ENVIRONMENTAL IMPACT ASSESSMENT OF SALTWATER INTENSIVE SHRIMP FARM PROJECT

Abstract

The ESIA report describes Khine Zin Yaw Intensive Saltwater Shrimp Farming Project, located in Myeik District, Tanintharyi Region, Myanmar. The project, initiated by Khine Zin Yaw Trading Co., Ltd., is subject to compliance with national and international regulations and standards, including Myanmar Environmental Impact Assessment Procedures 2015. This ESIA report comprehensively evaluates the environmental and social impacts of the project's development and outlines the mitigation measures and management plans for each relevant component. The project falls under the category of EIA Aquaculture, as per Myanmar's EIA Notification of Environmental Impact Assessment Procedures (2015). The project area boasts favorable conditions, including access to unpolluted water sources, clay soil suitable for shrimp farming, and essential infrastructure. The project involves grow-out ponds, sludge ponds, drainage canals, treated water ponds and covering an area of 366.7 acres. The assessment considers the environmental and social consequences of the project, with a focus on localized and reversible impacts. Mitigation measures and regular environmental monitoring are proposed to address these impacts. The report includes an alternative analysis and baseline environmental surveys, encompassing air quality, water quality, noise, vibration and biodiversity assessments. Some parameters in marine water and wastewater quality exceeded guidelines, necessitating mitigation measures for wastewater treatment and responsible aquaculture practices.

Key words: Focus highlighted in the ESIA report includes water quality management, waste management, habitat conservation, disease prevention, biosecurity, stakeholder engagement and monitoring.

Introduction

The project is situated in Field No. (9-OSS), Pa-Htaw-Kyae-Taing-Pyin Kwin, Ma-Aing Village Track, Kyun Su Township, Myeik District, Tanintharyi Region. The project is precisely located at coordinates 12˚24'32.60"N latitude and 98˚29'53.32"E longitude. The location, surrounded by Ma San Pa Village to the East, Kyun Su River to the West, Kalar Island to the South, and Ka Phwer Village to the North, offers favorable conditions for shrimp farming. The decision to choose Field No. 9-OSS was based on the availability of water resources free from industrial and residential pollution throughout the year, the suitability of clay soil for pond preparation, and convenient transportation access, meeting the basic needs of owners and local people engaged in shrimp farming.

The construction and operational timeline spans from 2017 to 2023, with initial establishment on 167 acres in 2017-2018, extension to 199.7 acres in 2021, and construction activities in 2023. There are 65 shrimp grow-out ponds, 17 shrimp sludge ponds, and 10 drainage canals for wastewater discharge at the project site. The layout plan illustrates the arrangement of facilities and ponds, emphasizing the efficient use of resources.

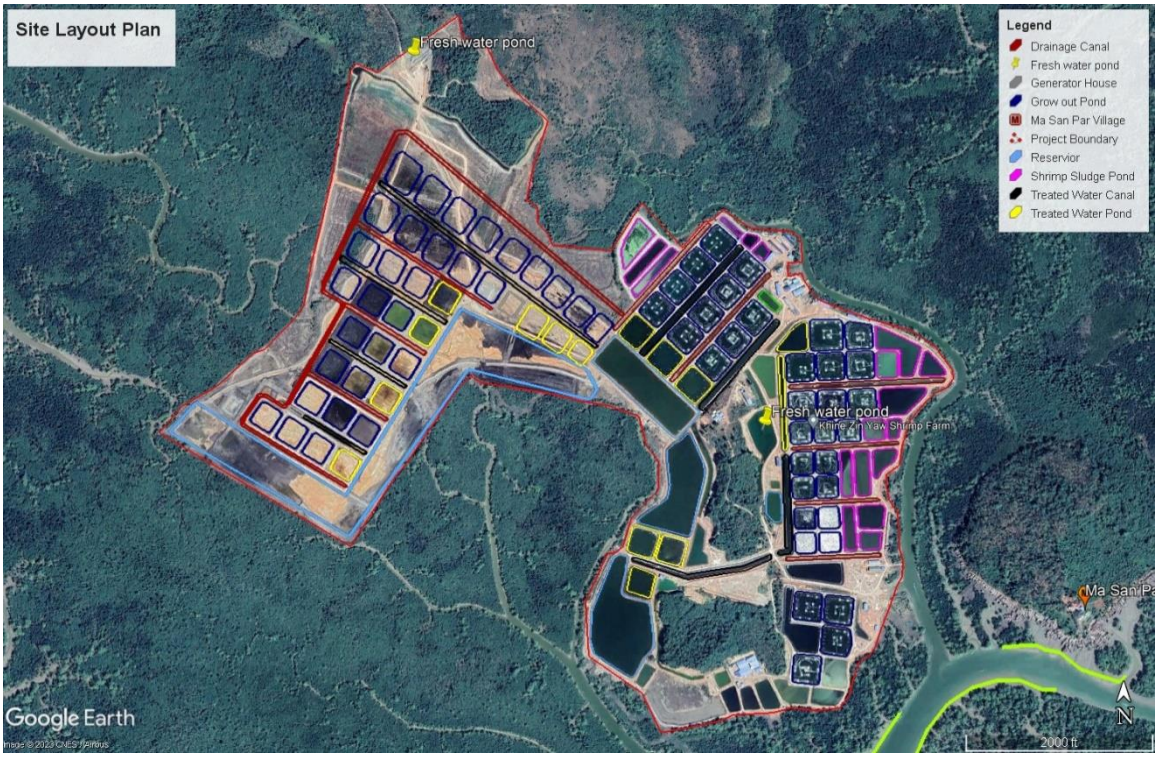

Figure 1 Layout Plan of KZY Shrimp Farm

Water resources management is a critical aspect, with raw water pumped from the nearest estuary stream, treated and stored in reservoirs. The treated water is then used for various operational purpose, including shrimp culture ponds. The juvenile shrimps (PL 10 and PL 12, *Penaeus Vannamei*) are imported from Charoen Pokphand Food Public Co., Ltd., Thailand. The cultivation process involves specific temperature and oxygen level adjustments during transfer and feeding regimes tailored to shrimp age and size. Continuous monitoring of water quality, aeration adjustments, and periodic checking of feed rates ensure successful shrimp cultivation.

The cultivation cycle, spanning 80-100 days, includes partial harvest at 75-80 days and 90-100 days, yielding marketable shrimp. Waste management involves collecting sludge and wastewater in waste ponds, utilizing conventional methods, and discharging the treated water to the nearest water bodies.

The environmental and social impacts are anticipated to be localized and reversible, with the implementation of suitable mitigation measures and regular compliance monitoring. The alternative analysis conducted encompasses technical, financial, environmental, and social feasibility, ensuring the safe and sustainable operation of the farm, as well as the creation of local job opportunities.

Methodology

The environmental impact assessment for the shrimp farming project employs a systematic methodology based on the principles outlines by the International Association for Impact Assessment (IAIA). The assessment considers various factors such as magnitude, duration, extent, and probability to quantify the significance of potential impacts on air, water, land, biodiversity, and human beings. The methodology involves assigning scales to each parameter, and a significant point is calculated for each impact. The impact significance is then categorized based on the calculated significant points.

Significant Point (SP) for each impact is calculated using the formula:

SP = (Magnitude + Duration + Extent) * Probability

The calculated Significant Point is used to categorize impact significance into five levels:

< 15	Very Low
15-29	Low
30-44	Moderate
45-59	High
≥60	Very High

Impact categorization as very low and low are considered negligible, indicating no significant harm to the environment. Moderate impacts suggest the need for mitigation measures, while high and very high impacts demand precise and effective mitigation strategies.

Result and Discussion

Using the Air Quality Monitoring Station AQM-09, PM_{10}, $PM_{2.5}$ and gases CO, CO_2, SO_2, RH, VOC and O_3 were measured continuously for 24 hours. While the level of NO_2 at the one-point source (near the generator house) and Ma San Par Village is higher than the standard value, all other data measured at specific places fall within the standard. The project site's measured odor level is within the National Standard. It has been noted that some marine water parameters have baseline levels that are higher than the ASEAN marine water guidelines. For the quality of wastewater discharged from the farm, the total suspended solids (TSS) of wastewater points (1, 2, and 3) and total phosphorous (TP) of wastewater point (2) are higher than the guidelines value. High levels of TSS and TP in wastewater can be caused by factors such as feed and waste material from the shrimp, uneaten feed, and uneaten organic matter that decomposes in the water.

A biodiversity survey was carried out in the vicinity of the project site. Data on the avifauna, fish and fauna were also gathered by point counting, transecting and interviewing locals and fishmen. Through surveys and interviews, a total of 38 species of fauna and 103 flora species were recorded from the project area. Various sampling points were selected for marine biodiversity survey, covering ponds, tidal creeks, mangroves and mudflats. The presence of copepods, diverse benthic organisms, and unique phytoplankton compositions indicate the complexity and richness of the aquatic ecosystem. Monitoring and managing nutrient levels, especially in waste ponds, are crucial for maintain balanced and sustainable marine environment. The observed ecological interaction, such as the role of midge larvae as a food source for birds, emphasize the interconnectedness of different species within the ecosystem.

The social team at E Guard employed a comprehensive research approach, combining case study methodology and quantitative research techniques, to collect primary data on the socioeconomic conditions of local residents residing in close proximity to the project area. Few respondents paid attention to the alterations and effects on their surroundings. Some individuals were unsure whether the project development would have an impact. Some residents believed that the community might experience socioeconomic improvement due to the project. A small percentage of respondents mentioned that the project does not recruit as much, that the area's restrictions may affect the harvesting of mangrove products (like crab and tiny prawns used to make fish paste), that noise pollution is a result of the project's large motor boats and generators, that there are occasionally bad odors released, and that wastewater generation may have an impact on plants and animals in long term.

Table 1 Summary of Project Impact Significance

Potential Impact/ Issue	Impact Significance
Construction Phase	
Impact on air	Minor
Impact on water	Moderate
Waste generation	Minor
Threats to biodiversity	Minor

Potential Impact/ Issue	Impact Significance
Land use change and utilization of local resources	Moderate
Operation Phase	
Impact on air	Moderate
Impact on water	Moderate
Waste generation	Moderate
Soil contamination	Minor
Noise Pollution	Moderate
Odor	Minor
Threats to biodiversity	Moderate
Contamination of marine ecosystem	Moderate
Employment and livelihood	+

The overall assessment indicates that the project's potential impacts have to be mitigated with recommended mitigation measures during both construction and operation phases.

Planning and Logistics: Optimal schedules to reduce excessive transportation and equipment movement. Strictly prohibit open burning of solid waste within the farm.

Monitoring and Benchmarking: establish fuel consumption benchmarks and goals, regular monitor fuel usage and identify areas for improvement, used fuel-efficient equipment meeting environmental standards, regular maintenance for optimal performance and fuel efficiency, implement idle reduction policies to minimize unnecessary fuel consumption

Restoration: restore vegetation in clearance areas left after construction if feasible

Erosion Control Measures: implement sediment barriers, silt fences, or drainage connected to existing sediment ponds

Wastewater Discharge: prohibit direct discharge of wastewater into adjacent water bodies.

Nutrient Management: Develop a comprehensive nutrient management plan to minimize discharge into water bodies, optimize feeding practices and monitor water quality parameters regularly, implement aeration and circulation systems, minimize chemical use and ensure proper chemical handling.

Waste Generation: Implement the 3R system (reduce, reuse, recycle) in waste management. Encourage suppliers and contractors to minimize packaging waste and deliver materials in bulk when possible. Additionally, durable and long-lasting materials are specified to reduce the need of frequent replacements. Hazardous waste, such as fuel and lubricants, is identified and managed according to regulations, with workers trained in safe handling and disposal practices. Implement composting systems for organic waste and landfill non-biodegradable trash.

Soil Contamination: Cover culture ponds with HDPE to prevent soil contamination, implement proposed solid waste and wastewater treatment systems, ensure drainage is connected to wastewater canals.

Noise Pollution: Provide personal protective equipment and monitor noise levels, implement mitigation measures by covering generators with sound-absorbing materials, provide medical checkups for workers.

Treats to Biodiversity: implement a wastewater management scheme and solid waste management plan. It also prohibits hunting and fishing of animals during their breeding seasons to protect local wildlife populations.

Land Use Change and Utilization of Local Resources: replantation of mangrove in surrounding gaps and native tree planting in leveled areas vicinity of the site. Support for local community needs is integrated into the (CSR) plan.

Contamination of Marine Ecosystem: implement biosecurity control measures, review hazards causing disease outbreaks and update control measures, install disinfection spray systems for vehicles.

Occupational Hazards: properly store chemicals, implement safe handling procedures, and provide worker training, establish maintenance schedules and inspect equipment regularly, train workers on safe operation and emergency shutdown procedures, assess and address ergonomic risks, provide ergonomic training, implement safety measures for working around water bodies, provide adequate life-saving equipment and monitor workers' health, implement good housekeeping practices and train employees on fire prevention measures and electrical safety.

The outlined strategies aim to minimize the environmental footprint of the project, focusing on environmental and social aspects. The emphasis is on preventive measures, efficient operations, and continuous monitoring to ensure adherence to environmental standards and promote sustainable practices throughout the construction and operation phases.

Conclusion

The Environmental Management Plan (EMP) provides a comprehensive framework outlining necessary mitigation measures and reporting obligations. Khine Zin Yaw Trading Co., Ltd. further demonstrates its commitment by appointing an Environmental, Occupational, Health, and Safety Officer (EOHSO) to monitor the implementation and compliance of proposed mitigation measures and management plans.

Key focal areas within the Environmental Impact Assessment (EIA) include water quality management, waste management, habitat conservation, disease prevention and biosecurity, biodiversity conservation, stakeholder engagement, and monitoring. The baseline environmental quality measurement and impact assessment indicate potential significant impacts on water quality and waste generation. As a response, the project proponent emphasizes the implementation of specific mitigation measures, including wastewater treatment through constructed wetlands and the adoption of land filling and composting approaches.

Through the adoption of responsible aquaculture practices, the shrimp farming project aims to minimize adverse impacts on coastal ecosystems, contributing to the promotion of marine biodiversity and the sustainable use of marine resources. The project commits to maintaining or replanting mangroves along the project's boundary, preserving the watershed area, and engaging in gap replanting of terrestrial native species to serve as crucial habitats for various species. Ultimately, the Environmental Impact Assessment serves as a valuable guide to navigate and minimize negative environmental impacts, promoting sustainable practices that ensure the long-term viability and ecological integrity of the shrimp farming.