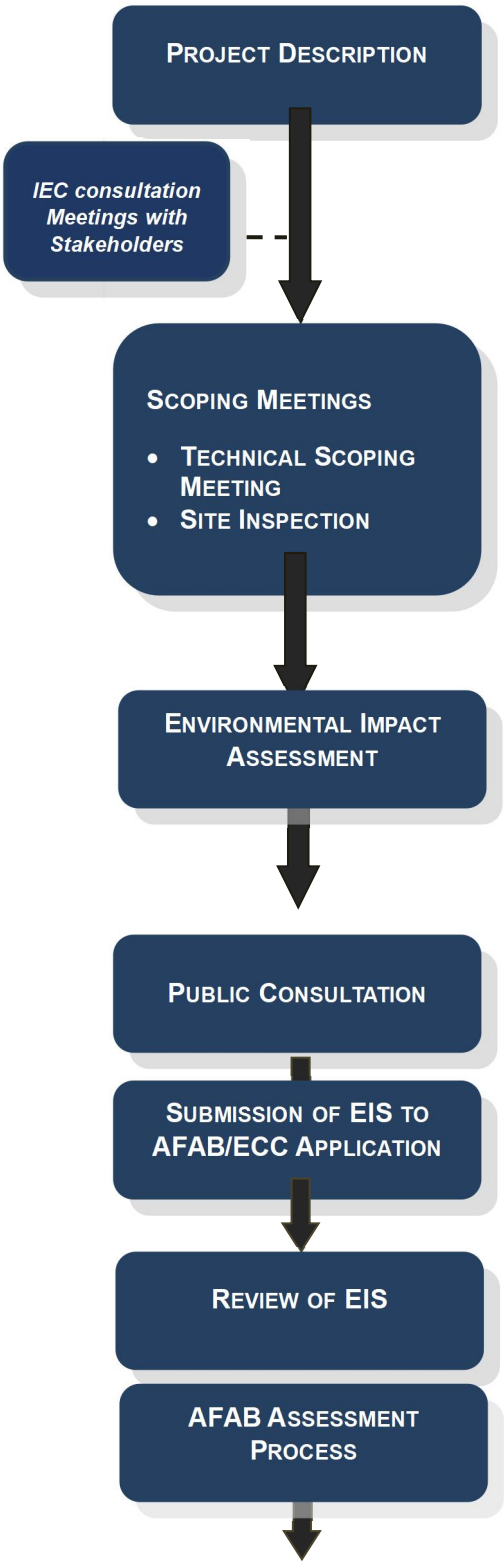
EXECUTIVE SUMMARY

PROJECT FACT SHEET

PROJECT NAME	**LUCANIN MULTI-TIER BROILER PROJECT**
PROJECT LOCATION	BRGY LUCANIN, MARIVELES, BATAAN
PROJECT AREA	146.90 HECTARES
NATURE OF PROJECT	BROILER FARM
PROJECT COST	PHP 4,803,966,948.42
PROJECT PROPONENT	**SAN MIGUEL FOODS, INC. (SMFI)**
PROPONENT'S ADDRESS	NO. 40 SAN MIGUEL AVENUE, MANDALUYONG CITY, PHILIPPINES
AUTHORIZED REPRESENTATIVE	**MR. JESUS M. MAGTIRA** Vice President- Head of Plant Expansion Projects
CONTACT DETAILS	(+632)-5317-5181
CONTACT PERSON / CONTACT DETAILS	**ENGR. EDUARDO ROMERO** CIVIL ENGINEER – STRATEGIC PROJECTS MANAGEMENT GROUP CELLPHONE NO.: 09175748438 EMAIL: EROMERO@SANMIGUEL.COM.PH
NAME OF EIA PREPARER	**BROWN & GREEN ENVIRONMENTAL SERVICES, INC. (BGESI)**
CONSULTANT'S ADDRESS	BLK. 2 LOT 8, MARIS TOWNHOMES, SAN JOSE, ANTIPOLO CITY
CONTACT PERSONS AND DETAILS	**ENGR. ELIZABETH I. LAYUG** ENVIRONMENTAL CONSULTANT DENR-EMB ACCREDITED EIS PREPARER (IPCO NO. 150) LANDLINE: (+632) 650 0463 EMAIL: BETHSIGNACIO2461@GMAIL.COM

PROCESS DOCUMENTATION



A project description was prepared by the Proponent which includes the project information, conceptual site layout plans, and the project site boundary, which defines the coverage of the ECC application.
The Project Screening and Technical Scoping meetings were held January 23, 2023 at AFAB Envi. Conference room was attended by Authority of the Freeport Area of Bataan (AFAB) representatives, SMFI and Brown & Green Environmental Services, Inc. (BGESI). Ocular inspection / site visit was conducted on February 14, 2023 with AFAB, SMFI and BGESI.
BGESI was subcontracted by SMFI in application to prepare an Environmental Impact Statement (EIS) report for Environmental Compliance Certificate (ECC) application for the proposed SMFI Lucanin Multi-Tier Broiler Project . BGESI conducted the required technical studies for the Environmental Impact Assessment (EIA). The studies include various baseline data gathering, environmental surveys, Information Education Campaign (IEC) and social surveys. The assessment of the potential impacts of the project and proposed mitigating measures are included in the study.
The Public Consultation was held on ____ at ____ and was attended by the ____. Additional relevant issues and concerns that will be gathered during the public consultation will be addressed in the revision of the EIS.
The final EIS was submitted to _____ for procedural review. It was accepted on _____.
A technical review of the EIS document followed passing the procedural review. The review was conducted by the EIARC. The first review meeting was held on _____. The final meeting was held on _____.
An assessment report will be prepared by the Environmental Impact Assessment Review Committee (EIARC) with endorsement from the AFAB.

DECISION ON ECC APPLICATION

AFAB will make a decision on the Environmental Compliance Certificate (ECC) application based on the Environmental Impact Statement (EIS), the Environmental Impact Assessment (EIA) process undertaken, and the recommendation of the EIARC.

The Environmental Impact Assessment (EIA) Study team and the role of each member is presented in **Table ES-1.** The Accountability Statements of the Proponent and the EIA preparer are shown in **Annex 2 and Annex 3** respectively.

Table ES-1
The EIA Study Team

NAME	ROLE
Elizabeth Ignacio-Layug	Team Leader / Environmental Specialist
Estephen Fortela	Terrestrial Flora and Fauna Specialist
Jessica Mae Amores	Geologist/Hydrologist/ Water Quality Specialist
Ruben Estudillo	Marine Specialist
Ronald Pahunang	Air Quality and Noise Specialist
Reindelleson Mendoza	Environmental Specialist
Juan Paulo Salino	IEC and Social Specialist
Maricel Domingo	Project Coordinator

Table ES-2 Summary of Baseline Characterization

THE LAND	○ **LAND USE AND CLASSIFICATION** Based on the Comprehensive Land Use Plan (CLUP) of Mariveles for years 2017-2026, the proposed Lucanin Multi-Tier Broiler Project is under agriculture classification. However, these lots were declared as Industrial Zone by the Mariveles MPDO as Planned Unit Development Area of the CLUP/ Zoning Ordinance approved under (Sangguniang Panlalawigan) SP Resolution No. 2018 dated May 18, 2018 and the SB Resolution No. 089-2018 dated June 18, 2018 (as adoption). The Project Area does not fall within any legislated or initial component of protected areas, according to data from DENR Region III. The nearest protected areas are the Palanas Watershed and Bataan National Park, which are about 9 km and 45 km away from the project site respectively. ○ **GEOLOGY AND SOILS**

	Lucanin is characterized by rugged and hilly terrain, with elevation ranging from sea level up to about 190 meters above sea level around the proposed broiler farm. The project area is located on the slopes of the Mount Mariveles, which is a dormant volcano that forms a prominent part of the landscape in the region. The terrain of Lucanin is dominated by steep slopes and deep valleys, with the highest peaks found in the northern part of the area. The topography is marked by numerous small streams and rivers, including the Lucanin River, which runs through the area and eventually empties into Manila Bay. The river system is an important source of water for irrigation and domestic use in the area. The area around Mariveles is underlain by a series of sedimentary rocks, including sandstones, shales, and conglomerates, which were deposited in shallow marine environments during the late Cretaceous period. These rocks have been uplifted and folded by tectonic forces, forming a series of ridges and valleys that characterize the topography of the region. The predominant soil type in the Municipality of Mariveles is Antipolo Clay and Pilar. Two (2) soil samples were obtained from the project area. As the results show, all parameters in both sampling stations fall below the favourable standards set forth by the guidelines. o **TERRESTRIAL FLORA AND FAUNA** A total of 86 species from 83 genera and 51 families of trees, shrubs, herbs, grasses and vines were observed in the proposed project area located in Brgy. Alion, Brgy. Lucanin and Brgy. Townsite in Mariveles, Bataan. In terms of habit, trees were the most represented with 42 species followed by shrubs, grasses, and vines with 19, eight (8) and six (6) species observed respectively. Malvaceae (flowering plants) was the most represented family with 12 species. This is followed by Fabaceae (legumes, peas, and beans family) and Poaceae (monocotyledonous grass family), which were represented by 10 and seven (7) species respectively. Moraceae (mulberry and figs family), Lamiaceae (mint and sage family), Sapindaceae (soapberry family) were represented by five (5) species each.

	Overall, there were 34 wildlife species that were recorded during the survey. It comprises 26 bird species, 4 mammal species, 3 reptile species and 1 amphibian species. The sampling period coincided with the migratory season of birds. The observed weather conditions of the survey varied from sunny to overcast.
THE WATER	○ **OCEANOGRAPHY** The phytoplankton organisms obtained during this survey was dominated by diatom Skeletonema (average 2,266,748 cells/m3, or 50.66%) followed by other diatoms Chaetoceros (average 1,111,929 cells/m3, or 24.85%; Rhizosolenia (average 219,981 cells/m3 or 4.92%;) and Thalassionema (average 206,280 cells/m3 or 4.61%). Overall, the zooplankton organisms sampled were dominated by the ciliate tintinnids (average 18,886 organisms/m3 or 49.98) followed by copepod nauplius larvae (average 38,537 organisms/m3 or 20.72%, appendicularia Oikopleura (average 28,410 organisms/m3, or 15.27%; ciliate Codonellopsis (average 28,410 organisms/m3, or 10.15%. The overall marine plankton organisms in this study were dominated by phytoplankton (96.01% of the total plankton catches), while zooplankton accounted for only 3.99% which indicates that the density of the phytoplankton in the area appears sufficient to support a substantial food base. The biomass ranged widely from 1.30 to 106.22 wwt g/m2. Inter-station comparison showed Station MSB3 with the highest biomass (106.22 wwt g/m2), while Station MSB3 had the least biomass (1.30 wwt g/m2). The mean biomass value recorded for all the four (4) stations was 37.99 wwt g/m2. Results of the coral reef habitat assessment based on the present literature survey conducted indicate that there are limited coral reef areas within Manila Bay. The reefs within the Manila Bay are concentrated close to the mouth of the bay. The major reef areas are specifically found along the southern Cavite coastline in the municipalities of Ternate and Maragondon. Along the Bataan coast, reefs are found only in the municipalities of Limay (Lamao Point to Petron pier) and Mariveles (Lucanin and Alas-asin). Coral reefs are also found in Corregidor and Caballo Islands. ○ **WATER QUALITY**

	Based on the result of marine quality sampling, the true color levels of the water samples collected in this survey were at a uniform level of three (3) TCU in all marine stations; however, all these color values are way below the maximum permissible limit of 75 TCU in Class SC water. The result of groundwater quality shows that the station GW 1 was slightly below the minimum temperature mandated by DAO Class A. Its TSS value is also above the limit for both PNSDW and DAO. High TSS levels in groundwater can be caused by a variety of factors, including natural processes such as erosion and weathering of rocks and soils. High levels of rainfall can also increase TSS levels in groundwater. Anthropogenic activities such as construction, mining, and agriculture can also increase TSS levels in groundwater. These activities can lead to soil erosion, which can cause sediment to enter the groundwater
THE AIR & NOISE	○ **CLIMATOLOGY** The climate at the project site belongs to Type 1. Type 1 climate has two (2) pronounced seasons, namely: dry and wet seasons. The dry season is from November to April and the wet season during the rest of the year (May to September). In the Province of Bataan, there are projected increases in air temperature in all periods under moderate and high emission scenarios. Most alarming is the increase of the warm spell duration index in all future scenarios (early, mid-, and late) from 10.8 days (baseline years) to as high as 365 days (1 year) mid and late future under moderate and high emission scenarios. ○ **AIR QUALITY** TSP PM10 levels ranged from 24.9 to 68.1 µg/Nm3 and 12.4 to 23.6 µg/Nm^3, respectively. PM_{10} levels in February 2023 ranged from 9.7 to 31 µg/$Nm^{3.}$ These concentrations were within the ambient guideline values set for TSP and PM_{10} at 230 and 150 µg/Nm^3, respectively. The measured ambient SO_2 and NO_2 concentrations air concentrations in the November 2021 and February 2023 sampling were all less than the ambient guideline values set at 180 and 150 µg/Nm^3, respectively. Ambient air concentrations of particulate metals (As, Cd, and Ni) were not detected in the February 2023 sampling. There were traces, however, of Zn

	(0.06 to 0.7 µg/Nm^3), Hg (0.002 to 0.006 µg/Nm^3), and 0.13 to 0.26 µg/Nm^3. Levels of Hg were all less than the guideline value of 1 µg/m^3 (annual average) for inorganic Hg vapor (WHO, 2000). In terms of the air quality indices (AQI) established by the DENR, levels of TSP, PM_{10}, $PM_{2.5}$, SO_2, and CO in the area were all in "good condition" at the time of monitoring. ○ **NOISE QUALITY** All air quality monitoring stations have results that are within the DENR guidelines. The median of the seven highest noise readings at Stations N1 to N4 were all within the respective ambient noise standards. This suggests relatively tranquil conditions typical of rural areas, the sources of noise of which were mostly from animals and insects, people conversing, and on some occasions, passing motorcycles
THE PEOPLE	○ **SOCIO ECONOMIC AND DEMOGRAPHIC PROFILE** Based on the 2020 data of Philippine Statistics Authority, Mariveles is the most populous municipality with 149,897 total population or 17.56% of Bataan Province. The project-affected barangays, Townsite, Lucanin and Alion have a combined population of 17,781 or 11.86% of Mariveles. Barangay Townsite's 2020 population increments to 7,203 from 6,880 in 2015 or 4.69% growth rate while Barangay Lucanin's 2020 population increases to 7,189 from 5,169 in 2015 In terms of population change and Barangay Alion's 2020 population increases to 3,389 from 3.264. Brgy. Lucanin has the second population growth rate in the municipality with 39.08%. ○ **BASIC SERVICES** The Mariveles Water District (MARIWAD) is the primary distributor of water in the Municipality of Mariveles. MARIWAD acquires water supply from 20 deep wells sources, seven have elevated steel tanks and one has a ground reservoir. Alternatively, the Freeport Area of Bataan (FAB), former Bataan Economic Processing Zone (BEPZ), has built its own water well. The Peninsula Electric Cooperative, Inc. (PENELCO) is the primary distributor of electric power supply to the Municipality of Mariveles and 11 other

	municipalities in Bataan. Based on the PENELCO's report last December 2015, all 18 barangays have accessed to electricity. There are 77 Barangay Power Associations (BAPAs) involving 56 sitios. About 15,716 households owned communication devices in the Municipality of Mariveles. As to the affected barangays of the project, Barangay Lucanin has 701 households with communication devices on their own and 635 households for Barangay Townsite and 512 households for Barangay Alion o **MORTALITY AND MORBIDITY** In 2014, there are 924 births in the Municipality wherein 479 are male and 445 are female. In 2013, the total number of deaths occurred in the municipality is 381 in which 212 are male and 169 are female. Out of 381 deaths, 30 were infant death (16 Male, 14 Female). Also, there are 5 fetal death and 2 Maternal deaths in 2013. There are 2,093 total births and 252 deaths recorded by the population of Mariveles resulting to net addition of 1,841 in the year 2015. The leading cause of deaths in Barangay Lucanin as of September 2023 data is Myocardial Infarction (Heart Attack) with 5 number of deaths recorded, followed by Hypertensive Vascular Disease with 2 incidents recorded. Barangay Alion reported about 5 people died for old age and 3 persons died with Diabetes. The leading disease for Barangay Lucanin is due to animal bite with 187 recorded incidents followed by Acute Respiratory Infection with about 183 reported cases. Barangay Alion reported about 107 cases with Acute Respiratory Infection, followed by animal bites with about 69 incidents. Barangay Townsite reported also about 179 cases of animal bites and with Urinary Tract Infection (UTI) with 50 cases. Other reported diseases for the three Barangays includes Hypertension, Diabetes, Tuberculosis and skin diseases o **PUBLIC PARTICIPATION** The Information Education Communication (IEC) Campaign for the affected barangays such as Lucanin, Alion and Townsite were conducted on February 8,2023. A courtesy call and visitation to Davao Broiler Farm and Limay Farm were

	conducted on May 3, 2023 and May 8, 2023, respectively. The visit aims to recognize and understand the technology that the proponent will use for the propose SMFI Lucanin Multi-Tier Broiler Project . o **INITIAL PERCEPTION** The perception of each barangay to the project were gathered by recording all the sentiments and concerns raised during the open forum. For Brgy. Lucanin, some residents pointed out the potential negative effects of the Broiler Farm to the nearby communities and expressed their objection to the project. However, the Brgy. Officials requested the residents to listen and understand the explanation / presentation of SMFI. In Brgy. Alion, both the Brgy. Officials and residents expressed their objection to the project. They all raised their concerns to the potential negative impacts of the project to their community once implemented. The Brgy. Officials of Brgy Townsite is requesting for another meeting to discuss all issues raised during the open forum and resolve it. They are also assessing the positive impacts of the project to their communities once implemented.
KEY ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES	The key physical environmental aspects, potential impacts and applicable measures were identified and are tabulated by project phases. **Tables ES-3** and **ES-4** show the potential impacts of the project and proposed mitigation measures.

Table ES- 3 Impact Management Plan (IMP) for Lucanin Multi-Tier Broiler Project

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
I. Pre-Construction Phase						
	The Land					
Clearing of vegetation for initial access roads and facilities	Terrestrial flora	Decrease in flora cover; Loss of vegetation; Biodiversity decline	• Design the location of roads and facilities where none to minimal tree individuals will be cleared. As much as possible, avoid areas with premium, endemic and endangered species.. • Limit clearing to the proposed footprint of facilities to avoid unnecessary vegetation and habitat removal • Designate buffer zones or 'no-take' zones within the project site.	Proponent and outsourced Terrestrial Flora expert)	Php 100,000	Included in the EMoP, ECC condition
	Terrestrial fauna	Possible displacement of existing wildlife animals	• Areas to be cleared should be delineated by fences to avoid excessive removal of vegetations. Areas to be cleared of vegetation should be rehabilitated to near pre-project conditions as possible. This would entail reforestation using indigenous plant species.	Proponent and outsourced Terrestrial Fauna expert)	Php 100,000	Included in the EMoP, ECC condition
	Land Geology, geomorphology, Geohazards	Erosion, slope failure, inducement of landslides, seismic activity, liquefaction	• Conduct necessary activities in the planning and design including slope stability and foundation studies, as well as seismic studies including site-specific peak ground acceleration (PGA) potential. • Account for the possible effects of climate change in the change in the amount of rainfall and number of days with rain.	Proponent / Contractor	Include in TOR of Detailed Engineering Design (DED) for Construction	Part of DED / Construction Cost
Generation of noise	Terrestrial fauna	Displacement of animals due to noise Affect navigation capability of birds and bats species	• Operation of high noise-emitting equipment and vehicles must be scheduled to prevent unnecessary activities. • Equipment and vehicles must be subjected to regular maintenance to minimize excessive noise	Proponent and outsourced Terrestrial Fauna expert)	Php 100,000	Included in the EMoP, ECC condition
II. Construction Phase						
Land clearing and excavation	**The Water**					
	Plankton community	Siltation/sedimentation and turbidity which would tend to limit light penetration in the water column which is essential in phytoplankton photosynthesis; would also slightly increase mortality of fish eggs/larvae (ichthyoplankton) including other planktonic organisms. However, these impacts are insignificant and temporary	• Provision of temporary drainage canals with silt traps or basin to intercept washed out soil particles particularly in areas of excavation. • Surface run-off should be directed into a temporary ditch to allow settlement of suspended solid • Mound of soils and construction spoils should not be placed near the creek/river to avoid its movement towards the bay waters. • Filling materials should be immediately transported to the fill area and compacted to avoid its transport to the bay through runoff. • Regular disposal of construction spoil should be done to prevent accumulation in the site which could increase the possibility of its transport to the sea	Proponent's Environmental Unit/Contractor	Part of construction cost	Proponent and Contractor's MOA
Project construction activity	Soft bottom benthos	No seabed disturbance since there will be no project construction activities along the shoreline which is about 2.25 km from the poultry farm project . Therefore, there will be no any significant effect on the soft bottom benthic communities in the area	• No mitigation is needed	-	-	-
	Coral, seagrass and mangrove communities	None of these sensitive biological communities (SBCs) were found to occur in the area. Therefore, no	• No mitigation is needed	-	-	-

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
		negative impacts are predicted				
	Local fisheries	Significant impacts to fisheries resources are unlikely due to the distant location of their traditional and municipal fishing grounds/operations from the proposed broiler farm project	• No need for mitigation of impacts is required	-	-	-
	Surface water quality	Decreased water quality due to erosion and sedimentation	• Sediment Control: To prevent sediment from entering nearby water bodies, sediment control measures such as silt fences, sediment basins, and vegetation cover can be used. Implementing soil conservation practices, such as cover cropping and conservation tillage, to reduce the potential for sediment runoff. • Properly managing construction waste: Construction waste such as excess soil, concrete, and chemicals can potentially contaminate water. To prevent contamination, construction waste should be properly managed and disposed of in accordance with local regulations. • Conducting water quality monitoring: Prior to construction, water quality monitoring can be conducted to establish baseline conditions and identify any potential sources of pollution. Regular monitoring during and after construction can also help to identify and address any issues that may arise. • Implementing Best Management Practices (BMPs): BMPs can be used to manage and minimize the impact of construction activities on water quality. These may include techniques such as slope stabilization, revegetation, and stormwater management practices.	Proponent / Contractor	Include in TOR of Detailed Engineering Design (DED) for Construction	PPart of DED / Construction Cost and Also Included in the EMoP, ECC condition
		Degradation from sewage, wastewater and solid waste	• Proper waste management: Implement proper waste management practices during construction, including proper disposal of sewage and solid waste. Ensure that waste is properly stored, collected, and disposed of in accordance with local regulations. • Install proper wastewater facilities: Install proper wastewater treatment facilities to ensure that any wastewater generated during construction is disposed of properly. • Implement erosion and sediment control measures: Implement erosion and sediment control measures to prevent soil erosion and sedimentation, which can lead to increased nutrient and bacteria levels in water bodies. • Establish buffer zones: Establish buffer zones around water bodies to prevent any potential negative impacts on water quality. • Monitor construction activities: Monitor construction activities to ensure that there are no leaks or spills of hazardous materials that could potentially contaminate water sources. • Conduct regular water quality testing: Conduct regular water quality testing to monitor for any changes in water quality, and take appropriate action if any issues are identified. • Engage with local communities: Engage with local communities and stakeholders to identify any concerns or issues related to water quality and take these into consideration in the planning process.	Proponent / Contractor	Include in TOR of Detailed Engineering Design	Part of DED / Construction Cost and Also Included in the EMoP, ECC condition
	Streamflow	Disruption of water flow	• Avoiding stream channelization: Stream channelization, or the straightening and deepening of streams, can cause changes in water flow patterns and disrupt natural habitats. To prevent this, it is important to avoid stream channelization and preserve the natural flow of streams and waterways. • Implementing erosion control measures: Construction activities can cause soil erosion, leading to sedimentation and the disruption of water flow. To prevent this, erosion control measures such as silt fences, sediment basins, and vegetation cover can be used to trap sediment and prevent it from entering nearby waterways.	Proponent / Contractor	Include in TOR of Detailed Engineering Design	Part of DED / Construction Cost

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			• Minimizing land disturbance: Minimizing land disturbance during construction can help to prevent soil erosion and minimize the potential for sediment runoff. This can be achieved by using proper excavation techniques, avoiding unnecessary grading, and limiting the use of heavy equipment. • Using BMPs for stormwater management: Best Management Practices (BMPs) can be used to manage stormwater runoff and prevent disruption of water flow. Techniques such as vegetated swales, infiltration trenches, and permeable pavements can help to slow down and filter stormwater runoff, promoting infiltration and reducing erosion. • Conducting hydrological studies: Prior to construction, hydrological studies can be conducted to evaluate the site's drainage patterns and identify any potential impacts on water flow. This can help to inform the design of stormwater management measures and ensure that water flow is maintained throughout construction.			
Transportation of materials, machineries and equipment to project site Operation and maintenance of vehicles and heavy equipment	Surface and groundwater Quality	Decreased water quality due to erosion and sedimentation	• Sediment Control: To prevent sediment from entering nearby water bodies, sediment control measures such as silt fences, sediment basins, and vegetation cover can be used. Implementing soil conservation practices, such as cover cropping and conservation tillage, to reduce the potential for sediment runoff. • Properly managing construction waste: Construction waste such as excess soil, concrete, and chemicals can potentially contaminate water. To prevent contamination, construction waste should be properly managed and disposed of in accordance with local regulations. • Conducting water quality monitoring: Prior to construction, water quality monitoring can be conducted to establish baseline conditions and identify any potential sources of pollution. Regular monitoring during and after construction can also help to identify and address any issues that may arise. • Implementing Best Management Practices (BMPs): BMPs can be used to manage and minimize the impact of construction activities on water quality. These may include techniques such as slope stabilization, revegetation, and stormwater management practices.	Proponent / Contractor	Include in TOR of Detailed Engineering Design	Part of DED / Construction Cost and Also Included in the EMoP, ECC condition
Clearing of vegetation and earth moving activities; change in land use	**The Land**					
	Terrestrial flora	• Loss of vegetation; • Loss of ethnobotanically important species; • Biodiversity decline	• Off-setting of lost vegetation through rehabilitation of suitable planting areas with native vegetation species; • Earth-balling of affected premium and endangered forest tree species (if applicable); • Regular monitoring of species composition in the baseline sites	Multi-partite Monitoring Team (MMT) or other monitoring agency (if applicable); Environmental Officer; Outsourced Terrestrial Flora expert)	Php 75,000/monitoring period	Included in the EMoP, ECC condition
	Terrestrial fauna	• Possible displacement of existing wildlife animals	• Areas to be cleared should be delineated by fences to avoid excessive removal of vegetations. Areas to be cleared of vegetation should be rehabilitated to near pre-project conditions as possible. This would entail reforestation using indigenous plant species.	Proponent and outsourced Terrestrial Fauna expert)	Php 100,000	Included in the EMoP, ECC condition
Generation of noise	Terrestrial fauna	• Displacement of animals due to noise • Affect navigation capability of birds and bats species	• Operation of high noise-emitting equipment and vehicles must be scheduled to prevent unnecessary activities. • Equipment and vehicles must be subjected to regular maintenance to minimize excessive noise	Proponent and outsourced Terrestrial Fauna expert)	Php 100,000	Included in the EMoP, ECC condition
Excavation of soil	Terrestrial Fauna	• Dust emission may result to respiratory	• For large vehicles that expire dust and smoke, devise a routing scheme for	Proponent and outsourced	Php 100,000	Included in the EMoP, ECC

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		impairment of wildlife animals	hauling vehicles to minimize areas to be disturbed and water should be sprinkled to minimize dust accumulation and spreading	Terrestrial Fauna expert)		condition
Disposal of waste materials such as oil from large equipment and vehicles, and garbage from personnel workers	Terrestrial Fauna	• Waste materials can be ingested by wildlife animals • Wildlife animals can be entangled by the waste materials • Released chemicals from the vehicles can be harmful to wildlife animals	• Proper waste management plan by the project proponent • Equipment and vehicles must be checked regularly to avoid generation of oil waste materials • Waste disposal should be coordinated with the project management to avoid excessive accumulation of wastes.	Proponent and outsourced Terrestrial Fauna expert)	Php 100,000	Included in the EMoP, ECC condition
Clearing, grubbing, excavation, and ground preparation Transportation of materials, machineries and equipment to project site Operation and maintenance of vehicles and heavy equipment	Land use and classification	• Change in land use and tenure	• Verify land-use assessment: Before construction begins, conduct a verification of the land-use assessment to identify the current land use and tenure status of the proposed construction site. This assessment should include consultation with local authorities and communities. • Respect existing land tenure: Respect the existing land tenure by ensuring that landowners are fairly compensated for any land use changes, and by securing the necessary permits and approvals from local authorities. • Engage with local communities: Engage with local communities and stakeholders to identify any concerns or issues related to land use and tenure status, and take these into consideration in the planning process. • Establish buffer zones: Establish buffer zones around the construction site to prevent any potential negative impacts on neighboring land uses. • Monitor construction activities: Monitor construction activities to ensure that land use and tenure status is not negatively impacted by the construction of the broiler farm.	Proponent / Contractor	Include in TOR of Detailed Engineering Design (DED) for Construction	Part of DED / Construction Cost
		• Encroachment and disturbance of ECAs	• Conduct a site assessment: Before construction begins, conduct a site assessment to identify any protected areas near the proposed construction site. This assessment should include a review of local and national laws and regulations related to protected areas. • Plan the construction carefully: Use the information from the site assessment to plan the construction activities carefully. Avoid any activities that could encroach on protected areas or cause unnecessary disturbance. • Work with local authorities: Consult with local authorities, including the Department of Environment and Natural Resources (DENR) and other relevant agencies, to ensure that all regulations and requirements related to protected areas are followed. • Establish buffer zones: Establish buffer zones around protected areas to prevent construction activities from encroaching on these areas. These buffer zones should be clearly marked and enforced throughout the construction process. • Implement environmental management practices: Implement environmental management practices during construction, such as proper waste management, erosion control measures, and sedimentation control measures. These practices can help prevent contamination and minimize the impact of construction activities on protected areas. • Monitor construction activities: Monitor construction activities to ensure that protected areas are not being encroached upon and that environmental management practices are being followed.	Proponent / Contractor	Include in TOR of Detailed Engineering Design (DED) for Construction	Part of DED / Construction
	Geohazards	• Inducement of effects of seismic activity	• Conduct a geohazard assessment: A geohazard assessment should be conducted to identify any potential geohazards in the construction site. The assessment should include an evaluation of the geology, soil conditions, topography, and other factors that can contribute to geohazards such as landslides and soil liquefaction. • Implement engineering controls: Engineering controls such as retaining walls,	Proponent/Contractor	Include in TOR of Detailed Engineering Design (DED) for	Part of DED / Construction Cost

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
			slope stabilization measures, and ground reinforcement techniques can be implemented to prevent landslides and other slope failures. Soil nailing, anchoring, and geotextiles are some examples of ground reinforcement techniques that can be used. • Avoid areas prone to flooding: Construction activities can cause sedimentation and erosion, which can affect the natural flow of water and increase the risk of flooding. To mitigate this, it is important to avoid areas prone to flooding and ensure that proper stormwater management measures are in place. • Implement proper site drainage: Proper site drainage is critical in preventing soil erosion and surface runoff. Drainage systems such as swales and sediment basins can be used to capture sediment and filter runoff. • Monitor construction activities: Monitoring construction activities is essential to ensure that proper mitigation measures are being implemented and that geohazards are being managed effectively.		Construction	
	Soil	• Loss of topsoil	• Whenever possible, convert topsoil and suitable dredge spoils for backfilling and landscaping within the project area.	Project proponent/ contractor	Include in TOR of Detailed Engineering Design (DED) for Construction	Part of DED / Construction Cost
		• Soil Erosion	• Implementing erosion control measures: Erosion control measures such as silt fences, sediment basins, and vegetation cover can be used to prevent soil erosion and protect nearby water resources.	Proponent / Contractor	Include in TOR of Detailed Engineering Design (DED) for Construction	Part of DED / Construction Cost
		• Soil Contamination	• Properly storing construction materials: Construction materials such as concrete, lumber, and soil can potentially contaminate soil. To prevent contamination, these materials should be stored properly and away from sensitive areas. • Minimizing land disturbance: Minimizing land disturbance during construction can help to preserve soil structure and minimize the potential for soil contamination. This can be achieved by using proper excavation techniques, avoiding unnecessary grading, and limiting the use of heavy equipment. • Properly managing construction waste: Construction waste such as excess soil, concrete, and lumber can potentially contaminate soil. To prevent contamination, construction waste should be properly managed and disposed of in accordance with local regulations. • Conducting soil testing and monitoring: Regular monitoring during and after construction can also help to identify and address any issues that may arise.	Proponent / Contractor	Include in TOR of Detailed Engineering Design (DED) for Construction	Part of DED / Construction Cost and Included in the EMoP, ECC condition
	The Air					
Construction of project facilities and access roads	Air	• Increase in fugitive/ dust and gaseous emission	• Use, where possible, of water for control of dust from construction and quarrying or clearing of lands; • Setting up wheel washing facilities at the construction site, particularly during rainy or wet seasons. • Impose speed limits within the construction site and along access roads • Limit construction works during arid and windy conditions, mainly when dust is visibly dispersed outside the project site, • Use wind erosion measures (e.g., windbreakers) and cover storage piles, if necessary,	Project proponent/ contractor	PhP 50,000 per month	Part of construction cost

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
			• Prevent possible spillage of materials along roads by providing the appropriate cover of haul materials in the truck, • Limit the idling of vehicles as much as possible to minimize the release of air pollutants. The recommended idling time is no more than three minutes while parking or stopping, though engines may idle when necessary, such as cement mixers and content delivery equipment (Source: www.doee.dc.gov), • Develop and implement an effective traffic management plan for continuous traffic flow, thereby reducing fuel consumption and tailpipe emissions, and • Maintenance of the heavy equipment, vehicles, and other construction equipment following the manufacturer's specifications and legal requirements			
Construction of project facilities and access roads	Noise	• Increase in noise levels	• Include Noise Mitigation Plan in the contractor's contract. Include compliance certificate. • Limit use of heavy equipment at nighttime, especially equipment that emits high noise level • Enclose high noise emitting equipment with temporary barriers and sound absorbing materials, when necessary. • Install adequate or appropriate mufflers at tailpipes of mobile equipment and generator sets • Reduce the number of operating equipment, particularly during nighttime and early morning/evening periods, if construction during nighttime will result in excessive noise at nearby noise-sensitive receptors; • Strictly impose speed limits on access roads and within the project area. • Provision partial or total enclosure of high noise sources, when necessary	Project proponent/ contractor	PhP 50,000 per month	Part of construction cost
	The People					
Construction of project facilities and access roads	Health and Safety	Risk on health and safety of the workers as well as the neighboring community	• Develop and implement a Construction Health and Safety Program • Establish and implement a solid waste management program • Close coordination with Barangay Local Government Units for any complaints (Complaints registry) • Residual wastes and hazardous wastes will be collected and transported to AFAB accredited landfill and/or treatment facilities by licensed waste transporters • Implementation of safe work methods and practices • Compliance to National Standards, local regulations and laws	Project proponent/ contractor	Part of construction cost	Proponent and Contractor's MOA
	Quality of Life: Health Services,Water Availability, and Sanitation	Disruption and/or competition indelivery of basic services and goods	• Provide housing and utilities for workers. • Ensure that contractor practice sustainable use of water. • Provide an Occupational Safety & Health Program for all employess and contractors • Close coordination with community leaders in promoting peace and order and acceptable lifestyle.	Project proponent/ contractor	Part of construction cost	Proponent and Contractor's MOA
	Quality of Life: Livelihood Opportunities	Generation of local employment. Increase in income for local residents and the LGUs. Increase in livelihood opportunities.	• Design and implement a robust "local first" hiring policy of q ualified applicants. • Observe no preference in terms of gender and race during the hiring process. • Source out other necessary consumable materials such as food from the community, people's organization, and/or farmers. • Provide livelihood trainings, as part of the SDP, to project-affected communities in preparation to the forthcoming opportunities.	Project proponent/ contractor	Part of construction cost	Proponent and Contractor's MOA
	Quality of Life:	Traffic Congestion	Prevent possible traffic congestion by implementing the following: • Plan logistic movement of equipment to avoid high density traffic areas and use	Project proponent/ contractor	Part of construction	Proponent and Contractor's

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
	Transportation Network		of alternate routes; • Schedule hauling and movement of construction vehicles by avoiding peak hour traffic such as 11 PM to 5 AM (from Manila) and to 8 PM to 6 AM (from Bataan) • Assign traffic personnel to ensure normal flow of vehicles particularly at intersections; • Conduct detailed traffic survey/route alignment to determine optimum route and schedule.		cost	MOA
II. Operational Phase						
Sewage and wastewater generation from various sources, including storm water and run-off from land	**The Water**					
	Plankton community	Will eventually end up in the nearshore marine waters of Lucanin (through the Amo River and Lucanin River)	Will develop the necessary infrastructure in the area of sewage and wastewater management to make the proposed broiler farm project sustainable.	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
		Water pollution with nitrate and pathogenic phosphate (usually fecal germs and Salmonella) is the main cause for concern in the case of poultry farming. Marine plankton communities can be negatively affected by the presence of these pollutants. Phytoplankton red tide organisms or HABs require nitrogen and phosphorus for their rapid growth, or bloom	Liquid wastes should be directed to a planned water treatment plant facility to ensure that coastal waters will be free from biological and bacteriological contaminants (liquid waste must be treated before it is released into the environment to prevent any harm or risk it may have on the environment and human health). Appropriate treatment will be employed so that the final effluent would meet the DENR water quality standards. Plankton monitoring/examination should be directed at screening for the occurrence of phytoplankton "red tide" organisms or other harmful algal bloom species.	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
	Surface and groundwater Quality	Degradation of water quality due to increased sewage, wastewater and solid waste from workers	Storm water should be diverted to the storm drains/canals (discharge points to be checked and inspected on a weekly basis for any sign of contamination before it will be discharged to the aquatic environment) • Implementing best management practices (BMPs) for nutrient and waste management, including proper storage and disposal of manure and other waste products. • Reducing the use of antibiotics and other chemicals that could potentially leach into surface water sources. • Regular monitoring of surface water quality to identify and address any potential issues in a timely manner.	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
Clearing of vegetation and earth moving activities; change in land use	**The Land**					
	Terrestrial flora	Biodiversity decline (decrease in species richness and abundance)	• Off-setting of lost vegetation through rehabilitation of suitable planting areas with native vegetation species; • Regular monitoring of species composition in the baseline sites; inclusion of flora protection programs in the IEC of the proponent.	Multi-partite Monitoring Team (MMT) or other monitoring agency (if applicable); Environmental Officer; Outsourced Terrestrial Flora	Php 75,000/monitoring period	Included in the EMoP, ECC condition

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
				expert)		
Accumulation of fecal matter from the poultry farm that can contaminate the nearby habitats such as the river system	Terrestrial Fauna	• Water pollution to the nearby river system • Disease transmission such as parasites from fecal matters to wildlife animals • Ingestion of toxic materials from fecal matters	Provision and construction of Waste water handling and treatment facilities such as • Anaerobic Baffled Reactor with Constructed Wetland - domestic wastewater coming from sanitary facilities of integrated building of different farmhouses will be treated via series of baffles along the treatment chamber • Wastewater Lagoon - wastewater discharge from the seasonal cleaning of houses will be treated via series of lagoons : Facultative, Aerobic, Maturation Pond and Engineered Wetlands • Sewage Treatment Plant - domestic wastewater from the ancillary building will be treated in a STP	Proponent and outsourced Terrestrial Fauna expert)	Php 100,000	Included in the EMoP, ECC condition
Operations of the broiler farm	Soil	Soil Contamination	• Implementing proper waste management: Proper management of waste is crucial to prevent the accumulation of waste products that can lead to soil contamination. Best management practices (BMPs) for waste management may include proper storage and disposal of manure and other waste products, composting, and the use of waste management systems such as lagoons or anaerobic digesters. • Using chemical inputs responsibly: The use of chemicals such as antibiotics, disinfectants, and pesticides can potentially contaminate soil. To reduce the potential impact of these substances on soil quality, it is important to use them responsibly and in accordance with recommended application rates and practices. • Implementing soil conservation practices: Soil conservation practices such as cover cropping, conservation tillage, and crop rotation can help to improve soil quality, reduce erosion, and maintain soil health. • Regular soil testing and monitoring: Regular soil testing and monitoring can help to identify potential issues with soil quality and allow for timely interventions to prevent contamination or degradation. • Engaging in responsible land use practices: Responsible land use practices such as minimizing land disturbance, reducing runoff, and avoiding soil compaction can help to maintain soil structure and prevent soil degradation.	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
	The Air					
Poultry farm operation (manure management, dead chicken disposal, etc.)	Air Quality	Odor nuisance	• Ensure that mechanical interventions at all points of entry and adequate ventilation to keep manure dry. • Implement a proper waste management to minimize or avoid odor nuisance that will arise • Regular maintenance of ventilation fans and other equipment • Ensure regular Collection of manure and proper handling and treatment. Collection of manure should be within time interval of 24 hours • Regular housekeeping of facilities	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
	Noise	Increase in noise levels	• Install adequate or appropriate mufflers at tailpipes of mobile equipment and generator sets • Strictly impose speed limits on access roads and within the project area.	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
	The People					
Operations of the broiler farm	Health and Safety	Risk on health and safety of the workers as well as the neighboring community	• Develop and implement an Environment ,Health and Safety Program • Establish and implement a solid waste management program • Close coordination with Barangay Local Government Units for any complaints (Complaints registry)	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
			• Residual wastes and hazardous wastes will be collected and transported to AFAB accredited landfill and/or treatment facilities by licensed waste transporters Implementation of safe work methods and practices Compliance to National Standards, local regulations and laws			
	Multiplier effect and improvement of local /regional economy	Increase in employment opportunities and improvement quality of life	• Apply the "Local First" Hiring Policy for qualified personnel, wherever applicable • Observe no preference in terms of gender, religion and ethnicity during the hiring process • Source out other necessary consumable materials such as food from the community, people's organization, and/or farmers. • Provide livelihood trainings, as part of the SDP, to project-affected communities in preparation to the forthcoming opportunities.	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
	Quality of Life: Transportation Network	Traffic Congestion	• Prevent possible traffic congestion by implementing the following: • Plan logistic movement of equipment to avoid high density traffic areas and use of alternate routes; • Schedule hauling and movement of trucks by avoiding peak hour traffic • Assign traffic personnel to ensure normal flow of vehicles particularly at intersections; • Conduct detailed traffic survey/route alignment to determine optimum route and schedule.	Proponent's Environmental Unit/Contractor	Part of Operation Cost	Included in the EMoP, ECC condition
III. Abandonment Phase						
Removal of broiler farm facilities	**The Water**					
	• Plankton and benthos communities and local fisheries	• No negative impacts are predicted	• No mitigation is needed			
	• Surface and groundwater Quality	• Degradation of water quality due to increased sewage, wastewater	• Proper waste disposal: Ensure that all waste generated during decommissioning is properly disposed of, including any sewage and solid waste. Follow local regulations and guidelines for waste disposal to prevent contamination of water sources. • Site cleanup: Conduct a thorough site cleanup after decommissioning, including removal of any remaining waste or debris. This will prevent any potential negative impacts on water quality and other environmental resources. • Restoration of the site: Restore the site to its natural state after decommissioning, including the removal of any buildings, structures, or equipment. This will minimize the impact on the surrounding environment and prevent any long-term negative impacts on water quality. • Water Quality monitoring: Monitor surface and groundwater quality around the site after decommissioning to ensure that there are no negative impacts on water quality. If any issues are identified, appropriate action should be taken to address them. • Community engagement: Engage with local communities and stakeholders during decommissioning to identify any concerns or issues related to water quality, and take these into consideration in the planning process.	Proponent's Environmental Unit/Contractor	Part of Abandonement Cost	Included in the ECC condition
	The Land					
	Soil	Soil contamination	• Soil testing: Conduct soil testing before decommissioning to identify any potential	Proponent's	Part of	Included in the ECC

PROJECT PHASE / ENVIRONMENTAL ASPECT (PROJECT ACTIVITY WHICH WILL LIKELY IMPACT THE ENVIRONMENTAL COMPONENT)	ENVIRONMENTAL COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	RESPONSIBLE ENTITY	COST	GUARANTEE / FINANCIAL ARRANGEMENTS
			contamination that may need to be addressed. If contamination is identified, appropriate measures should be taken to remediate the soil before decommissioning. • Proper waste disposal: Ensure that all waste generated during decommissioning is properly disposed of, including any soil that may be contaminated. Follow local regulations and guidelines for waste disposal to prevent contamination of soil and water sources. • Site cleanup: Conduct a thorough site cleanup after decommissioning, including removal of any contaminated soil. This will prevent any potential negative impacts on soil quality and other environmental resources. • Restoration of the site: Restore the site to its natural state after decommissioning, including the removal of any buildings, structures, or equipment. This will minimize the impact on the surrounding environment and prevent any long-term negative impacts on soil quality. • Monitoring: Monitor soil quality around the site after decommissioning to ensure that there are no negative impacts on soil quality. If any issues are identified, appropriate action should be taken to address them. • Community engagement: Engage with local communities and stakeholders during decommissioning to identify any concerns or issues related to soil quality, and take these into consideration in the planning process.	Environmental Unit/Contractor	Abandonement Cost	condition

Table ES- 4 Proposed Environmental Monitoring Plan (EMoP) for the Lucanin Multi-Tier Broiler Project

MODULE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETERS TO BE MONITORED	SAMPLING AND MEASUREMENT			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME[1]					
								EQPL RANGE			MANAGEMENT MEASURE		
			METHODS	FREQUENCY	LOCATION			ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT
I. PRE- CONSTRUCTION PHASE													
Land	Terrestrial Flora	Biodiversity indices, species richness and abundance	Belt-transect method, opportunistic sampling and ethnobiological surveys	Semi-annual	Baseline sampling stations	Proponent and Outsourced Terrestrial Flora expert)	Php 100,000/sampling	-	-	-	-	-	-
	Terrestrial Fauna	Biodiversity indices, species richness and abundance	Line-transect method, mist-netting method, opportunistic sampling and ethnobiological surveys	Semi-annual	Baseline sampling stations	Proponent and Outsourced Terrestrial Fauna expert)	Php 100,000/sampling	-	-	-	-	-	-
II. CONSTRUCTION PHASE													
Land	Terrestrial Flora	Biodiversity indices, species richness and abundance Occurrence and or counts of premium or native species	Belt-transect method, opportunistic sampling and ethnobiological surveys	Semi-annual	Baseline sampling stations	Multi-partite Monitoring Team (MMT) or other monitoring agency (if applicable); Environmental Officer; Outsourced Terrestrial Flora expert)	Php 75,000/monitoring period	10% decline in species composition with reference to baseline data or ranges can be identified by the MMT	30% decline in species composition with reference to baseline data or ranges can be identified by the MMT	50% decline in species composition with reference to baseline data or ranges can be identified by the MMT	Enhance maintenance and protection activities in the buffer zones	Rehabilitation of suitable planting areas with native tree species	Rehabilitation of suitable planting areas with native tree species with enhanced maintenance and protection activities to ensure higher plantation survival rate
	Terrestrial Fauna	Biodiversity indices, species richness and abundance; presence of absence of important native and endemic wildlife species	Line-transect method, mist-netting method, opportunistic sampling and ethnobiological surveys	Semi-annual	Baseline sampling stations	MMT; Environmental Officer; Outsourced Terrestrial Fauna expert	Php 100,000/sampling	10% decline in species composition with reference to baseline data	30% decline in species composition with reference to baseline data	50% decline in species composition with reference to baseline data	Continue monitoring; Determine the cause of decrease in species population	Continue monitoring; Determine the cause of decrease in species population; Coordinate with	Continue monitoring; Determine the cause of decrease in species population; Coordinate with

[1] *EQPL-Environmental Quality Performance Levels based on DAO 2003-30*

MODULE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETERS TO BE MONITORED	SAMPLING AND MEASUREMENT			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME[1]					
								EQPL RANGE			MANAGEMENT MEASURE		
			METHODS	FREQUENCY	LOCATION			ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT
												MMT	MMT; Determine which parameters near the limit
Water	May tend to limit light penetration which is essential in photosynthesis/plank-ton production, and may lead to irritation and clogging of gills of pelagic fish larvae/juveniles due to siltation/sedimenta-tion and increased turbidity from land clearing and excavation	Plankton species composition, richness, abundance and biomass	Plankton net sampling	Semi-annual	Nearshore (closer to river mouths) and offshore	PCO/Environ-mental Officer	50,000	80-100% decline in baseline data on species composition, richness, abundance and biomass	30% decline in baseline data on species composition, richness , abundance and biomass	50% decline in baseline data on species composition, richness, abundance and biomass	Investigate whether the decline is project-related or non-project related	If project related then inform concerned department/pro-ject management. If not project related, then inform MMT, LGU and DENR	If project related, evaluate existing mitigation measures being implemented. Implement a more effective mitigation measure as necessary. If not project related, then inform MMT, LGU and DENR for proper action
	Water Quality	TSS	Grab Sampling	Monthly	Baseline Stations	Contractor	10,000/month	-	-	-	-	-	-
		pH, BOD, Temp, DO, chloride, fecal coliform, nitrate, phosphate, color, oil and grease	Grab Sampling	Quarterly	Baseline Stations	Contractor	100,000 per quarter	-	-	-	-	-	-
Air and Noise													
	Increase in fugitive/ dust and gaseous emission	Ambient TSP, PM_{10}, SO_2, and NO_2	TSP– High volume-Gravimetric, USEPA 40 CFR, Part 50 PM_{10}- High volume with 10 micron particle-size inlet-Gravimetric, USEPA 40 CFR, Part 50, Appendix J SO_2 – Gas Bubbler -	Quarterly or as frequent as necessary	Project boundary and nearest residences	Project proponent/ contractor	PhP 50,000 per month	≥75% of ambient standard. EQPL (Alert Mininum in µg/Nm^3) NO_2 = 195 TSP = 225 PM_{10} = 150 SO_2 =255	≥ 90% of ambient standard. EQPL (Action minimum in µg/Nm^3) NO_2 = 234 TSP = 270 PM_{10} = 180 SO_2 =306	NAAQS (in µg/Nm^3) NO_2 = 260 TSP = 300 PM_{10} = 200 SO_2=340	Monitor levels and determine prevailing wind flows and other meteorological condition Identify possible sources of high ambient concentrations	Check for complaints from residence Implement mitigation measures to reduce fugitive emissions during construction (e.g., water spraying) Inform management in case the proposed project	Suspend construction related work that causes exceedance with ambient levels (e.g., TSP) and implement corrective measure (e.g., water spraying)

MODULE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETERS TO BE MONITORED	SAMPLING AND MEASUREMENT			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME[1]					
								EQPL RANGE			MANAGEMENT MEASURE		
			METHODS	FREQUENCY	LOCATION			ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT
			Pararosaniline Method NO_2- Gas Bubbler-Griess Saltzman Method or Chemiluminescence Method									is the possible source of high ambient levels based on meteorological condition	
	Increase in noise levels	Noise Levels	Direct reading/sound level meter	Quarterly (or as frequent as necessary) (depends if there are complaints from nearby residents)	Residences and other noise sensitive receptors adjacent construction sites	Proponent	Included in air monitoring	Post-ECC agreement	Post-ECC agreement	NPCC (1980) ambient noise standard: a) Class A- Residential - Daytime= 55 dBA -Evening/ morning = 50 dBA -Nighttime =45 dBA	Check background noise levels	Check sources of noise that contribute to higher noise levels	Implement noise attenuation measures
		Vehicles, machineries	Operates equipment, machines according to manufacturer's instruction. Limit operations of loud equipment during daytime (as much as it is practical) Regular inspection and maintenance of equipment machineries Provision and use of appropriate PPE Review complaint register	Monthly	Number and details of noise complaints	Proponent	Included in air monitoring	-	-	-	-	-	-
People	Employment opportunities	No. of locally- hired worker during construction stage (skilled and unskilled);	Actual count/ interview	Monthly	Project Site	Contractor's Safety Officer	-	-	-	-	-	-	-

MODULE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETERS TO BE MONITORED	SAMPLING AND MEASUREMENT			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME[1]					
								EQPL RANGE			MANAGEMENT MEASURE		
			METHODS	FREQUENCY	LOCATION			ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT
	Hazard to Workers	Implementation of safe work methods and practices	Observation/ occurrence	Daily	Project Site	Contractor's Safety Officer	300,000	-	-	-	-	--	-
	Health and safety of workers	Implementation of COVID-19 safety protocol	Actual count of active cases	Weekly	Project Site	Contractor's Health and Safety Officer	300,000	-	-	-	-	-	-
III. OPERATION PHASE													
Land	Terrestrial Flora	Biodiversity indices, species richness and abundance Occurrence and or counts of premium or native species	Belt-transect method, opportunistic sampling and ethnobiological surveys	Semi-annual	Baseline sampling stations	Multi-partite Monitoring Team (MMT) or other monitoring agency (if applicable); Environmental Officer; Outsourced Terrestrial Flora expert)	Php 75,000/monitoring period	10% decline in species composition with reference to previous monitoring data or ranges can be identified by the MMT	30% decline in species composition with reference to previous monitoring data or ranges can be identified by the MMT	50% decline in species composition with reference to previous monitoring data or ranges can be identified by the MMT	Enhance maintenance and protection activities in the buffer zones	Rehabilitation of suitable planting areas with native tree species	Rehabilitation of suitable planting areas with native tree species with enhanced maintenance and protection activities to ensure higher plantation survival rate
		Growth Performance and Survival Rate of planted native tree species	Height and diameter measurement; counting of survived planted seedlings	Semi-annual	Suitable planting/rehabilitation areas	Environmental Officer; Outsourced Terrestrial Flora expert	Php 100,000. (*varies depending on the hectarage and type of planted species*)	>90% survival rate	85-90% survival rate	<85% survival rate	Continue the implementation and establishment of rehabilitation areas	Enhance maintenance and protection activities	Replanting with appropriate native tree species
	Terrestrial Fauna	Biodiversity indices, species richness and abundance; presence of absence of important native and endemic wildlife species	Line-transect method, mist-netting method, opportunistic sampling and ethnobiological surveys	Semi-annual	Baseline sampling stations	MMT; Environmental Officer; Outsourced Terrestrial Fauna expert	Line-transect method, mist-netting method, opportunistic sampling and ethnobiological surveys	10% decline in species composition with reference to baseline data	30% decline in species composition with reference to baseline data	50% decline in species composition with reference to baseline data	Continue monitoring; Determine the cause of decrease in species population	Continue monitoring; Determine the cause of decrease in species population; Coordinate with MMT	Continue monitoring; Determine the cause of decrease in species population; Coordinate with MMT; Determine which parameters near the limit
Air	Odor nuisance	Odor	Complaints registry – number	Every 2 weeks	Nearby residents	PCO	Part of PCO task	-	-	-	-	-	-

MODULE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETERS TO BE MONITORED	SAMPLING AND MEASUREMENT			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME[1]					
								EQPL RANGE			MANAGEMENT MEASURE		
			METHODS	FREQUENCY	LOCATION			ALERT	ACTION	LIMIT	ALERT	ACTION	LIMIT
			and details of odor and other complaints										
People	Employment opportunities	No. of locally- hired worker during construction stage (skilled and unskilled);	Actual count/ interview	Monthly	Project Site	SMFI's Safety Officer	-	-	-	-	-	-	-
	Hazard to Workers	Implementation of safe work methods and practices	Observation/ occurrence	Daily	Project Site	SMFI's Safety Officer	300,000	-	-	-	-	-	-
	Health and safety of workers	Implementation of COVID-19 safety protocol	Actual count of active cases	Weekly	Project Site	SMFI's Safety Officer	300,000	-	-	-	-	-	-
Water	Proliferation of harmful algal species or phytoplankton toxic "red tide" due to nutrient (nitrogen and phosphorous) enrichment of coastal waters	Species composition and abundance of phytoplankton "red tide" organisms or harmful algal blooms (HABs)	Phytoplankton net sampling and microscopic examination of causative dinoflagellate organisms	Semi-annual	Nearshore (closer to river mouths) and offshore	PCO/Environ-mental Officer	50,000	70-100% proliferation of phytoplankton dinoflagellate species causing red tide in the plankton samples	40% proliferation of phytoplankton dinoflagellate species causing red tide in the plankton samples	10% proliferation of phytoplankton dinoflagellate species causing red tide in the plankton samples	Investigate whether the prolifera-tion is project-related or non-project related. If "red tide" occurrence is not project related, then immediate-ly inform MMT, LGU/BFAR and DENR for p0roper action	If project related then inform concerned department/pro-ject management. If not project related, then immediately inform MMT, LGU/BFAR and DENR	If project related, evaluate existing mitigation measures being implemented. Implement a more effective mitigation measure as necessary. If not project related, then inform MMT, LGU, BFAR and DENR for proper action
	Water Quality	TSS	Grab Sampling	Monthly	Baseline Stations	Contractor	10,000 / month	-	-	-	-	-	-
	Water Quality	pH, BOD, Temp, DO, chloride, fecal coliform, nitrate, phosphate, color, oil and grease	Grab Sampling	Quarterly	Baseline Stations	Contractor	100,000 per quarter	-	-	-	-	-	-