	At MRF Facility, daily, and weekly	Operations Manager - Eco Waste Solutions	Monitoring checklist Waste disposal records Evidence for application, smoke or fogging methods	Monthly site audits	Operations Manager - Eco Waste Solutions Technical Expert-UNOPs Bhutan Country team	USD 200 (Waste management/cleanliness and mosquito control measures-200)
Worker exposure to hazardous waste may lead to skin conditions and other health issues.	<ol style="list-style-type: none"> 1. Implement proper training for workers on handling hazardous waste safely. 2. Establish clear protocols for hazardous waste handling and disposal to minimize exposure. 3. Ensure regular health check-ups for workers to detect any early signs of health issues. 	At MRF Facility, daily	Operations Manager - Eco Waste Solutions	Training records Records of health check-ups	Monthly site audits	Operations Manager - Eco Waste Solutions Technical Expert-UNOPs Bhutan Country team	USD 100 (worker health and safety-100)
Operations OHR risks for workers during the operation	<ol style="list-style-type: none"> 1. Separate sanitary facility for male and female 2. Access to safe drinking water and a clean dining area 3. Training on safety and proper use of personal protective equipment (PPE) and daily safety briefing 4. Provision of a First aid box 5. Installation of fire extinguisher 	At MRF Facility, daily	Operations Manager - Eco Waste Solutions	Availability of adequate sanitary facilities, Use of PPEs Availability of valid Fire extinguishers,	Monthly site audits	Operations Manager - Eco Waste Solutions Technical Expert-UNOPs Bhutan Country team	USD 300 (Worker Health and Hygiene-100 PPEs and Emergency Preparedness-100)

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/ Timing/ Frequency	Responsibility	Parameter to be monitored	Methodology, including Location & Frequency	Responsibility	
	and fire hydrants 6. Adopt and train on the Emergency preparedness plan 7. Maintain accident registry 8. Perform regular medical check-ups for workers 9. Display Instruction Boards			Availability of First Aid box Accident records and follow up actions available Availability of Emergency Preparedness plan Number of awareness sessions on the plan Medical check-up records			50 Safety Training and Awareness-50)
Risks of Sexual exploitation and abuse (SEA) and sexual harassment (SH) among workers and between workers and community members at the facility	1. Provide a workers' grievance redress mechanism (Workers' GRM), incorporating SEA/SH Focal Points for both genders and an effective referral mechanism 2. Provide an anonymous reporting system, along with protection measures for individuals who report 3. Provide referrals to SEA/SH service providers as required 4. Provide training on recognizing, preventing, and responding to SEA/SH for workers and communities	At MRF Facility, daily	Operations Manager - Eco Waste Solutions	Availability of workers' GRM and SEA/SH Focal Points Availability of the reporting system Number of SEA/SH awareness sessions for a) workers, and b) surrounding communities Availability of CoC	Monthly site audits	Operations Manager - Eco Waste Solutions Technical Expert-UNOPs Bhutan Country team	USD 350 (Implementation of PSEA policy-350)

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/ Timing/ Frequency	Responsibility	Parameter to be monitored	Methodology, including Location & Frequency	Responsibility	
	5. Prepare a Code of Conduct for workers at the facility that includes reference to SEA/SH 6. Ensure workers at the facility sign a Code of Conduct (CoC)			Percentage of workers that have signed the CoC			
Potential for social issues related to labor influx	1. Prioritise the local community in the recruitment 2. Worker grievance meetings 3. Awareness of communicable diseases, Training on gender-based violence	At MRF Facility, daily	Operations Manager - Eco Waste Solutions	Availability of meeting and training records	Monthly site audits	Operations Manager - Eco Waste Solutions Technical Expert-UNOPs Bhutan Country team	USD 250 (Training and Awareness-250)
Non-compliance with the local regulatory requirements and workers' dissatisfaction due to extensive work requirements	1. Provide workers' GRM 2. Pay wages in accordance with national laws	At MRF Facility	Operations Manager - Eco Waste Solutions	Number of workers' grievances filed Payrolls	Monthly site audits	Operations Manager - Eco Waste Solutions Technical Expert-UNOPs Bhutan Country team	USD 250 (Training and awareness GRM -250)
Risk of child labor and forced labor at the facility	1. Comply with minimum age requirements of national laws and document age of workers upon hiring 2. Verify age of workers with communities where required 3. Provide workers' GRM and access to Project GRM 4. Raise awareness in communities	At MRF Facility, daily	Operations Manager - Eco Waste Solutions	Availability of training records Age verification records	Monthly site audits	Operations Manager - Eco Waste Solutions Technical Expert-UNOPs Bhutan Country team	USD 250 (Training and awareness GRM -250)
Gender discrimination in job opportunities and wages	1. Preparation of non-discriminatory guidelines for the recruitment	At MRF Facility, daily	Operations Manager - Eco Waste Solutions	Availability of HR Policy Grievance Redress Mechanism	Monthly site audits	Operations Manager - Eco Waste Solutions	USD 250 (implementation of gender

Anticipated E&S Risks & Impacts	Risk Mitigation & Management Measures	Impact Mitigation		Impact/Mitigation Monitoring			Mitigation & Monitoring cost in USD
		Location/ Timing/ Frequency	Responsibility	Parameter to be monitored	Methodology, including Location & Frequency	Responsibility	
	<p>process and operations affecting all levels of workers</p> <p>2. Equal wages for men and women</p>					Technical Expert-UNOPs Bhutan Country team	equality measures-250)

5. Capacity Development & Training

To ensure the effective operation of the Material Recovery Facility (MRF), a structured capacity development and training program will be implemented for MRF workers. The training will encompass the following key components:

- **Emergency Preparedness and Risk Mitigation:** Workers will be trained to recognize, prevent, and respond to occupational health and safety risks, emergency situations, and Workers' GRM and potential social grievances from the community. Additionally, strategies to mitigate workplace conflicts and disharmony will be addressed.
- **Personal Protective Equipment (PPE) and Safety Protocols:** Training on the proper use of PPE, occupational safeguards, and first aid will be conducted to enhance workplace safety and minimize health risks.
- **Gender & Social Inclusion:** Understanding gender-based violence, discrimination, and Protection from Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH) through informal discussion.
- **Technical and Operational Training:** Workers will receive comprehensive training on machinery operations, with periodic updates to enhance technological proficiency, especially when new equipment, machinery, or facility upgrades are introduced. Standard Operating Procedures (SOPs) will be integrated into the training to ensure compliance with operational best practices.
- **Workplace Organization and Environmental Safeguards:** Training will cover workplace organization, quality control measures, housekeeping protocols, and environmental and social (ES) protection and monitoring, with a particular emphasis on sustainable waste management practices within the facility.

In addition to the above training, associated communities will also receive training on

- Gender & Social Inclusion, covering gender-based violence, discrimination, Protection from Sexual Exploitation and Abuse (SEA) and Sexual Harassment (SH), and community grievance redress mechanisms (GRM).
- The circular economy and sustainable plastic waste management, promoting responsible waste

6. Implementation Schedule and Cost Estimates

Nature of cost	Timeline	Cost - USD
Noise and Vibration Control Measure	Dec 2024 to March 2025	1300
Wastewater management during construction	Dec 2024 to March 2025	200
Solid waste management	Sep 2024- March 2025	400
OHS related cost	Sep 2024- March 2025	500
Social Safeguards and community engagement (awareness and training on PSEA, GRM, child labour, gender, etc)	Sep 2024- March 2025	1600
Environmental Protection and Pollution Control during transportation	Feb 2025- March 2025	500
Total cost		4500

7. Attachments

1. [Environmental and Social screening report](#)
2. [Pictures of the surroundings](#)
3. [Environment Clearance](#)
4. [PSEA Documents](#)