Environmental Impact Statement Report

Camaya Golf Course Project

Sitio Wain, Brgy. Biaan, Mariveles, Bataan

April 2019

Earth, Fairways and Green Leisure Club Association Inc.
Camaya Coast, Sitio Wain, Biaan, Mariveles, Bataan

Executive Summary

This Environmental Impact Statement (EIS) Report was prepared to secure the Environmental Compliance Certificate (ECC) of the proposed Camaya Golf Course Project of Earth, Fairways and Greens Leisure Club Association Inc. located at Brgy. Biaan, Mariveles, Bataan.

Earth, Fairways and Green Leisure Club Association Inc. (EFGLCAI) is proposing a 9-hole golf course project equipped amenities and facilities aim to provide world class facilities both for local and international tourist. Also, the golf course project is envisioned to be in harmony with other tourist attractions available around and adjacent of the project site, such as resorts, vacation houses, recreational activities, and other associated facilities.

The project will cover a total development area of 21.8615 hectares covered by three land titles - Transfer Certificate of Titles (TCT) Nos. 038-2018000975, 038-2018000976, and 038-2018000977 all registered under and owned by Earth and Shore Tourism Landholdings Corporation (ESTLC). A Deed of Assignment on April 4, 2017 was executed by and between the Proponent and ESTLC that allows the development and operation of a golf course by the former.

ES.1 Project Fact Sheet

ES.1.1 Summary of Project Description

Project Name:	**CAMAYA GOLF COURSE PROJECT**
Project Type:	Golf Course
Project Location:	Sitio Wain, Barangay Biaan, Mariveles, Bataan
Project Size:	21.8615 hectares
Project Components:	9-hole Golf Course, Irrigation/Artificial Lakes, Cart Path, Club House
Project Cost:	Php76,330,000.00

ES.1.2 Profile of the Proponent

Proponent Name:	**Earths, Fairways and Green Leisure Club Association Inc.**
Office Address:	Camaya Coast, Barangay Biaan, Mariveles, Bataan
Authorized Representative:	Ms. Lourdes Polintan – General Manager Engr. Marilen A. Panlilio – Project Coordinator
Contact Number	+632 917 529 6850

ES.1.3 Profile of the Preparer

EIA Preparer:	**Grip-Enviro Consulting Corp.**
Office Address:	Sanville Subdivision, Brgy. Culiat, Quezon City
Contact Persons:	Mr. Allan P. Alcantara
	(02) 543 3060

ES.2 Process Documentation

ES.2.1 EIA Team

The Environmental Impact Assessment (EIA) Team is composed of the following specialists:

Team Member	Field of Expertise	IPCO No.
Engr. Louie June D. Sioson	Environmental Impact Assessment (EIA), Water Quality	095
Engr. Analie F. Angcona	Land Module, Air and Noise	227
Mr. Allan P. Alcantara	Small Sections, IMP and EMP	-
For. Armando V. Gillado Jr.	Terrestrial Flora	312
Russel Baniqued	Terrestrial Fauna	157
Mr. Henry James P. Botengan	Social Impact Assessment	063

ES.2.2 EIA Study Schedule and Area

The following presents the schedule of activities conducted as part of the preparation of the EIS.

Activity	Date
Public Scoping	July 13, 2016
Technical Scoping	August 8, 2016
Conduct of field sampling and surveys	September 2016; January 19, 2019
Conduct of perception survey, key informant interviews and focus group discussions	January 19, 2019

The study area focuses on the Direct and Indirect Impact Areas of the project delineated based on DENR Administrative Order No. 30 Series of 2003 (DAO 03-30). Direct Impact Areas are: the 21.8615-hectare golf course area in terms of physical environment where all project components are proposed to be located and Barangay Biaan in terms of social impacts, the primary beneficiary of the social development programs and projects whose demographic and socio-economic conditions would be affected by the project. Indirect Impact Areas are areas located outside the coverage of the project facilities and operations such as adjacent water bodies and surrounding barangays and adjacent barangays or municipalities that will benefit from potential revenues and taxes of the project are considered as indirect impact areas in terms of social impacts.

ES.2.3 Description of Key EIA Methodologies

The EIA Methodologies presented below are guided by the Technical Scoping Checklist approved on August 8, 2016.

Activity	Date
Public Scoping	July 13, 2016
Technical Scoping	August 8, 2016

Activity	Date
Conduct of field sampling and surveys	September 2016; January 19, 2019
Conduct of perception survey, key informant interviews and focus group discussions	January 19, 2019

ES.2.4 PUBLIC PARTICIPATION

Public Scoping

Public Scoping was conducted on July 13, 2016 at Seashore Restaurant in the Municipality of Mariveles, Bataan. It was attended by stakeholders, personnel from Environmental Management Bureau Region III, Local Government Units (LGUs) of Brgy. Biaan and Municipality of Mariveles, Non-Government Organizations (NGOs) and Proponent's representatives.

Perception Survey

A Perception Survey was conducted on January 19, 2019 on 100 respondents in Barangay Biaan.

ES 3 EIA SUMMARY

ES 3.1 Summary of Baseline Characterization

The summary of baseline characterization and its corresponding environmental impacts and mitigation plan is presented below. **Chapter 2** of this EIS provides a more detailed discussion of the baseline conditions, environmental impacts and mitigation measures.

Module	Summary of Baseline Condition / Key Findings
Land Use	While the project sits on the grassland area based on the land use map of CLUP the proposed project site is titled land own by the Earth Fairways and Green Leisure Club Association Inc. and the Municipal Planning and Development Office (MPDO) of Mariveles Bataan already issued a certification that the proposed project is viable to be developed in the area as it is located within the propose eco-tourism zone of the municipality.
Geology/Geomorphology	The project site is located on the southern flank of Mount Mariveles, in an area characterized by rolling hills with short steep cliffs near the streams and gentle slopes near the shore. The project site is located in the southwestern flank of Mariveles Volcano, which is part of the chain of Quaternary volcanoes formed by subduction in the Manila Trench. The project is located between 60 to 120 meters above sea level with two rivers on west and east side. Based on geohazard map, is not flood prone area
Terrestrial Ecology	• Based on 2010 Land Cover Map from the DENR-FMB, the land cover of the project is 58% grassland, 35% wooded grass land and 6% perennial crop • Site visit revealed that the project area is composed of grassland

Module	Summary of Baseline Condition / Key Findings
	with patches of trees and agroforestry with perennial crops that are located in riparian areas • It was noted that the undergrowth of vegetation in some portion of the project has already been removed while other portion has already been replaced with preferred grass species for the golf course. • There were at least 28 flora species belonging to 17 flora families recorded. Majority of the species are members of FABACEAE (21%), POACEAE (11%) AND MORACEAE (11%) families • FABACEAE and POACEA species have the highest importance value (IV) in the canopy and understory layer, respectively • There are at least five (5) species recorded in the area that are considered as invasive by Global Invasive Species Database. Among the recorded invasive species, hagonoi (*Chromolaena odorata)* is the most distributed in the project site. • Among the 28 species recorded, only antipolo (*Artocarpus blancoi*) was identified as threatened. • Among the 28 recorded species 75% are indigenous, 21% are exotic or introduced and 4% are endemic • Based on Fernando (1998) relative measure of diversity scale, the diversity of the project area can be considered as very low (H' > 2.00) while evenness of the species is considered as high to very high (e'= 0.50 and above)
Hydrology	There are two rivers adjacent the proposed project - Basay River and Tilin River. Tilin River converge with Wain River and flows south going to Wain Bay while Basay flows south going directly to Basay Bay. The project is not expected to induce flooding nor reduce stream volumetric flow. Domestic and non-domestic water requirement for the project components will be sourced from the existing water reservoir maintained by the Camaya coast – a sister company of the proponent. No groundwater extraction through deepwell is proposed nor foreseen.
Water Quality	Based on DENR Administrative Order No. 2016-08, the freshwater within the project area can be classified to Class B or Recreational Water Class I intended for primary contact recreation (swimming and bathing, etc). Among the parameters analyzed, Fecal Coliforms, Biological Oxygen Demand, Surfactants, Total Suspended Solids, Oil & Grease, Ammonia and Boron exceeded the standards for Class B Freshwater Classification.
Meteorology	Climate of Mariveles Bataan belongs to the Type I under the Modified Coronas Climate Classification PAGASA station Subic Bay International Airport (SBIA) recorded an annual rainfall amount of 3,364.47 millimeter (mm) with a total of 330 rainy days during the period of 2013-2015.
Ambient Air Quality	The ambient Air results at all Sampling Stations indicate that the TSP, SO_2 and NO_2 concentrations were within the applicable DENR standards.
Ambient Noise Quality	The result of the noise level measurement shows that the noise levels at both stations were within the applicable DENR Daytime limit of 65 dBA. Audible noise during the time of measurement normally came from the guests passing by and waves
Socio-Demographic/ Economic Conditions	Barangay Biaan has a total population of 1,911 based on the 2018 census while the total number of households living in Barangay Biaan is 550. The common cause of sickness in Barangay Biaan are the following: 1. Fever 2. Common Colds 3. Cough

Module	Summary of Baseline Condition / Key Findings
	4. Diarrhea 5. Rheumatism 6. High Blood Pressure 7. Cases of Malnutrition Based on the perception survey, most of the respondents (56%) was aware of the proposed golf course while 32% said that they did not know about the project. The majority (88%) of the respondents say that the project will be favorable to the Barangay. It will be an additional source of income since the priority for hiring is the impact barangay. A small percent (12%) from the barangay did not answer because they do not understand how the golf course project, 16 kilometers away, will affect them. The Social Issues and Concerns about the Project are: 1. Loss or depletion of water supply 2. Damage/destruction of fishing/marine waters due to siltation or pesticide use 3. Safety of employees during landslide 4. Threat to health due to generation/dispersion of dust 5. IEC and consultation on community

Environmental Management Plan

Chapter 3 and 6 of this EIS present the environmental management and monitoring plan (EMP) for the proposed Project.

Based on the impact assessment, the potential adverse impacts during construction include soil erosion, degradation of water quality and freshwater environment due to construction works, degradation of air quality due to dust and fugitive emissions from heavy equipment, increased noise, traffic congestion, and occupation health and safety risks. During operations phase, potential impacts are related to degradation of water quality and freshwater environment due to domestic wastes, pesticide and fertilizer applications, and traffic congestion.

Majority of these impacts can be addressed by the mitigating measures proposed in this study and would result to no residual impacts. For some impacts, such as those influenced by extreme weather events (tropical cyclones), there may potentially be residual impacts due to uncertainties in the changing conditions of the environment. However, the project ensures that such risks are as low as reasonably possible by incorporating results of the study into the project design and construction methodology. In this case, safety warning systems and emergency response procedures would need to be in place to further reduce the magnitude of such risks.

TABLE ES-1. IMPACT MANAGEMENT PLAN – SUMMARY OF KEY ENVIRONMENTAL ASPECTS

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
CONSTRUCTION PHASE						
Civil works	Land	(-) Contamination of soil due to increased rate of erosion as a result of earthmoving, excavation, tunneling, and generation and presence of topsoil	• Proper road construction technique such as adhering to engineering best practices (i.e. proper gradient, proper slope stabilization) • Provision of proper and adequate drainage system. • Progressive ground preparation and clearing will be conducted to minimize total area of land that will be disturbed at any one time, where practical. Construction plan will be programmed consistent with this principle.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
	Land Water	(-) Generation of solid wastes	• Implementation of the Solid Waste Management Plan • Segregation of solid waste according to recyclable and non-recyclables • Hauling of discarded/recyclable items by DENR-Registered transporters	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
		(-) Generation of hazardous wastes	• Segregation at source of hazardous wastes from ecological solid wastes. Common hazardous wastes that will be generated during construction and development phase will consist of busted fluorescent lamps, used lead-acid batteries, used oil, grease traps, and chemicals related to fertilizers and pesticides. • Storage of these hazardous items will be consistent with the requirements of DAO No. 2013-22. • Transport and treatment/disposal of	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			hazardous wastes by DENR-Registered transporters and treater, respectively.			
		(-) Soil Erosion/Loss of Topsoil	• Conduct of earthworks during dry season to minimize to possible soil erosion. • Implement progressive clearing and earthworks moving to the remaining undeveloped area to minimize erosion • Conduct immediate revegetation of carabao grass to reduce rainfall impact to soil that cause soil erosion during wet season.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
	People	(+) Generation of Employment (-) influx of construction personnel (+) Creation of additional sources of income and livelihood	• Prioritize hiring of qualified residents of the host communities • Prioritize purchasing of local items, if applicable, within the host communities	HR Department	Variable	Proponent's Public Relations Guidelines
OPERATION PHASE						
Maintenance of Golf Course (i.e., fertilizer application, pest management, landscape maintenance)	Land Water	(-) Solid waste generation	• Implementation of the Solid Waste Management Plan • Segregation at source • Segregation of solid waste according to recyclable and non-recyclables • Management and operation of materials recovery facility • Collection and disposal of segregated solid waste	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
		(-) Change in soil quality/fertility	• The fertilizers to be used should only be specific substances approved by the Fertilizer and Pesticide Authority (FPA) of the Department of Agriculture. • Use of controlled-release fertilizer to minimize the possible contamination of groundwater by nitrate	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
		(-) Contamination soil and groundwater due to excess fertilizers and pesticides	• Fertilizers to be used should only be specific substances approved by the Fertilizer and Pesticide Authority (FPA). • Use of controlled-release fertilizer to minimize the possible contamination of groundwater by nitrate. • If practicable, weeding control shall be done manually. • Ensure proper handling, management and storage of fertilizers and pesticides to avoid spills.	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
Daily operations	Land	(-) Solid waste generation	• Implementation of the Solid Waste Management Plan • Segregation of solid waste according to recyclable and non-recyclables • Provided trash bins within the golf course and clubhouse shall regularly be collected • Collected wastes shall be segregated and stored in garbage area prior to collection. • Ensure regular collection of wastes (wastes are hauled by municipal collection system)	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
	Water	(-) Wastewater generation	• Provision of appropriate sewage treatment plant	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
	Air People	(-) Emission from genset, vehicles and other diesel generating equipment	• "Turn Off Engine while Parked" sign shall be posted at the parking area. • Regular maintenance of generator set and diesel operated equipment. • Ensure that appropriate control facilities are installed and being used to reduce emission and help reduce the noise.	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
ABANDONMENT PHASE						
Cessation of operation	Land Water	(-) Possible contamination of soil and water	• Ensure that all materials with hazardous substances are collected in covered drums or container. These sealed drums shall properly be labelled for easy identification and hauling • Ensure that all hazardous materials are hauled out of the site by DENR accredited hauler • Conduct of Environmental Site Assessment shall be done • Properly inform EMB 30 days prior to abandonment	Proponent and Hired Contractor	Part of operation costs	Abandonment Plan, Proponent and Contractor's MOA
	Air	Generation of dust due to civil works such land preparation intended for succeeding land use.	• Use of water as dust suppressant whenever applicable. • Provide temporary barriers between dust generating work areas and adjacent sensitive receptors such as the resort and residential establishments. • Implement traffic management such	Proponent and Hired contractor	Part of operation costs	Abandonment Plan, Proponent and Contractor's MOA

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			as imposing speed limits to heavy equipment and vehicles to help mitigate dust generation.			
	People	Termination of workers	• Advance notice shall be given to workers • Proper compensation shall be provided	Proponent HR Manager	Part of operation costs	

TABLE ES-2. SELF MONITORING PLAN – SUMMARY OF KEY ENVIRONMENTAL ASPECTS

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measures		
								ALERT	Action	Limit	Alert Action		Limit
CONSTRUCTION PHASE													
Land	• Vegetation removal/ Loss of habitat • Threat to existence and/ or loss of important local species • Threat to abundance, frequency and distribution of important species	Species richness, abundance, diversity, evenness, dominance and presence of endemic and threatened species	Transect survey and netting	Annual	Direct impact areas and rehabilitated areas particularly reforestation/ re-vegetated areas	PCO/ Environmental Officer	100,000	10% decline in baseline species richness and abundance	30% decline in baseline species richness and abundance	50% decline in baseline species richness and abundance	Investigate whether the decline is project-related or non-project related	If project-related then inform concerned department/ project management If not project-related, then inform MMT. LGU and DENR.	If project related, evaluate existing rehabilitation measures being implemented. Implement a more effective rehabilitation measure as necessary. If not project-related, then inform MMT. LGU and DENR for proper action.
Water/Land	Generation of solid waste	Solid Wastes	Actual Monitoring Waste collection and segregation of personnel	Daily	Project site segregation/ garbage area	Building Administrator/ PCO	Minimal	Build-up of waste materials	Noticeable odor and pilings of solid wastes	Generation of foul odor and attraction of rodents/ insects	Ensure waste segregation and regular collection of wastes	Issue Notice to employees/ workers to implement further the segregation of wastes Remind/ coordinate with waste	Intensify the waste segregation practices. Collection of segregated wastes shall be scheduled accordingly.

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measures		
								ALERT	Action	Limit	Alert Action		Limit
												hauler to ensure regular hauling of wastes	Domestic wastes such as leftovers must be placed in covered bins or properly tied up garbage bags if will not be collected by contracted waste collector.
People	Generation of Employment	Employment	Qualified locals	Entire Operation Stage		Admin/HR/	Minimal	Coordination with LGU			Coordination with LGU regarding number of available jobs and respective requirements.		
OPERATION PHASE													
Water	Impairment of surface and groundwater quality	TSS	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO	Php 50,000 per sampling station	Not more than 60mg/L increase	Not more than 68mg/L increase	Not more than 76mg/L increase	Regular maintenance of water distribution system.	Change/adjust fertilizer and pesticide requirement/ amount of application	Install liners to unlined artificial lakes Install liners to unlined artificial lakes
		pH	In-situ					6.75	7.65	8.55			
		Temperature	Grab sampling					2.25 ^{o}C change	2.55 ^{o}C change	2.85 ^{o}C change			
		BOD	Grab sampling					7.55mg/L	8.5mg/L	9.5mg/L			
		Oil and Grease	Grab sampling					7.55mg/L	8.5mg/L	9.5mg/L			
		Nitrate	Grab sampling					5.255mg/L	5.95mg/L	6.65mg/L			
		Phosphate	Grab sampling					0.38mg/L	0.43mg/L	0.48mg/L			
		Total Coliform	Direct sampling with sample					7,500 MPN/100mL	8,500 MPN/100mL	9,500 MPN/100mL			

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measures		
								ALERT	Action	Limit	Alert Action		Limit
			container										
		Fecal Coliform	Direct sampling with sample container					300 MPN/100mL	340 MPN/100mL	380 MPN/100mL			
		Ammonia	Grab sampling					0.375mg/L	0.425mg/L	0.475mg/L			
		Surfactants	Grab sampling					11.25mg/L	12.75mg/L	14.25mg/L			
Water/Land	Generation of solid waste	Solid Wastes	Actual Monitoring Waste collection and segregation of personnel	Daily	Project site segregation/ garbage area	Building Administrator/ PCO	Minimal	Build-up of waste materials	Noticeable odor and pilings of solid wastes	Generation of foul odor and attraction of rodents/ insects	Ensure waste segregation and regular collection of wastes	Issue Notice to employees/ workers to implement further the segregation of wastes Remind/ coordinate with waste hauler to ensure regular hauling of wastes	Intensify the waste segregation practices. Collection of segregated wastes shall be scheduled accordingly. Domestic wastes such as leftovers must be placed in covered bins or properly tied up garbage bags if will not be collected by contracted waste collector.

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measures		
								ALERT	Action	Limit	Alert Action		Limit
	Generation of hazardous waste i.e. empty fertilizer bags, empty containers of pesticides, used oil, BFLs, grease trap.	Hazardous Wastes	Segregation/ Collection	Daily All hazardous waste generated such as containers of fertilizers and pesticides, BFLs, used oil, and grease trap will be monitored on a daily basis. A record will be maintained and updated regularly.	Genset room/ Hazardous waste collection area	Building Administrator/ PCO	PhP25,000/year (might change depending on volume and other circumstances)	Accumulation n of hazardous wastes	Significant increase of wastes i.e. use up nearly 80% of the storage drums	Hazardous wastes storage area can no longer handle the accumulated wastes	Properly segregate and store the materials. Proper labeling shall be done	Accounting of used materials. Contact DENR accredited hauler	Immediate haul of wastes and address the contamination by DENR accredited hauler/treater.

ES 3.3 Environmental Monitoring Fund and Environmental Guarantee Fund

The Environmental Monitoring Fund (EMF) is a fund that a Proponent shall commit to establish in support of the activities of the MMT for the compliance monitoring. The EMF will be established as agreed upon and specified in the MOA between DENR-EMB and the Proponent, with conformity of the MMT members. An EMF is required for all MMTs of EIS based projects.

The initial determination of the EMF is included as part of the Environmental Management and Monitoring Plan and as established in the ECC for a particular project or undertaking. However, the actual amount to be allocated for the EMF shall be determined on the basis of the Annual Work and Financial Plan (AWFP) that would be agreed upon by the MMT, derived from the Proponent's Environmental Monitoring Plan (EMoP).

An appropriate basis for the determination of the EMF would be the cost of monitoring activities and environmental information programs as proposed by the Proponent in the Environmental Management Plan. The rates or amounts that will be used in the preparation of the Work and Financial Plan shall be in accordance with the rates agreed upon and within the limits set herein or as prescribed in pertinent government guidelines.

The proponent shall set aside an initial amount of PhP200,000.00, at least, for this purpose.

An Environmental Guarantee Fund (EGF) is a fund that proponents shall commit to establish when an ECC is issued for projects or undertakings determined by EMB to pose significant risk to answer for damage to life, property, and the environment caused by such risk, or requiring rehabilitation or restoration measures.

The EGF shall be established and used for the following risk-management related purposes:

(a) the immediate rehabilitation of areas affected by damage to the environment and the resulting deterioration of environmental quality as a direct consequence of project construction, operation, and abandonment;
(b) the just compensation of parties and communities affected by the negative impacts of the project;
(c) the conduct of scientific or research studies that will aid in the prevention or rehabilitation of accidents and/or risk-related environmental damages; or
(d) For contingency clean-up activities, environmental enhancement measures, damage prevention programs and social equity measures (e.g. livelihood, social development programs) including the necessary IEC and capability building activities related to the project.
(e) The proponent shall set aside an initial amount of PhP500,000.00, at least, for this purpose.

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Annex A – Proof of Authority over the Project Site

Annex B – Compatibility with Existing Land Use

Annex C – SEC Registration

Annex D – Sworn Accountability of Proponent and Preparer

Annex E – PEMAPS

Annex F – Laboratory Certificates

Annex G – Public Scoping Report

1 PROJECT DESCRIPTION

Earth, Fairways and Green Leisure Club Association Inc. (the "Proponent") is a Filipino-owned company duly registered to the Philippines' Securities and Exchange Commission with Registration No. CN201614270 approved on July 4, 2016.

The Proponent is proposing a 9-hole golf course project, to be known as Camaya Golf Course Project, located at Barangay Binaan, Municipality of Mariveles, Province of Bataan. The Project will cover a development area of 21.8615 hectares covered by three land titles - Transfer Certificate of Titles (TCT) Nos. 038-2018000975, 038-2018000976, and 038-2018000977 all registered under and owned by Earth and Shore Tourism Landholdings Corporation (ESTLC). A Deed of Assignment between the Proponent and ESTLC was duly executed and entered on April 4, 2017 that provides the right and authority to the former the development and operation of its golf course project.

The land titles and corresponding Deed of Assignment, that both form part of the Proponent's legal authority over the area is presented in **Annex A**.

Also, the project is in line with the local government's goal to promote eco-tourism within the municipality. A Certification issued by the Municipal Planning and Development Office of the Mariveles LGU on June 2, 2016 stating that the proposed project is within the eco-tourism zone of the municipality. A copy of said Certification is provided in **Annex B**.

1.1 Project Location and Area

The proposed Camaya Golf Course Project (the "Project") is located at Barangay Biaan, Mariveles, Bataan. The municipality of Mariveles is a first class municipality located at the southernmost tip of Bataan peninsula, which is approximately 173 kilometers away from Manila in an overland trip. It is bounded by Manila Bay on the east, North Channel on the south, municipality of Limay on the northeast, municipality of Bagac on the northwest and West Philippine Sea on the west.

The proposed project is bounded by the coordinates presented in **Table 1-1** to **Table 1-3** and **Figure 1-1**.

TABLE 1-1. GEOGRAPHIC COORDINATES OF LOT 1 BLOCK 33

Corner No.	Latitude	Longitude
1	14° 28' 25.718"	120° 25' 16.354"
2	14° 28' 23.800"	120° 25' 20.039"
3	14° 28' 23.100"	120° 25' 19.771"
4	14° 28' 22.681"	120° 25' 19.623"
5	14° 28' 22.255"	120° 25' 19.499"
6	14° 28' 21.822"	120° 25' 19.401"
7	14° 28' 21.385"	120° 25' 19.329"
8	14° 28' 20.944"	120° 25' 19.284"
9	14° 28' 20.502"	120° 25' 19.264"
10	14° 28' 20.059"	120° 25' 19.271"
11	14° 28' 19.617"	120° 25' 19.304"

Corner No.	Latitude	Longitude
12	14° 28' 19.269"	120° 25' 19.334"
13	14° 28' 18.921"	120° 25' 19.353"
14	14° 28' 18.571"	120° 25' 19.360"
15	14° 28' 16.746"	120° 25' 19.370"
16	14° 28' 14.922"	120° 25' 19.390"
17	14° 28' 13.097"	120° 25' 19.421"
18	14° 28' 10.884"	120° 25' 19.463"
19	14° 28' 10.884"	120° 25' 19.466"
20	14° 28' 10.495"	120° 25' 19.456"
21	14° 28' 10.106"	120° 25' 19.432"
22	14° 28' 09.719"	120° 25' 19.394"

Corner No.	Latitude	Longitude
23	14° 28' 09.333"	120° 25' 19.344"
24	14° 28' 08.949"	120° 25' 19.279"
25	14° 28' 08.709"	120° 25' 19.232"
26	14° 28' 08.470"	120° 25' 19.179"
27	14° 28' 08.232"	120° 25' 19.122"
28	14° 28' 07.995"	120° 25' 19.059"
29	14° 28' 07.064"	120° 25' 18.992"
30	14° 28' 07.534"	120° 25' 18.920"
31	14° 28' 07.306"	120° 25' 18.843"
32	14° 28' 07.079"	120° 25' 18.762"
33	14° 28' 06.843"	120° 25' 18.670"
34	14° 28' 06.608"	120° 25' 18.574"
35	14° 28' 06.376"	120° 25' 18.473"
36	14° 28' 06.1445"	120° 25' 18.367"
37	14° 28' 05.998"	120° 25' 18.294"
38	14° 28' 07.656"	120° 25' 13.763"
39	14° 28' 07.768"	120° 25' 13.811"
40	14° 28' 08.213"	120° 25' 13.999"
41	14° 28' 08.659"	120° 25' 14.182"
42	14° 28' 09.108"	120° 25' 14.360"
43	14° 28' 09.558"	120° 25' 14.584"
44	14° 28' 10.010"	120° 25' 14.702"
45	14° 28' 10.463"	120° 25' 14.866"
46	14° 28' 10.918"	120° 25' 15.025"
47	14° 28' 11.375"	120° 25' 15.180"
48	14° 28' 11.681"	120° 25' 15.279"
49	14° 28' 11.991"	120° 25' 15.350"
50	14° 28' 12.034"	120° 25' 15.412"
51	14° 28' 11.619"	120° 25' 15.459"
52	14° 28' 12.937"	120° 25' 15.489"
53	14° 28' 13.256"	120° 25' 15.503"
54	14° 28' 13.375"	120° 25' 15.501"
55	14° 28' 13.893"	120° 25' 15.483"

Corner No.	Latitude	Longitude
56	14° 28' 14.210"	120° 25' 15.449"
57	14° 28' 14.526"	120° 25' 15.400"
58	14° 28' 14.838"	120° 25' 15.334"
59	14° 28' 15.147"	120° 25' 15.253"
60	14° 28' 15.437"	120° 25' 15.161"
61	14° 28' 15.647"	120° 25' 15.265"
62	14° 28' 15.838"	120° 25' 15.359"
63	14° 28' 16.157"	120° 25' 15.427"
64	14° 28' 16.421"	120° 25' 15.467"
65	14° 28' 16.688"	120° 25' 15.479"
66	14° 28' 16.955"	120° 25' 15.464"
67	14° 28' 17.219"	120° 25' 15.421"
68	14° 28' 17.478"	120° 25' 16.351"
69	14° 28' 17.728"	120° 25' 15.254"
70	14° 28' 17.967"	120° 25' 15.132"
71	14° 28' 18.193"	120° 25' 14.986"
72	14° 28' 18.464"	120° 25' 14.811"
73	14° 28' 18.750"	120° 25' 14.666"
74	14° 28' 19.050"	120° 25' 14.553"
75	14° 28' 19.360"	120° 25' 14.472"
76	14° 28' 19.676"	120° 25' 14.426"
77	14° 28' 19.995"	120° 25' 14.413"
78	14° 28' 20.314"	120° 25' 14.434"
79	14° 28' 20.629"	120° 25' 14.430"
80	14° 28' 20.937"	120° 25' 14.329"
81	14° 28' 21.234"	120° 25' 14.700"
82	14° 28' 23.174"	120° 25' 15.617"
83	14° 28' 23.855"	120° 25' 15.897"
84	14° 28' 24.558"	120° 25' 16.106"
85	14° 28' 25.279"	120° 25' 16.242"
86	14° 28' 25.531"	120° 25' 16.263"

TABLE 1-2. GEOGRAPHIC COORDINATES OF LOT 1 BLOCK 34

Corner No.	Latitude	Longitude
1	14° 27' 51.866"	120° 25' 05.560"
2	14° 27' 52.041"	120° 25' 05.606"
3	14° 27' 52.317"	120° 25' 05.711"
4	14° 27' 52.603"	120° 25' 05.843"
5	14° 27' 52.817"	120° 25' 05.950"
6	14° 27' 53.038"	120° 25' 06.041"
7	14° 27' 53.256"	120° 25' 06.118"
8	14° 27' 53.628"	120° 25' 06.228"
9	14° 27' 53.990"	120° 25' 06.341"
10	14° 27' 54.352"	120° 25' 06.455"
11	14° 27' 54.714"	120° 25' 06.572"
12	14° 27' 55.074"	120° 25' 06.691"
13	14° 27' 55.434"	120° 25' 06.812"
14	14° 27' 55.794"	120° 25' 07.179"
15	14° 27' 56.152"	120° 25' 07.060"
16	14° 27' 56.426"	120° 25' 07.179"
17	14° 27' 56.680"	120° 25' 07.336"
18	14° 27' 56.858"	120° 25' 07.461"
19	14° 27' 57.039"	120° 25' 07.580"
20	14° 27' 57.222"	120° 25' 07.695"
21	14° 27' 57.463"	120° 25' 07.824"
22	14° 27' 57.715"	120° 25' 07.927"
23	14° 27' 57.976"	120° 25' 08.002"

Corner No.	Latitude	Longitude
24	14° 27' 58.244"	120° 25' 07.927"
25	14° 27' 58.514"	120° 25' 08.049"
26	14° 27' 58.286"	120° 25' 08.056"
27	14° 27' 59.054"	120° 25' 08.016"
28	14° 27' 58.317"	120° 25' 07.948"
29	14° 27' 59.428"	120° 25' 07.927"
30	14° 27' 59.540"	120° 25' 07.932"
31	14° 27' 59.648"	120° 25' 07.964"
32	14° 27' 59.747"	120° 25' 08.020"
33	14° 27' 59.820"	120° 25' 08.098"
34	14° 28' 00.186"	120° 25' 08.198"
35	14° 28' 00.544"	120° 25' 08.930"
36	14° 28' 00.905"	120° 25' 09.343"
37	14° 28' 01.269"	120° 25' 07.753"
38	14° 28' 01.636"	120° 25' 10.161"
39	14° 28' 02.005"	120° 25' 10.567"
40	14° 28' 02.376"	120° 25' 10.969"
41	14° 28' 02.750"	120° 25' 11.370"
42	14° 28' 02.922"	120° 25' 11.538"
43	14° 28' 03.108"	120° 25' 11.690"
44	14° 28' 03.305"	120° 25' 11.825"
45	14° 28' 03.513"	120° 25' 11.842"
46	14° 28' 03.730"	120° 25' 12.041"

Corner No.	Latitude	Longitude
47	14° 28' 03.954"	120° 25' 12.120"
48	14° 28' 04.184"	120° 25' 12.179"
49	14° 28' 04.320"	120° 25' 12.213"
50	14° 28' 04.584"	120° 25' 12.255"
51	14° 28' 04.584"	120° 25' 12.307"
52	14° 28' 04.711"	120° 25' 12.367"
53	14° 28' 05.143"	120° 25' 12.588"
54	14° 28' 05.574"	120° 25' 13.083"
55	14° 28' 06.009"	120° 25' 13.014"
56	14° 28' 06.445"	120° 25' 13.220"
57	14° 28' 06.884"	120° 25' 13.422"
58	14° 28' 07.325"	120° 25' 11.613"
59	14° 28' 07.656"	120° 25' 13.763"
60	14° 28' 05.998"	120° 25' 18.294"
61	14° 28' 05.770"	120° 25' 18.180"
62	14° 28' 05.403"	120° 25' 17.977"
63	14° 28' 05.044"	120° 25' 17.759"
64	14° 28' 04.694"	120° 25' 17.526"
65	14° 28' 04.354"	120° 25' 17.278"
66	14° 28' 04.076"	120° 25' 17.051"
67	14° 28' 03.806"	120° 25' 16.813"
68	14° 28' 03.546"	120° 25' 16.564"
69	14° 28' 03.296"	120° 25' 16.304"
70	14° 28' 03.056"	120° 25' 16.034"
71	14° 28' 02.779"	120° 25' 15.732"
72	14° 28' 02.495"	120° 25' 15.436"
73	14° 28' 02.205"	120° 25' 15.147"
74	14° 28' 01.908"	120° 25' 14.864"
75	14° 28' 01.606"	120° 25' 14.589"
76	14° 28' 01.097"	120° 25' 14.320"
77	14° 28' 00.983"	120° 25' 14.059"
78	14° 28' 00.663"	120° 25' 13.805"

Corner No.	Latitude	Longitude
79	14° 28' 00.338"	120° 25' 13.558"
80	14° 28' 00.036"	120° 25' 13.356"
81	14° 27' 59.728"	120° 25' 13.065"
82	14° 27' 59.413"	120° 25' 12.985"
83	14° 27' 59.092"	120° 25' 12.818"
84	14° 27' 58.753"	120° 25' 12.663"
85	14° 27' 58.403"	120° 25' 12.535"
86	14° 27' 58.045"	120° 25' 12.433"
87	14° 27' 57.681"	120° 25' 12.358"
88	14° 27' 57.313"	120° 25' 12.311"
89	14° 27' 56.942"	120° 25' 12.292"
90	14° 27' 56.570"	120° 25' 12.300"
91	14° 27' 56.219"	120° 25' 12.309"
92	14° 27' 55.867"	120° 25' 12.293"
93	14° 27' 55.518"	120° 25' 12.252"
94	14° 27' 55.172"	120° 25' 12.187"
95	14° 27' 54.831"	120° 25' 12.097"
96	14° 27' 54.497"	120° 25' 11.984"
97	14° 27' 54.171"	120° 25' 11.847"
98	14° 27' 53.856"	120° 25' 11.687"
99	14° 27' 53.501"	120° 25' 11.508"
100	14° 27' 53.134"	120° 25' 11.356"
101	14° 27' 52.575"	120° 25' 11.230"
102	14° 27' 52.373"	120° 25' 11.133"
103	14° 27' 51.983"	120° 25' 11.064"
104	14° 27' 51.589"	120° 25' 11.023"
105	14° 27' 51.193"	120° 25' 11.012"
106	14° 27' 50.798"	120° 25' 11.029"
107	14° 27' 50.493"	120° 25' 11.047"
108	14° 27' 50.187"	120° 25' 11.050"
109	14° 27' 50.115"	120° 25' 11.048"

TABLE 1-3. GEOGRAPHIC COORDINATES OF LOT 1 BLOCK 34

Corner No.	Latitude	Longitude
1	14° 27' 51.866"	120° 25' 05.560"
2	14° 27' 50.115"	120° 25' 11.048"
3	14° 27' 49.881"	120° 25' 11.039"
4	14° 27' 49.577"	120° 25' 11.014"
5	14° 27' 49.273"	120° 25' 10.975"
6	14° 27' 48.972"	120° 25' 10.922"
7	14° 27' 48.673"	120° 25' 10.854"
8	14° 27' 48.378"	120° 25' 10.773"
9	14° 27' 48.196"	120° 25' 10.730"
10	14° 27' 48.010"	120° 25' 10.707"
11	14° 27' 47.822"	120° 25' 10.705"
12	14° 27' 47.636"	120° 25' 10.725"
13	14° 27' 47.446"	120° 25' 10.743"
14	14° 27' 47.412"	120° 25' 10.656"
15	14° 27' 47.331"	120° 25' 10.494"
16	14° 27' 47.327"	120° 25' 10340"
17	14° 27' 47.129"	120° 25' 10.196"
18	14° 27' 47.105"	120° 25' 10.070"
19	14° 27' 46.812"	120° 25' 09.953"
20	14° 27' 46.671"	120° 25' 09.773"
21	14° 27' 46.437"	120° 25' 09.610"
22	14° 27' 46.191"	120° 25' 09.466"
23	14° 27' 45.936"	120° 25' 09.342"
24	14° 27' 45.633"	120° 25' 09.207"
25	14° 27' 45.319"	120° 25' 09.101"

Corner No.	Latitude	Longitude
26	14° 27' 44.996"	120° 25' 09.027"
27	14° 27' 44.668"	120° 25' 08.984"
28	14° 27' 44.316"	120° 25' 08.926"
29	14° 27' 43.978"	120° 25' 08.809"
30	14° 27' 43.663"	120° 25' 08.639"
31	14° 27' 43.379"	120° 25' 08.418"
32	14° 27' 43.133"	120° 25' 08.153"
33	14° 27' 42.933"	120° 25' 07.851"
34	14° 27' 42.782"	120° 25' 07.519"
35	14° 27' 42.551"	120° 25' 06.942"
36	14° 27' 42.279"	120° 25' 06.384"
37	14° 27' 41.969"	120° 25' 05.847"
38	14° 27' 41.622"	120° 25' 05.335"
39	14° 27' 41.239"	120° 25' 04.850"
40	14° 27' 40.823"	120° 25' 04.395"
41	14° 27' 40.376"	120° 25' 03.972"
42	14° 27' 40.120"	120° 25' 03.727"
43	14° 27' 39.887"	120° 25' 03.460"
44	14° 27' 39.678"	120° 25' 03.173"
45	14° 27' 39.493"	120° 25' 02.868"
46	14° 27' 39.336"	120° 25' 02.548"
47	14° 27' 39.206"	120° 25' 02.215"
48	14° 27' 39.118"	120° 25' 01.896"
49	14° 27' 39.068"	120° 25' 01.570"
50	14° 27' 39.057"	120° 25' 01.239"

Corner No.	Latitude	Longitude
51	14° 27' 39.084"	120° 25' 00.910"
52	14° 27' 39.149"	120° 25' 00.586"
53	14° 27' 39.252"	120° 25' 00.273"
54	14° 27' 39.391"	120° 24' 59.974"
55	14° 27' 39.564"	120° 24' 59.695"
56	14° 27' 39.767"	120° 24' 59.439"
57	14° 27' 40.000"	120° 24' 59.210"
58	14° 27' 40.089"	120° 24' 59.130"
59	14° 27' 40.172"	120° 24' 59.045"
60	14° 27' 40.333"	120° 24' 58.928"
61	14° 27' 40.572"	120° 24' 58.849"
62	14° 27' 40.821"	120° 24' 58.820"
63	14° 27' 41.070"	120° 24' 58.841"
64	14° 27' 41.311"	120° 24' 58.913"
65	14° 27' 41.533"	120° 24' 59.032"
66	14° 27' 41.729"	120° 24' 59.193"
67	14° 27' 41.889"	120° 24' 59.390"
68	14° 27' 42.212"	120° 24' 59.843"
69	14° 27' 42.565"	120° 25' 00.271"
70	14° 27' 42.947"	120° 25' 00.671"
71	14° 27' 43.356"	120° 25' 01.043"
72	14° 27' 43.790"	120° 25' 01.385"
73	14° 27' 44.246"	120° 25' 01.693"
74	14° 27' 44.722"	120° 25' 01.968"
75	14° 27' 45.217"	120° 25' 02.207"
76	14° 27' 45.726"	120° 25' 02.410"
77	14° 27' 46.248"	120° 25' 02.574"
78	14° 27' 46.781"	120° 25' 02.701"
79	14° 27' 47.321"	120° 25' 02.788"
80	14° 27' 47.865"	120° 25' 02.835"
81	14° 27' 48.286"	120° 25' 02.887"
82	14° 27' 48.696"	120° 25' 02.997"
83	14° 27' 49.087"	120° 25' 03.165"
84	14° 27' 49.452"	120° 25' 03.387"
85	14° 27' 49.784"	120° 25' 03.659"
86	14° 27' 49.987"	120° 25' 03.834"
87	14° 27' 50.204"	120° 25' 03.992"
88	14° 27' 50.433"	120° 25' 04.130"
89	14° 27' 50.673"	120° 25' 04.247"
90	14° 27' 50.922"	120° 25' 04.343"
91	14° 27' 51.075"	120° 25' 04.388"
92	14° 27' 50.817"	120° 25' 05.357"
93	14° 27' 51.025"	120° 25' 05.409"
94	14° 27' 51.234"	120° 25' 05.450"
95	14° 27' 51.446"	120° 25' 05.480"
96	14° 27' 51.746"	120° 25' 05.528"

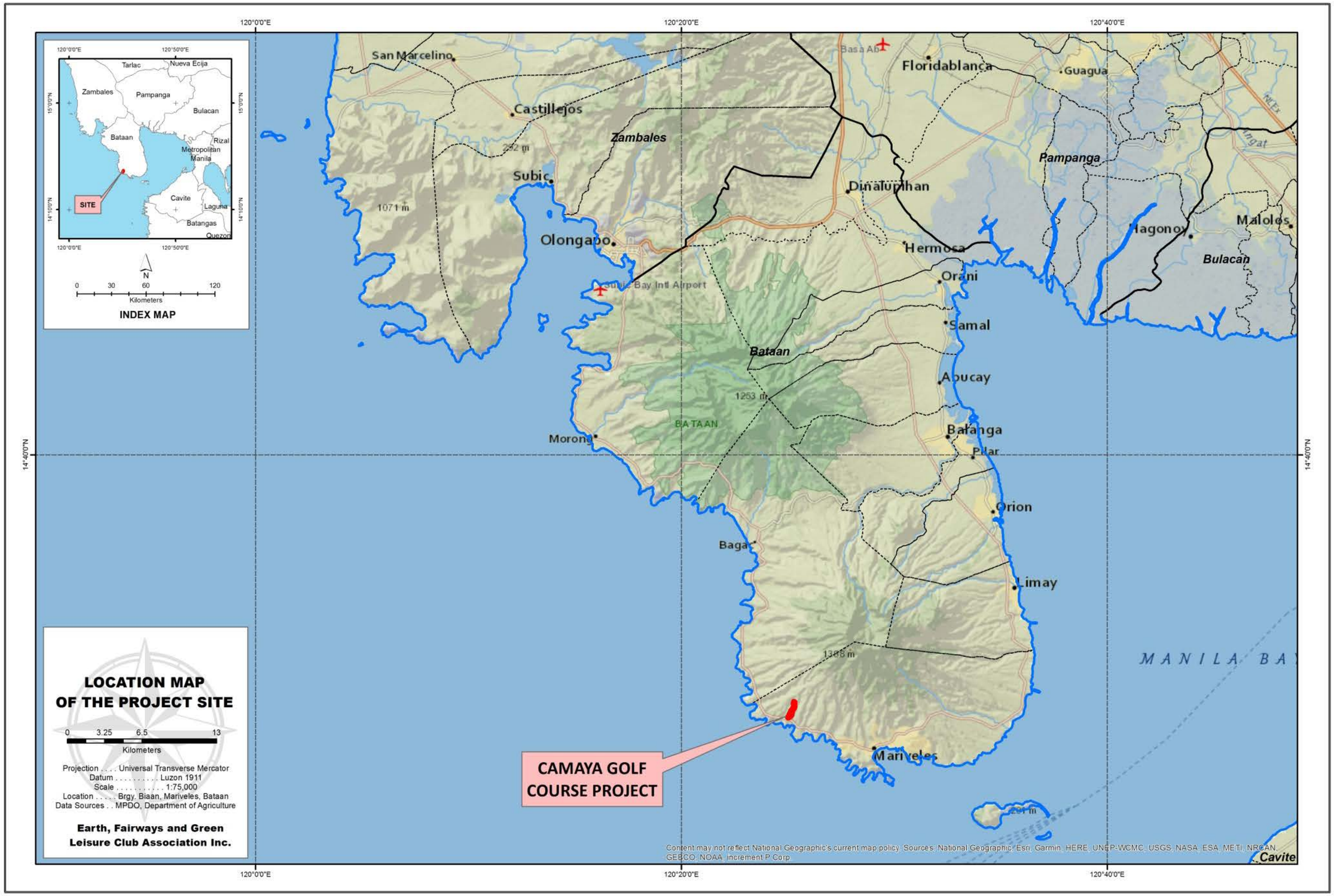


FIGURE 1-1. PROJECT LOCATION

FIGURE 1-2. SATELLITE IMAGE OF THE PROJECT

1.1.1 Site Accessibility

The Municipality of Mariveles is 205 kilometers or more than 3 hours away from Manila via North Luzon Expressway, Bataan Provincial Highway / Roman Superhighway and R-8 (**Figure 1-3**). The project site may be accessed via land by traversing the Bagac-Mariveles Road from the Mariveles Municipal Hall to a roundabout going to Camaya Coast.

Also, the Municipality of Mariveles can be reached through jet ferry plying the Mariveles to Manila route with approximate travel time of 40 minutes (**Figure 1-4**). From the port of Mariveles, the project site can be reached by traversing Bagac-Mariveles Road.

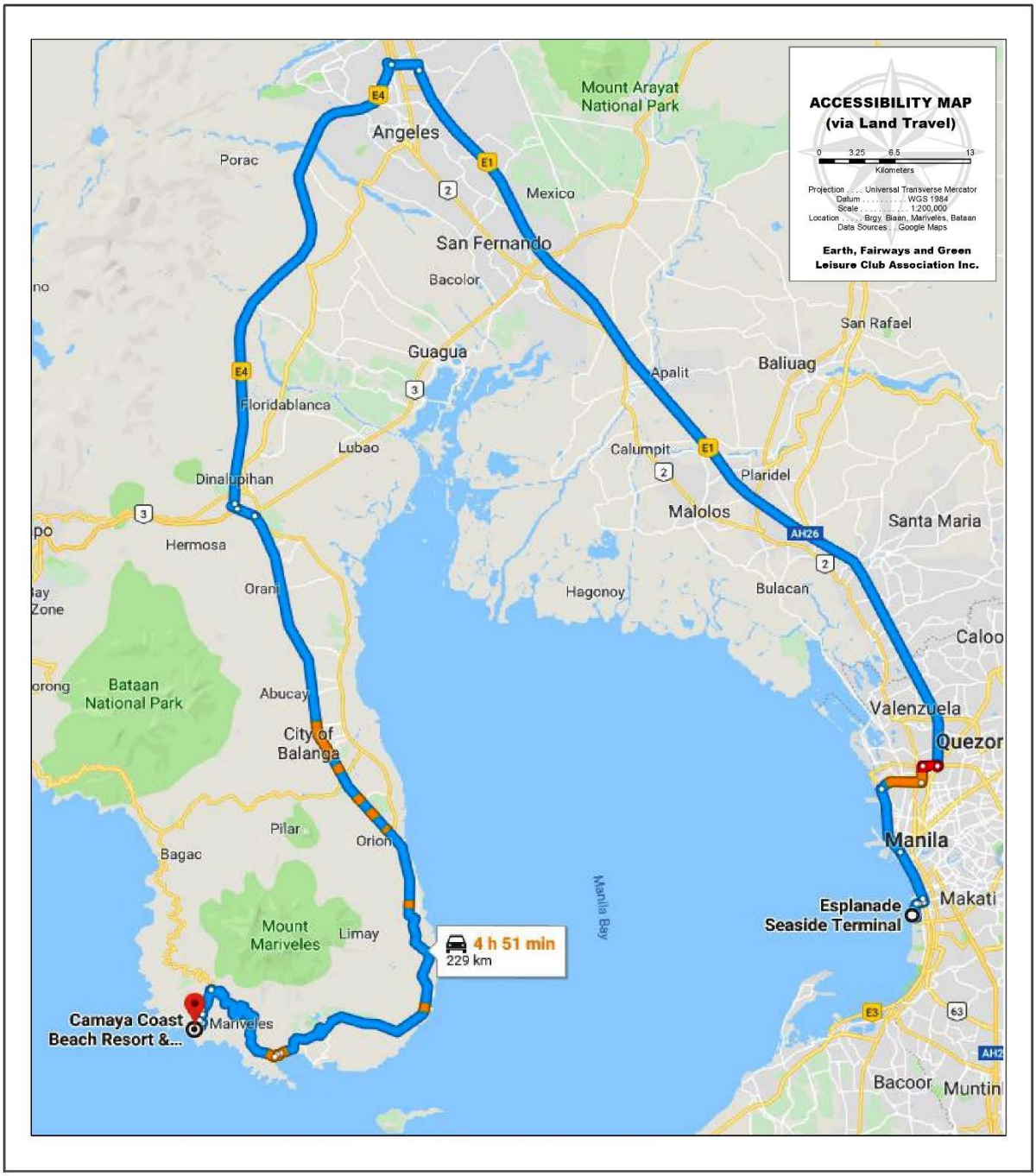


FIGURE 1-3. ACCESSIBILITY MAP VIA LAND

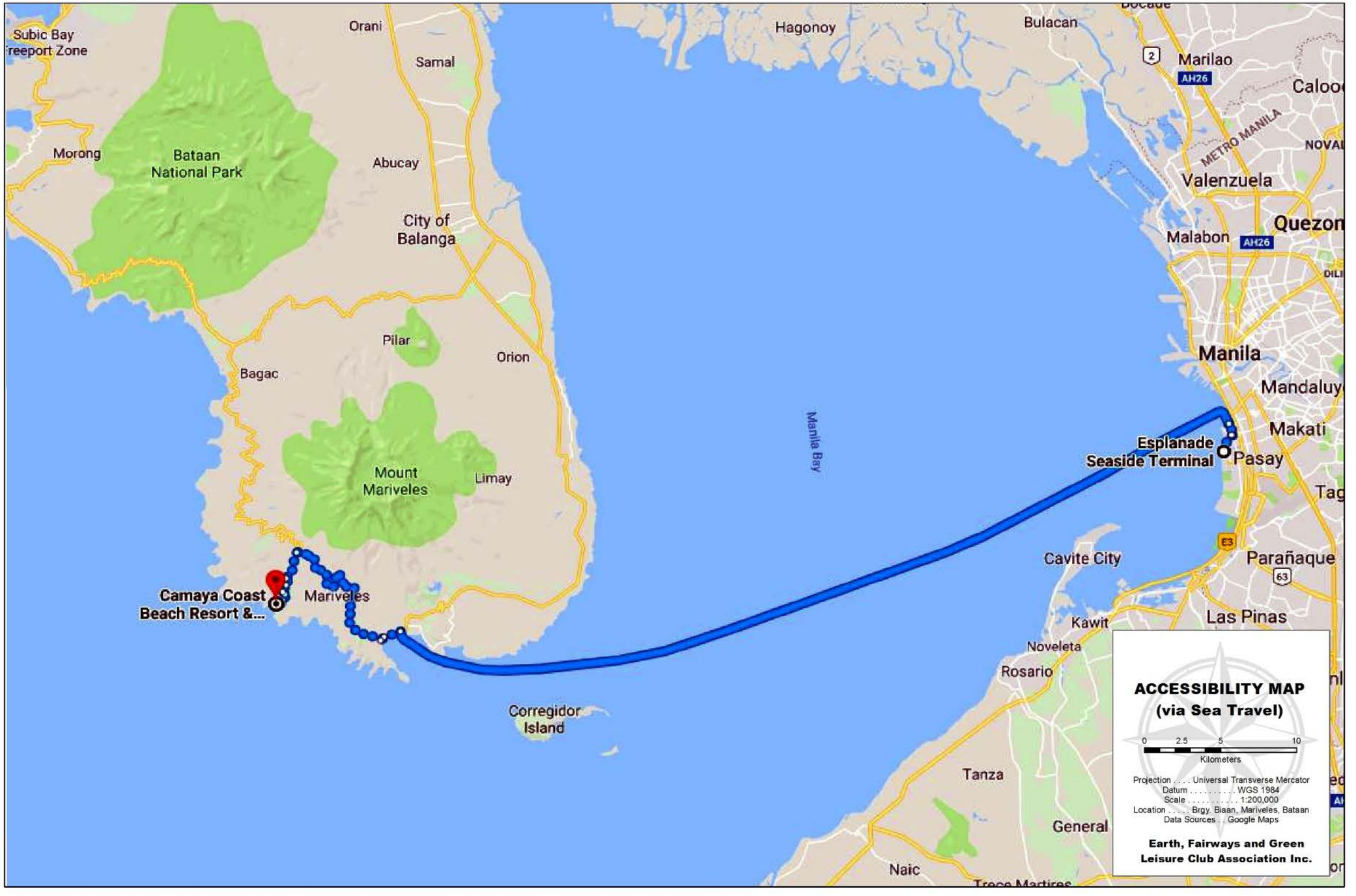


FIGURE 1-4. ACCESSIBILITY MAP VIA SEA

1.1.2 Delineation of Impact Zones

The direct and indirect impact areas of the Project were delineated based on DENR Administrative Order No. 30 Series of 2003 (DAO 03-30) and DENR Administrative Order 2017-15.

As per DENR Administrative Order No. 30 Series of 2003 (DAO 03-30), the direct impact areas (in terms of the physical environment) are those areas where all project components are proposed to be constructed/situated which is the 21.8615-hectare golf course area.

Indirect impact areas, on the other hand, are areas located immediately outside the coverage of the project facilities and operations.

DENR Administrative Order 2017-15 provides a more detailed description of the impact areas:

Impacts	Direct Impact Areas	Indirect Impact Areas
Biophysical Impacts	• 21.8615-hectare golf course area • Barangay Biaan • Areas about 1-2 km radius from the project boundaries which will be the receptors of air and noise impacts during reclamation.	• The adjacent waterbodies of the golf course • Surrounding/ adjacent barangays i.e, and historical sites
Social Impacts	• Barangay Biaan as primary beneficiaries of the Social Development Programs and whose lifestyle would be affected by the project. • Residents of Barangay Biaan who will most likely be affected by the construction and operation (livelihood and employment, health, etc.) • Municipality of Mariveles as direct beneficiary of the revenue from the development.	• Adjacent barangays/cities other than the primary beneficiaries of the SDP that will benefit at a provincial and regional level from potential revenues and taxes of the project. • Adjacent communities other than direct impact areas that will benefit from potential livelihood and employment opportunities both during development and eventual operations.

The Impact Areas are delineated in the **Figure 1-5**.

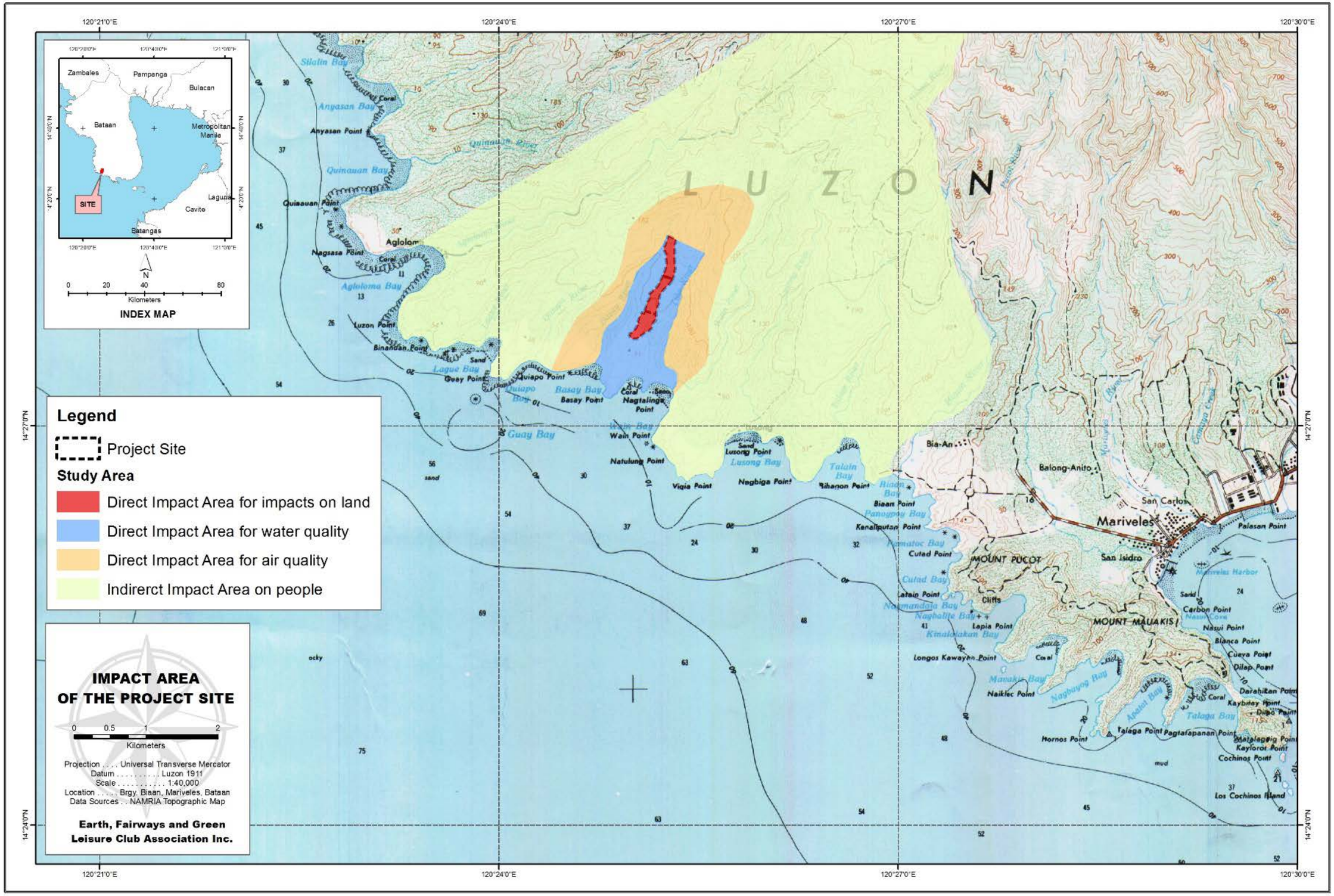


FIGURE 1-5. DIRECT AND INDIRECT IMPACT AREAS OF THE PROJECT

1.2 Project Rationale

The project development is envisioned to be economically attractive while preserving a large portion of the area as green, aesthetically pleasant open space. Further, it will complement the residential area and enhance the overall land values of the property and environs. In addition, the project site has the potential of attracting tourists due to its proximity to the existing resort and retirement subdivision under construction.

The project site for the proposed project is identified as one of the priority areas for eco-tourism of the municipality. Likewise, the area has been identified as tourist destination due to the presence of Camaya Coast (beach resort with a residential development) of Earth and Shore Leisure Communities.

It has been projected that there will be a big need for developments that will blend the environs and at the same time provide enjoyment and satisfaction to residents and visitors.

The proposed project will contribute to the economic growth of the area by providing first-class recreational facilities. The project is projected to provide a major attraction for investors and tourists both local and foreign helping further boost in tourism in Mariveles.

In the local context, the proposed project will increase job opportunities for the communities and revenues for the local government unit. As a consequence, it will induce economic growth and will also assist the economic recovery of the country through tourism industry/development.

1.3 Project Alternatives

1.3.1 Siting

1.3.1.1 Location

The game of Golf is increasing in popularity and there is an increasing demand for quality golf courses particularly in the Province of Bataan. As there are only 3 courses in the province such as Anvaya Cove Golf Course, The Peninsula Golf Club, and Petron Bataan Golf Course, the proposed golf course will be an attraction for players looking for a challenging and exciting golf game with a world class golf landscape design.

The factors considered for the project siting are:

- Availability of lot property;
- The property is covered by Transfer Certificate of Title (TCTs);
- Accessibility and the site is very ideal for the proposed development considering that associated tourism facilities are present nearby;
- Compatibility with the existing landuse as well as the support of the Local Government Unit (LGU) in favor of the project;
- The area is far from the community and free from any informal settlers and no indigenous people present at the project site; and
- Basic services are available.

While alternative locations were considered, none met the above mentioned requirements as well as the proposed area.

1.3.1.2 Severity of Impacts

The severity of impacts in terms in project siting alternatives is minimized due to the following:

1. No communities will be displaced as the project area is idle and privately-owned;
2. No indigenous groups are present in the area; and
3. Compatible with the municipality's land use.

1.3.1.3 Perception of Affected Communities

A Public Scoping Activity was conducted in July 13, 2016. Based on the documentation report, the main concerns of the stakeholders were siltation, solid wastes management, wastewater discharge, pesticides, dust, smoke emission, employment opportunities for the locals among others.

Based on the results of the Perception Survey conducted for the project, 88% of the respondents say that the project will be favorable to the Barangay. It will be an additional source of income since the priority for hiring is the impact barangay. A small percent (12%) from the barangay did not answer because they do not understand how the golf course project, 16 kilometers away, will affect them.

1.3.2 Technology Selection / Operation Processes

Pollution control devices involved are waste management system and wastewater treatment that will be installed in the area or an option for tapping the wastewater effluent outflow to the existing sewage treatment plant of Camaya Resort.

The golf course design will conform to the international standards of quality, resource conservation and ecological safety. A prominent feature of the project is its system for water conservation and recycling that will minimize water consumption, discharge, and risk of chemical contamination.

1.3.3 Resources

1.3.3.1 Source of Power Supply

To ensure high reliability of power supply during the operation, adequate redundancies in the transmission and distribution will be incorporated in the detailed design stage. Electricity may be supplied by the local distribution utility, Peninsula Electric Cooperative, Inc.

1.3.3.2 Water Supply and Demand

Water supply during operational phase will be sourced from the springs. There is an adequate supply of water in area to cope with the water requirements of the proposed project. Water harvesting will be resorted to as much as possible through the construction of

lined artificial lakes for the irrigation of the golf course. Reuse of treated wastewater for irrigation is envisioned.

1.3.4 No Project Alternative

The 'no-go' alternative is the option of not proceeding with the proposed project. This alternative will result in the continuation of the project site's current state which is devoid of any development. Since the site is underutilized, no yield is expected which would mean no profit and no additional income for the local government.

The proposed project will offer substantive socio-economic benefits not only for the host local government of Mariveles but also to the regional and national levels as well. Without the project, the economic benefits such as employment, livelihood opportunities, social development programs, and revenues for the local government as funds for projects will not be pursued.

1.4 Project Components

1.4.1 Major Facilities

1.4.1.1 Golf Course

The proposed Camaya Golf Course Project is a 9-hole golf course with facilities such as clubhouse and car path. The development will be built on a 21.8615-hectare lot and designed to conform to the international standards of quality, resource conservation and ecological safety.

Figure 1-6 provides the Site Development Plan of the project. Further, Figure 1-7 shows the locations of the following project components:

- Tees, greens, bunkers fairways, limits of rough, native planting areas, lakes and car paths;
- Irrigation system including, but not limited to, sprinkler heads, quick couplers, pipe fittings, wire splices, valves, pump station, and mainline and lateral line routing;
- Property line, clubhouse area, maintenance facility, parking lot, entrance road, and rain shelters and utility easements; and
- Perforated and solid pipe, manholes, catch basins, pipe outlets, overflows and observation risers including cleanouts for greens, bunkers and practice area tees.

Cut materials will be backfilled to the lower portion of the area. The total estimated cut-and-fill volume for the golf holes is 59,752.97 m^3 as shown in **Table 1-4**.

TABLE 1-4. CUT AND FILL SUMMARY

Name	Cut (m^3)	Fill (m^3)	Net (m^3)
Hole 1	23,113.610	711.850	22,401.760
Hole 2	738.920	639.850	99.070
Hole 3	3,002.280	1,447.160	1,555.120

Name	Cut (m^3)	Fill (m^3)	Net (m^3)
Hole 4	5,994.140	13,999.810	(8,005.670)
Hole 8	13,296.030	7,271.290	6,024.740
Hole 9	23,835.200	6,077.590	17,757.610
Clubhouse and Lake	27,960.700	8,040.360	19,920.340
Total	**97,940.880**	**38,187.910**	**59,752.970**

1.4.1.2 Irrigation Lake

The project design envisages the creation of three irrigation lakes (or artificial lakes) – two situated at the top portion and one at the lower portion near the Clubhouse facility. All three lakes will have a design depth of approximately 2.5meters presented in **Table 1-5**.

TABLE 1-5. DETAILS OF PROPOSED LAKES

Description	Maximum Estimated Volume Capacity (m^3)
Lake 1	7,000.00
Lake 2	5,000.00
Lake 3	15,000.00
Total	**27,000.00**

The lakes will serve the purpose of rain water harvesting and also serve as water hazard feature on the golf course. Rain water or runoff water retained in the lakes will serve the purpose as backup source of water supply during dry season and El Niño where water is scarce. Development of irrigation or artificial lakes will consider the following designs:

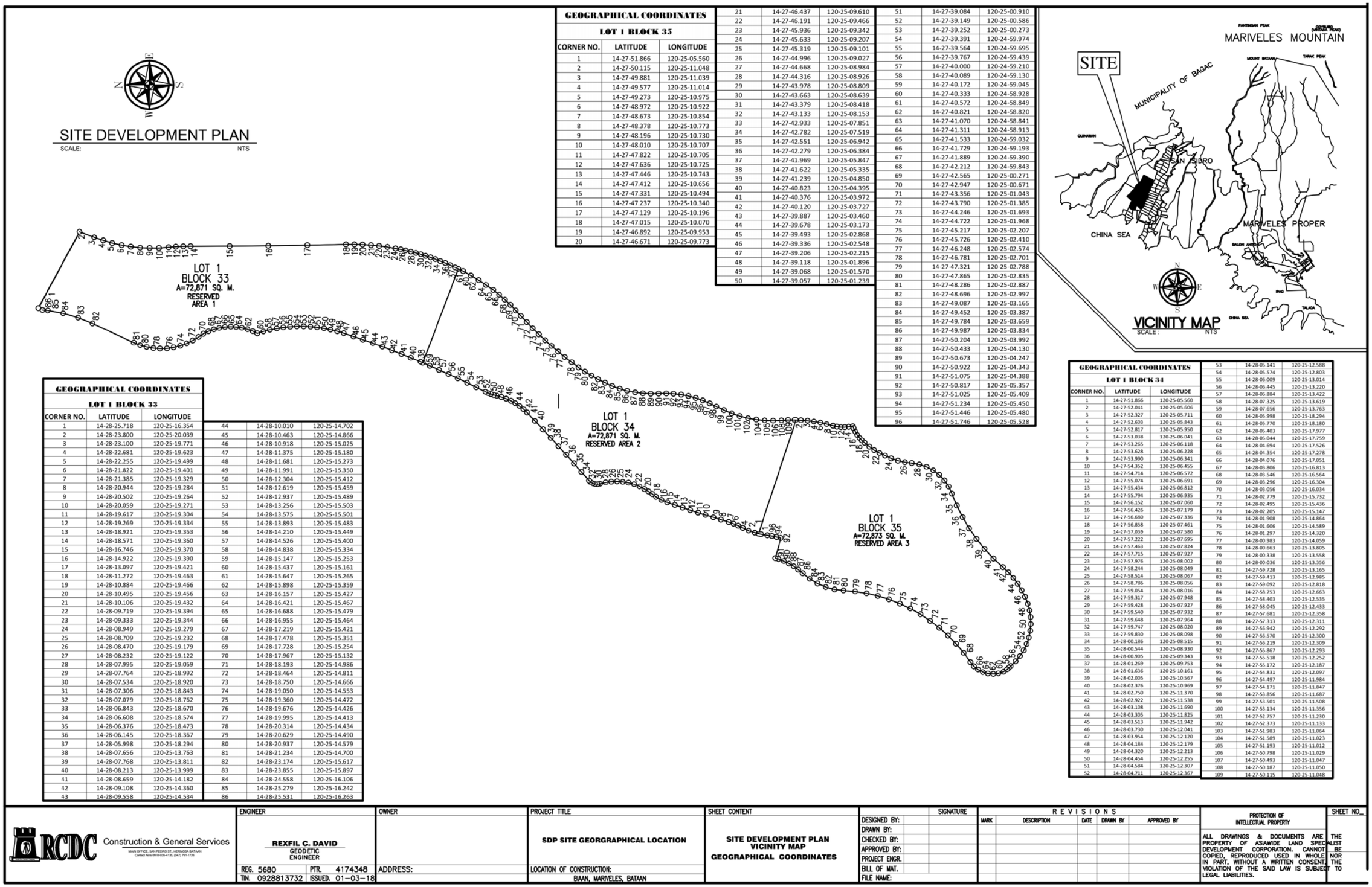
- Establish safe embankment fill where the existing contour level is lower than the lake top level.
- Safe and suitable internal slopes.
- Geo-synthetic or other approved with specified thickness will be used.
- Construction of cushion layer on the embankment.
- Overflow weir with piping/pumping arrangement for usage of harvested water.

Figure 1-7 illustrates the irrigation plan for the project. As a standard practice in golf course operation, an irrigation system must be installed in accordance to detailed plans.

1.4.1.3 Cart Path

Cart paths, maintenance paths and concrete curbing shall be built to the specifications and drawings compatible with sound traffic flow and safe gradients. The Proponent, through its golf course expert designer, will consult the conceptual locations of cart paths, maintenance paths and concrete curbing to allow for aesthetics of the golf course.

- **Cart Paths** – Minimum of 2.5-meter concrete
- **Maintenance Paths** – Minimum of 3-meter concrete
- **Concrete Curbing** – Concrete Curbing will be installed around the green and tee complexes and as directed to capture runoff water and direct it into catch basins or drainage swales.



GEOGRAPHICAL COORDINATES

LOT 1 BLOCK 33

CORNER NO.	LATITUDE	LONGITUDE
1	14-28-25.718	120-25-16.354
2	14-28-23.800	120-25-20.039
3	14-28-23.100	120-25-19.771
4	14-28-22.681	120-25-19.623
5	14-28-22.255	120-25-19.499
6	14-28-21.822	120-25-19.401
7	14-28-21.385	120-25-19.329
8	14-28-20.944	120-25-19.284
9	14-28-20.502	120-25-19.264
10	14-28-20.059	120-25-19.271
11	14-28-19.617	120-25-19.304
12	14-28-19.269	120-25-19.334
13	14-28-18.921	120-25-19.353
14	14-28-18.571	120-25-19.360
15	14-28-16.746	120-25-19.370
16	14-28-14.922	120-25-19.390
17	14-28-13.097	120-25-19.421
18	14-28-11.272	120-25-19.463
19	14-28-10.884	120-25-19.466
20	14-28-10.495	120-25-19.456
21	14-28-10.106	120-25-19.432
22	14-28-09.719	120-25-19.394
23	14-28-09.333	120-25-19.344
24	14-28-08.949	120-25-19.279
25	14-28-08.709	120-25-19.232
26	14-28-08.470	120-25-19.179
27	14-28-08.232	120-25-19.122
28	14-28-07.995	120-25-19.059
29	14-28-07.764	120-25-18.992
30	14-28-07.534	120-25-18.920
31	14-28-07.306	120-25-18.843
32	14-28-07.079	120-25-18.762
33	14-28-06.843	120-25-18.670
34	14-28-06.608	120-25-18.574
35	14-28-06.376	120-25-18.473
36	14-28-06.145	120-25-18.367
37	14-28-05.998	120-25-18.294
38	14-28-07.656	120-25-13.763
39	14-28-07.768	120-25-13.811
40	14-28-08.213	120-25-13.999
41	14-28-08.659	120-25-14.182
42	14-28-09.108	120-25-14.360
43	14-28-09.558	120-25-14.534
44	14-28-10.010	120-25-14.702
45	14-28-10.463	120-25-14.866
46	14-28-10.918	120-25-15.025
47	14-28-11.375	120-25-15.180
48	14-28-11.681	120-25-15.273
49	14-28-11.991	120-25-15.350
50	14-28-12.304	120-25-15.412
51	14-28-12.619	120-25-15.459
52	14-28-12.937	120-25-15.489
53	14-28-13.256	120-25-15.503
54	14-28-13.575	120-25-15.501
55	14-28-13.893	120-25-15.483
56	14-28-14.210	120-25-15.449
57	14-28-14.526	120-25-15.400
58	14-28-14.838	120-25-15.334
59	14-28-15.147	120-25-15.253
60	14-28-15.437	120-25-15.161
61	14-28-15.647	120-25-15.265
62	14-28-15.898	120-25-15.359
63	14-28-16.157	120-25-15.427
64	14-28-16.421	120-25-15.467
65	14-28-16.688	120-25-15.479
66	14-28-16.955	120-25-15.464
67	14-28-17.219	120-25-15.421
68	14-28-17.478	120-25-15.351
69	14-28-17.728	120-25-15.254
70	14-28-17.967	120-25-15.132
71	14-28-18.193	120-25-14.986
72	14-28-18.464	120-25-14.811
73	14-28-18.750	120-25-14.666
74	14-28-19.050	120-25-14.553
75	14-28-19.360	120-25-14.472
76	14-28-19.676	120-25-14.426
77	14-28-19.995	120-25-14.413
78	14-28-20.314	120-25-14.434
79	14-28-20.629	120-25-14.490
80	14-28-20.937	120-25-14.579
81	14-28-21.234	120-25-14.700
82	14-28-23.174	120-25-15.617
83	14-28-23.855	120-25-15.897
84	14-28-24.558	120-25-16.106
85	14-28-25.279	120-25-16.242
86	14-28-25.531	120-25-16.263

GEOGRAPHICAL COORDINATES

LOT 1 BLOCK 35

CORNER NO.	LATITUDE	LONGITUDE
1	14-27-51.866	120-25-05.560
2	14-27-50.115	120-25-11.048
3	14-27-49.881	120-25-11.039
4	14-27-49.577	120-25-11.014
5	14-27-49.273	120-25-10.975
6	14-27-48.972	120-25-10.922
7	14-27-48.673	120-25-10.854
8	14-27-48.378	120-25-10.773
9	14-27-48.196	120-25-10.730
10	14-27-48.010	120-25-10.707
11	14-27-47.822	120-25-10.705
12	14-27-47.636	120-25-10.725
13	14-27-47.446	120-25-10.743
14	14-27-47.412	120-25-10.656
15	14-27-47.331	120-25-10.494
16	14-27-47.237	120-25-10.340
17	14-27-47.129	120-25-10.196
18	14-27-47.015	120-25-10.070
19	14-27-46.892	120-25-09.953
20	14-27-46.671	120-25-09.773
21	14-27-46.437	120-25-09.610
22	14-27-46.191	120-25-09.466
23	14-27-45.936	120-25-09.342
24	14-27-45.633	120-25-09.207
25	14-27-45.319	120-25-09.101
26	14-27-44.996	120-25-09.027
27	14-27-44.668	120-25-08.984
28	14-27-44.316	120-25-08.926
29	14-27-43.978	120-25-08.809
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31	14-27-43.379	120-25-08.418
32	14-27-43.133	120-25-08.153
33	14-27-42.933	120-25-07.851
34	14-27-42.782	120-25-07.519
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36	14-27-42.279	120-25-06.384
37	14-27-41.969	120-25-05.847
38	14-27-41.622	120-25-05.335
39	14-27-41.239	120-25-04.850
40	14-27-40.823	120-25-04.395
41	14-27-40.376	120-25-03.972
42	14-27-40.120	120-25-03.727
43	14-27-39.887	120-25-03.460
44	14-27-39.678	120-25-03.173
45	14-27-39.493	120-25-02.868
46	14-27-39.336	120-25-02.548
47	14-27-39.206	120-25-02.215
48	14-27-39.118	120-25-01.896
49	14-27-39.068	120-25-01.570
50	14-27-39.057	120-25-01.239
51	14-27-39.084	120-25-00.910
52	14-27-39.149	120-25-00.586
53	14-27-39.252	120-25-00.273
54	14-27-39.391	120-24-59.974
55	14-27-39.564	120-24-59.695
56	14-27-39.767	120-24-59.439
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58	14-27-40.089	120-24-59.130
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61	14-27-40.572	120-24-58.849
62	14-27-40.821	120-24-58.820
63	14-27-41.070	120-24-58.841
64	14-27-41.311	120-24-58.913
65	14-27-41.533	120-24-59.032
66	14-27-41.729	120-24-59.193
67	14-27-41.889	120-24-59.390
68	14-27-42.212	120-24-59.843
69	14-27-42.565	120-25-00.271
70	14-27-42.947	120-25-00.671
71	14-27-43.356	120-25-01.043
72	14-27-43.790	120-25-01.385
73	14-27-44.246	120-25-01.693
74	14-27-44.722	120-25-01.968
75	14-27-45.217	120-25-02.207
76	14-27-45.726	120-25-02.410
77	14-27-46.248	120-25-02.574
78	14-27-46.781	120-25-02.701
79	14-27-47.321	120-25-02.788
80	14-27-47.865	120-25-02.835
81	14-27-48.286	120-25-02.887
82	14-27-48.696	120-25-02.997
83	14-27-49.087	120-25-03.165
84	14-27-49.452	120-25-03.387
85	14-27-49.784	120-25-03.659
86	14-27-49.987	120-25-03.834
87	14-27-50.204	120-25-03.992
88	14-27-50.433	120-25-04.130
89	14-27-50.673	120-25-04.247
90	14-27-50.922	120-25-04.343
91	14-27-51.075	120-25-04.388
92	14-27-50.817	120-25-05.357
93	14-27-51.025	120-25-05.409
94	14-27-51.234	120-25-05.450
95	14-27-51.446	120-25-05.480
96	14-27-51.746	120-25-05.528

GEOGRAPHICAL COORDINATES

LOT 1 BLOCK 34

CORNER NO.	LATITUDE	LONGITUDE
1	14-27-51.866	120-25-05.560
2	14-27-52.041	120-25-05.606
3	14-27-52.327	120-25-05.711
4	14-27-52.603	120-25-05.843
5	14-27-52.817	120-25-05.950
6	14-27-53.038	120-25-06.041
7	14-27-53.265	120-25-06.118
8	14-27-53.628	120-25-06.228
9	14-27-53.990	120-25-06.341
10	14-27-54.352	120-25-06.455
11	14-27-54.714	120-25-06.572
12	14-27-55.074	120-25-06.691
13	14-27-55.434	120-25-06.812
14	14-27-55.794	120-25-06.935
15	14-27-56.152	120-25-07.060
16	14-27-56.426	120-25-07.179
17	14-27-56.680	120-25-07.336
18	14-27-56.858	120-25-07.461
19	14-27-57.039	120-25-07.580
20	14-27-57.222	120-25-07.695
21	14-27-57.463	120-25-07.824
22	14-27-57.715	120-25-07.927
23	14-27-57.976	120-25-08.002
24	14-27-58.244	120-25-08.049
25	14-27-58.514	120-25-08.067
26	14-27-58.786	120-25-08.056
27	14-27-59.054	120-25-08.016
28	14-27-59.317	120-25-07.948
29	14-27-59.428	120-25-07.927
30	14-27-59.540	120-25-07.932
31	14-27-59.648	120-25-07.964
32	14-27-59.747	120-25-08.020
33	14-27-59.830	120-25-08.098
34	14-28-00.186	120-25-08.515
35	14-28-00.544	120-25-08.930
36	14-28-00.905	120-25-09.343
37	14-28-01.269	120-25-09.753
38	14-28-01.636	120-25-10.161
39	14-28-02.005	120-25-10.567
40	14-28-02.376	120-25-10.969
41	14-28-02.750	120-25-11.370
42	14-28-02.922	120-25-11.538
43	14-28-03.108	120-25-11.590
44	14-28-03.305	120-25-11.825
45	14-28-03.513	120-25-11.942
46	14-28-03.730	120-25-12.041
47	14-28-03.954	120-25-12.120
48	14-28-04.184	120-25-12.179
49	14-28-04.320	120-25-12.213
50	14-28-04.454	120-25-12.255
51	14-28-04.584	120-25-12.307
52	14-28-04.711	120-25-12.367
53	14-28-05.141	120-25-12.588
54	14-28-05.574	120-25-12.803
55	14-28-06.009	120-25-13.014
56	14-28-06.445	120-25-13.220
57	14-28-06.884	120-25-13.422
58	14-28-07.325	120-25-13.619
59	14-28-07.656	120-25-13.763
60	14-28-05.998	120-25-18.294
61	14-28-05.770	120-25-18.180
62	14-28-05.403	120-25-17.977
63	14-28-05.044	120-25-17.759
64	14-28-04.694	120-25-17.526
65	14-28-04.354	120-25-17.278
66	14-28-04.076	120-25-17.051
67	14-28-03.806	120-25-16.813
68	14-28-03.546	120-25-16.564
69	14-28-03.296	120-25-16.304
70	14-28-03.056	120-25-16.034
71	14-28-02.779	120-25-15.732
72	14-28-02.495	120-25-15.436
73	14-28-02.205	120-25-15.147
74	14-28-01.908	120-25-14.864
75	14-28-01.606	120-25-14.589
76	14-28-01.297	120-25-14.320
77	14-28-00.983	120-25-14.059
78	14-28-00.663	120-25-13.805
79	14-28-00.338	120-25-13.558
80	14-28-00.036	120-25-13.356
81	14-27-59.728	120-25-13.165
82	14-27-59.413	120-25-12.985
83	14-27-59.092	120-25-12.818
84	14-27-58.753	120-25-12.663
85	14-27-58.403	120-25-12.535
86	14-27-58.045	120-25-12.433
87	14-27-57.681	120-25-12.358
88	14-27-57.313	120-25-12.311
89	14-27-56.942	120-25-12.292
90	14-27-56.570	120-25-12.300
91	14-27-56.219	120-25-12.309
92	14-27-55.867	120-25-12.293
93	14-27-55.518	120-25-12.252
94	14-27-55.172	120-25-12.187
95	14-27-54.831	120-25-12.097
96	14-27-54.497	120-25-11.984
97	14-27-54.171	120-25-11.847
98	14-27-53.856	120-25-11.687
99	14-27-53.501	120-25-11.508
100	14-27-53.134	120-25-11.356
101	14-27-52.757	120-25-11.230
102	14-27-52.373	120-25-11.133
103	14-27-51.983	120-25-11.064
104	14-27-51.589	120-25-11.023
105	14-27-51.193	120-25-11.012
106	14-27-50.798	120-25-11.029
107	14-27-50.493	120-25-11.047
108	14-27-50.187	120-25-11.050
109	14-27-50.115	120-25-11.048

RCDC Construction & General Services
MAIN OFFICE, BAN-PEDRO ST., HERMOSA-BATAAN
Contact No's 0918-935-4135, (047) 791-1726

ENGINEER	REXFIL C. DAVID, GEODETIC ENGINEER
REG. 5680	PTR. 4174348
TIN. 0928813732	ISSUED. 01-03-18
OWNER	
ADDRESS:	
PROJECT TITLE	SDP SITE GEORGRAPHICAL LOCATION
LOCATION OF CONSTRUCTION:	BIAAN, MARIVELES, BATAAN
SHEET CONTENT	SITE DEVELOPMENT PLAN VICINITY MAP GEOGRAPHICAL COORDINATES
DESIGNED BY:	SIGNATURE
DRAWN BY:	
CHECKED BY:	
APPROVED BY:	
PROJECT ENGR.	
BILL OF MAT.	
FILE NAME:	

REVISIONS

MARK	DESCRIPTION	DATE	DRAWN BY	APPROVED BY

SHEET NO._

FIGURE 1-6. GENERAL SITE DEVELOPMENT PLAN

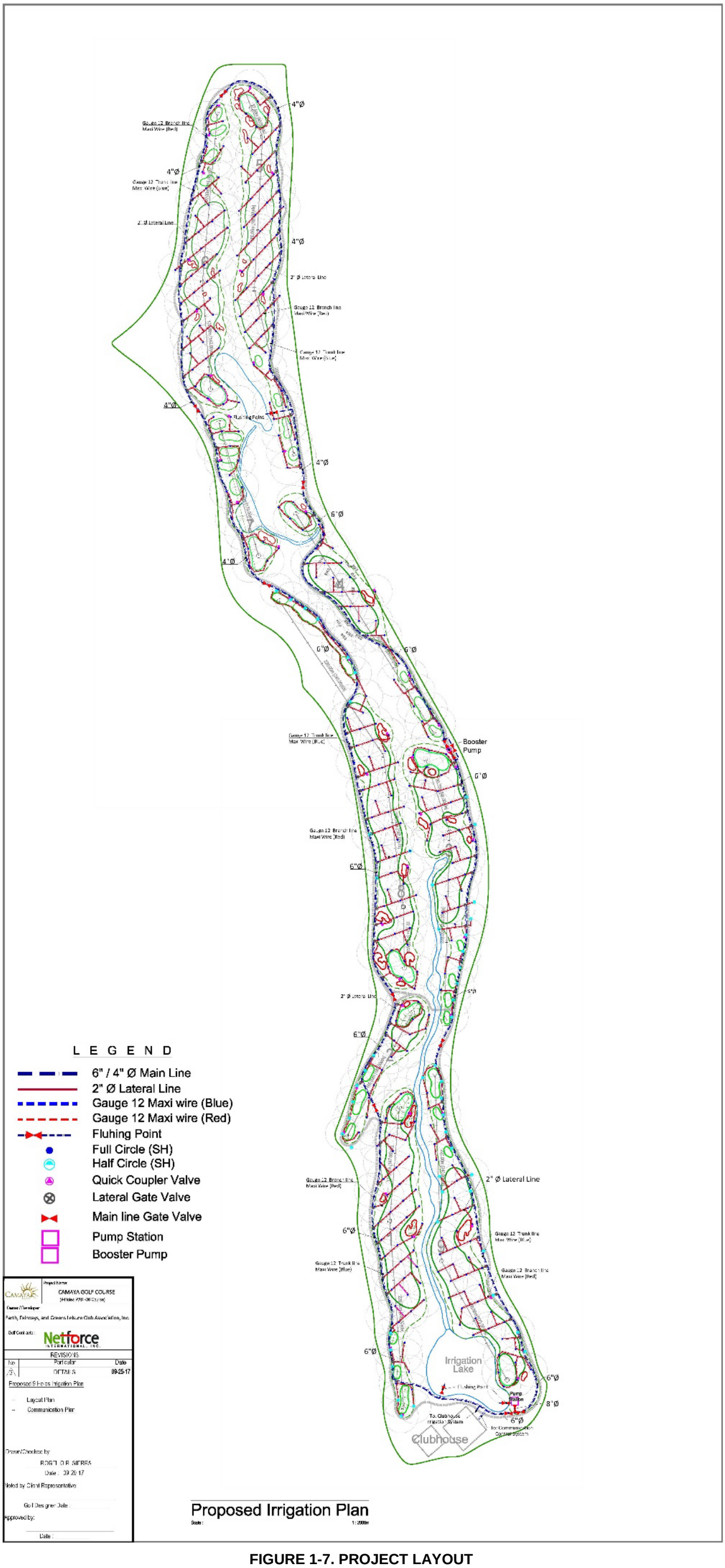


FIGURE 1-7. PROJECT LAYOUT

1.4.2 Support Facilities

1.4.2.1 Clubhouse

The clubhouse will be developed in an area of 1,500 square meters that will consist of multi-purpose function area, lounge and bar, locker and shower area, storage facility for Golf Equipment/Golf Carts/Other Storages, pool area, kitchen, administrative and engineering services. Open parking areas will also be part of clubhouse facility.

Figure 1-8 presents the perspective design of the proposed clubhouse facility.

FIGURE 1-8. PERSPECTIVE VIEW OF THE PROPOSED CLUBHOUSE

1.4.2.2 Turf Nursery Area

A turf nursery area of approximately 1,850 square meters will be established and maintained by the company in support of its turf grass replacement requirement.

1.4.2.3 Power Supply

Electricity that will supply all facilities and support infrastructures of the project will be supplied by the local distribution utility, Peninsula Electric Cooperative, Inc. (PENELCO). The said electric cooperative currently supplies a total of 12 municipalities namely: Dinalupihan, Hermosa, Orani, Samal, Abucay, Balanga, Pilar, Orion, Limay, Mariveles, Bagac at Morong. The additional power requirement of the project will not result to power shortage.

However, to ensure steady supply of power for the golf course project, a stand-by generator set a sufficient capacity to supply the project will be a back-up power source in cases where power interruption is imminent.

1.4.2.4 Water Supply and Demand

1.4.2.4.1 Water Demand - Construction Phase

During the construction phase, water will be required for construction activity and the daily laborers' domestic activity requirement for the purpose of drinking, washing, cleaning and other ancillary requirements such as water requirement for the maintenance of plant nursery,

and other construction-related purposes. Around 35,000 to 40,000 cubic meters of water is estimated as the requirement for the construction phase of the project.

The estimated water requirement during construction phase is assumed on the basis where construction phase is estimated to last for a period of 50 to 60 months.

1.4.2.4.2 Water Demand - Operation Phase

During operation period, water requirement for domestic and non-domestic (golf course operation and maintenance) purposes is estimated to have a combined peak requirement of 605 cubic meters per day.

Water supply during operational phase will be sourced from the existing water sources on-site, particularly from existing spring source located downstream of Tilin River and water from Agloloma River thru an existing pipeline established and being maintained by the Camaya Resort – a sister company of the proponent. There is an adequate supply of water in area to cope with the water requirements of the proposed project.

Domestic Water Supply

Domestic water will be required for the day–to-day operation of Clubhouse and other support facilities and amenities of the project, particularly for washing, cleaning, and other similar activities.

It is estimated that a maximum demand of 30m^3/day during peak season of operation especially during events and tournaments where influx of visitors and golfers are at peak.

Table 1-6 shows the peak potable water requirements for clubhouse facility.

TABLE 1-6. PEAK DOMESTIC WATER REQUIREMENTS

Purpose	No. of Persons	Water required (L/Capita)	Total Requirement (LPD)
Clubhouse Bar and Lounge Area (major load during sporting events, conferences, holidays)	500 guests - Maximum load expected -	60[1]	30,000
Administrative, engineering and kitchen areas			
Total water requirement			**30,000 L/day** or **30 cubic meters / day**

Non-Domestic Water Supply

Non-domestic water supply requirement is required mainly for the golf course's irrigation and landscape. The peak water requirement is estimated at around 575 cubic meters per day or at 17,250 cubic meters per month as presented in **Table 1-7**. This estimate considers the dry months in November to April of the year.

[1] *Average water consumption in rural setting based on the Philippine Environment Monitor by the World Bank.*

TABLE 1-7. PEAK NON-DOMESTIC WATER REQUIREMENT

Development Elements	Water Requirement	
	Cubic Meters per Day (cmd)	Cubic Meters per Month (cmm)
Golf Course - Irrigation	400	12,000.00
Landscape - Irrigation	160	4,800.00
Landscape - water features	15	450.00
Total	**575**	**17,250.00**

The required water supply of the project will be sourced from the following possible sources:

- Existing water reservoir of the EFGLCAI sister company, Camaya Coast, tapped from Agloloma River upstream of the project area. Water from said river is conveyed through a pipeline and stored in a water reservoir within the company premises.
- Spring water source adjacent to the project site located downstream of Tilin River, particularly located at where Water Sampling Station 1 is situated.
- Rainwater or runoff water retained in three irrigation/artificial lakes of the golf course.

1.4.2.5 Drainage

The project will install a well-engineered drainage pipeline system that is critical to the project's operation. All excavated areas will be kept smooth and well drained at all times during construction. All swales and depressions will be maintained to provide positive drainage to designated collection points.

Drainage will be installed by embedding a 10 cm perforated drainpipe in a trench and filled with gravel. The water draining into the perforated pipe will go to the golf course lake and utilize for irrigation purposes.

Figure 1-7 illustrates the drainage plan of the golf course as well as the details of the irrigation and corresponding piping system.

1.4.2.6 Soil Erosion and Siltation Management Controls

Prior to grading and shaping of the site, soil erosion control features will be installed to minimize soil exposure. A variety of methods will be used to contain soil erosion and sediment movement during grading activities, such as: construction of engineered fills; installation of erosion mats, rip-rap silt fences, and silt traps.

A siltation pond will be installed to strategic locations to control run-off, to and from adjacent areas and also contribute to all-weather characteristics of the course. Drainage patterns throughout the property naturally will serve as the basis for the drainage plan of the Project.

1.4.2.7 Safety and Emergency Facilities

Safety and emergency facilities, equipment, policy/program, and corresponding manpower complement will be operationalized during the projects operation. A designated health

center, to be located in the clubhouse area, will be established to attend to golfers and employees' minor health concerns during emergency situations.

More importantly, the company will strengthen its prevention controls by implementing safety guides, policies, and programs that will be strictly adhered to golfers, tourist, and company personnel. Sufficient and efficient safety equipment, devices and PPEs will also be in-placed to ensure that untoward incidents are addressed and avoided. Further, as part of the requirement of the DOLE-OSHA, the company will establish and operationalize an Emergency Response Team that will be responsible for and respond to any emergency situations.

1.4.3 Pollution Control Devices and Waste Management System

1.4.3.1 Wastewater Generation

The principal source of wastewater will be from the operation and maintenance of the Clubhouse facility. Particularly, wastewater effluent from the clubhouse will be generally from toilet, kitchen, laundry and floor cleaning.

All the wastewater from these sources will be collected through a network of sewerage pipes and channelized through the sewer network to the proposed chambered Septic Tank comprising of black and grey water treatment processes.

Sewerage system of the clubhouse facility will consider the following:

- Kitchen waste will be connected to grease trap prior to its connection to the main sewerage system;
- Provision of access into the sewer system to allow periodic cleaning;
- Installation of sufficient plumbing vents to allow the release of sewer gases from the sewer system.

1.4.3.2 Solid Waste Generation

The project will generate solid waste as a result of day-to-day operation of facilities, particularly the clubhouse, and the maintenance of the golf course area. The composition of the generated solid waste will be biodegradable, recyclable, and residual from the clubhouse and agricultural waste generated from the golf course area as a result of trimming and maintenance of trees and grasses.

Solid waste generation is estimated at a peak of 200 kg/day during operation phase considering a peak season of 500 combined project personnel, golfers, and guests. The estimate is based on the 2016 National Solid Waste Management Commission (NSWMC) data where an estimated average per capita waste generation is 0.40 kilograms per day for both urban and rural.

The Project will comply with solid waste management regulations stipulated in the Ecological Solid Waste Management Act of 2000. Solid wastes generated by the project will be segregated at source according to biodegradable, recyclable, residual, and agricultural wastes. Biodegradable and agricultural wastes and other compostable materials will be managed by composting. Compost material generated will be utilized as soil conditioner for the in-house plant nursery. Recyclable wastes will be collected and managed in the project's

Materials Recovery Facility (MRF) which will be later on disposed or sold to waste-recycling facilities in the Province or in the Region. On the other hand, residual waste or solid waste materials that are non-compostable and non-recyclable will be disposed ecologically through a long-term disposal facility such as the sanitary landfill. Residual waste will be managed and stored properly prior to collection by the Local Government Units (LGU). Generated residual waste of the project will be disposed, through the LGU, at the existing Sanitary Landfill of the Municipality of Mariveles.

1.4.3.3 Water pollution and possible toxicity due to application of fertilizers and pesticides

The following mitigating measures will be carried-out to address possible water pollution:

- The well-established principles of Integrated Pest Management (IPM[2]) will be adopted to reduce the use of fertilizers and pesticides.
- If practicable, only easily bio-degradable pesticides having low "persistence/residual effect" will be used.
- Use of conventional pesticides will be supplemented by the application of bio-pesticides.
- Use of fertilizers will be supplemented by use of bio-fertilizers and manures and their quantities rationalized by need-based application determine on the basis of soil analysis.
- A series of structures such as, dikes, check dams, trenches, grassed waterways, grass swales, roughs and lakes will be used for the said purpose of runoff control. Water retained in artificial lakes will be monitored for traces and content of chemicals found in fertilizers and pesticides.
- Storage, handling and disposal of fertilizers and pesticides and contaminated materials, will conform to the requirements and standards of DAO No. 2013-22.

1.4.3.4 Storing of Hazardous Materials

Table 1-8 and Table 1-9 present the list of selection of fertilizers and pesticides, respectively, which may be utilized by the Company to maintain the turf grasses of the golf course site. These common fertilizers and pesticides are widely used worldwide for various applications and more commonly for golf courses. Further, applications of any of these fertilizers and pesticides will depend on careful selection by the Company's Agronomist that will have minimal environmental impact while still providing the grasses with the needed nutrients.

TABLE 1-8. LIST OF FERTILIZERS USED IN GOLF COURSES

Fertilizer grade	Recommended	Kg/ha. of Product per Application
Slow Release Fertilizers		
1. 19-3-19 (rough grade)	0.25 – 1.0 LBN/1000 ft2	136 kg – 272 kg
2. 19-3-19 (greens grade)	0.50 – 1.0 LBN/1000 ft2	20 kg – 40 kg
3. 18-3-18 (greens grade)	0.50 – 1.0 LBN/1000 ft2	18 kg –36 kg

[2] *Integrated pest management, or IPM, is a process that can be used to solve pest problems while minimizing risks to people and the environment. IPM can be used to manage all kinds of pests anywhere–in urban, agricultural, and wildland or natural areas.*

Fertilizer grade	Recommended	Kg/ha. of Product per Application
4. 14-028 (greens grade)	0.50 – 1.0 LBN/1000 lft2	30 kg – 60 kg
5. 23-5-10 (rough grade)	1.0 –2.0 LBN/1000 ft2	37 kg –74 kg
6. 22-5-5 (rough grade)	0.75 – 2.0 LBN/1000 ft2	27 kg 72 kg
Quick release Fertilizers		
1. 46-0-0	0.25 – 1.0 LBN/1000 ft2	28 kg - 112 kg
2. 21-0-0-245	0.25 – 1.0 LBN/1000 ft2	61 kg - 244 kg
3. 14-14-14	0.25 – 1.0 LBN/1000 ft2	92 kg – 363 kg
Others		
1. Step (Micronutrient Fertilizer)	39 LBS-60 LBS products/Acre	33.6 kg –67.3 kg
2. Sulfur	50-LBS-100LBS	56kg – 112 kg

Note: Used in Turf Maintenance/Grow-In Maintenance
Registered to the Bureau of Fertilizers and Pesticide Authority

TABLE 1-9. LIST OF PESTICIDES USED IN GOLF COURSES

Chemical/Brand Name	Active Ingredient (Name %)	Recommended Rate Used
Herbicide		
1. Basagran	Bentazon 480 g/L	320 ml/161 or (2.6 oz/gal)
2. Agroxone	4-chloro-2-Methylphenoxy Acetic Acid (MCPA), 400 g/L	170 ml/161 or (14 oz/gal)
3. Shell 2,4-D Ester	2,4-D Isobutyl Ester, 400 g/L	6.6 ml/161 or (0.05 oz/gal)
4. 2,4-D Granules	2,4-D Isobutyl Ester, 30 g/kg	20 kg/ha
5. Ronstar	Oxadiaxon, 250 g/L	Experimental Recommended
6. Round-up	Glyphosate, 430 g/L	320 ml/161 or (2.6 oz/gal) 2%
7. MSMA (Bucno 6)	Monosodium Acid Methane Arsenate	115 ml/151 or (1 oz/gal)
8. Image	Ammonium Salt of Imazaguim	60 ml/161 or (0.5 oz/gal)
9. Manage	Methy15 – {1(4,6 – Dimethoxy –2- pyrimidinly1) amino 1 carbonylaminosulfony1 } 3-chloro-1111Methy1-1-H-pyrazole-4-carboxylate, 75%	3.6 gm/161 or (0.03 oz/gal
Fungicide		
1. DACONIL 2787	Chlorothalonil, 750 g/kg	Preventive 3 oz / 1000fy^2 Curative 5 oz / 1000fy^2
2. Manzata 200	Mancozeb, 80% (800 g/kg	38 kg/ha or (6 oz/1000fy^2)
Insecticide		
1. Lorsban 3E	Chlorpyrifos, 30%	3 oz/1000fy^2 or 10 Lit/Ha
3. Sevin 85 WP	Carbonate, 85%	1.5 kg/74,052 fy^2 or o.7 oz/1000fy^2 (0.1702 – 1.36 oz/1000fy^2

Storage requirement of fertilizers and pesticides that may be used for the project, as presented in Table 1-8 and Table 1-9, respectively, and other hazardous materials and substances that may utilized in the golf course operation will be in accordance with Republic Act No. 6969 or the *"Toxic, Substances and Hazardous and Nuclear Waste Control Act of 1990*", particularly Chapter 6 of DENR Administrative Order No. 2013-22 "Revised Procedures and Standards for the Management of Hazardous Wastes). Also, the proponent will comply with the requirements of the Department of Agriculture-Fertilizer and Pesticide Authority (FPA) particularly on the proper use and handling of fertilizers and pesticides.

Hazardous materials and/or waste will be stored based on the following standards:

a. Accessible in cases of emergency and for purposes of inspection and monitoring. Shall have full emergency response equipment corresponding to the class of wastes being stored and potential emergencies associated with it.
b. Enclosed and adequately ventilated
c. Provision of floors that are:
    i. Impermeable to liquids
    ii. Resistant to attack of chemicals.
    iii. Not slippery
    iv. Able to retain spillages
d. Secured and can only be accessed by authorized personnel;
e. Have provision for proper wastes segregation in accordance with the following:
    i. Chemical properties
    ii. Waste type
f. Shall conform with the maximum storage limits set by DAO No. 2013-22 or its updated version.
g. Shall conform with the labeling and packaging requirements

1.5 Process / Technology

1.5.1 Sewage Treatment

The principal sources of sewage/effluent within the resort will be from toilet, kitchen, and laundry facilities and as a result of cleaning and gardening activities. All the wastewater from these sources and activities will be collected through a network of sewerage pipes and manholes and channelized through the sewer network to the proposed sewage treatment facility such as a Septic Tank/Chamber. The manholes will provide access into the sewers to allow periodic maintenance, monitoring and cleaning. Ample ventilation to the sewers, to prevent formation of sulfur dioxide and hydrogen sulfide, will be provided.

The sewerage system is proposed for the project will have the following design considerations:

- Sewage shall be discharged properly to channelized pipe system directly to treatment facility.
- Kitchen waste will be connected to a grease trap prior to its connection to the sewerage system.

1.5.2 Description of the Operation and Maintenance of Facility

The operation and maintenance of the 9-hole golf course will be under the management of the Earth and Greens Leisure Club Corporation and the golf course superintendent will oversee the application of fertilizers and pesticides.

1.5.2.1 Turf Grass Maintenance

Regular application of fertilizer is necessary. The fertilizers to be used should only be specific substances that are approved by the Fertilizer and Pesticide Authority (FPA). Prior to the application of fertilizers, soil samples will be taken and tested in the laboratory. Fertilizer formulations to be used are based on the specific deficiencies of the soil. For

example, soils lacking in phosphorous (a nutrient needed in the development of roots) will use agricultural grade fertilizers (quick release). To minimize the possible contamination of groundwater by nitrate, controlled-release fertilizer will be utilized. Slow release fertilizers are balls of complete fertilizers coated with a permeable substance. When moistened, a small amount of nutrients leached through the coating until the encapsulated fertilizer is used up. Shelf life of these products is from 3 to 8 months.

1.5.2.2 Pesticide Management

As much as possible, weeds will be removed manually. Although hand pulling takes time and effort, the total removal of the weeds is ensured and use of chemical herbicides will be avoided. The application of pesticide, programmed by a resident agronomist is necessary to maintain grass quality.

Only formulations certified by the Fertilizer and Pesticide Authority (FPA) will be used. All chemical containers will be labeled and disposed properly pursuant to Republic Act 6969 otherwise known as “Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990.

1.5.2.3 Aeration

Once the turf has been established, the course will be aerated using motorized aeration systems. Aeration is a method of punching holes into the turf to allow moisture, oxygen and nutrients to penetrate the soil. It breaks up thatch which hinders water absorption and root be backed combed with rake to level the ground.

FIGURE 1-9. TYPICAL AERATION / AERIFICATION ACTIVITY

1.5.2.4 Mowing

The project will be adequately equipped with state-of-the-art cutting equipment to be manned by experienced crew. Their task is to control the vegetation growth.

1.6 Project Size

The proposed Camaya Golf Course Project is a 9-hole golf course situated in a 21.8615-hectare property covered by three land titles - Transfer Certificate of Titles (TCT) Nos. 038-2018000975, 038-2018000976, and 038-2018000977 all registered under and owned by Earth and Shore Tourism Landholdings Corporation.

1.7 Development Plan, Description of Project Phases and Corresponding Timeframes

The stages of development and the time for each activity are listed in **Figure 1-10**. The project has started its construction and is proposed to be completed by the year 2020.

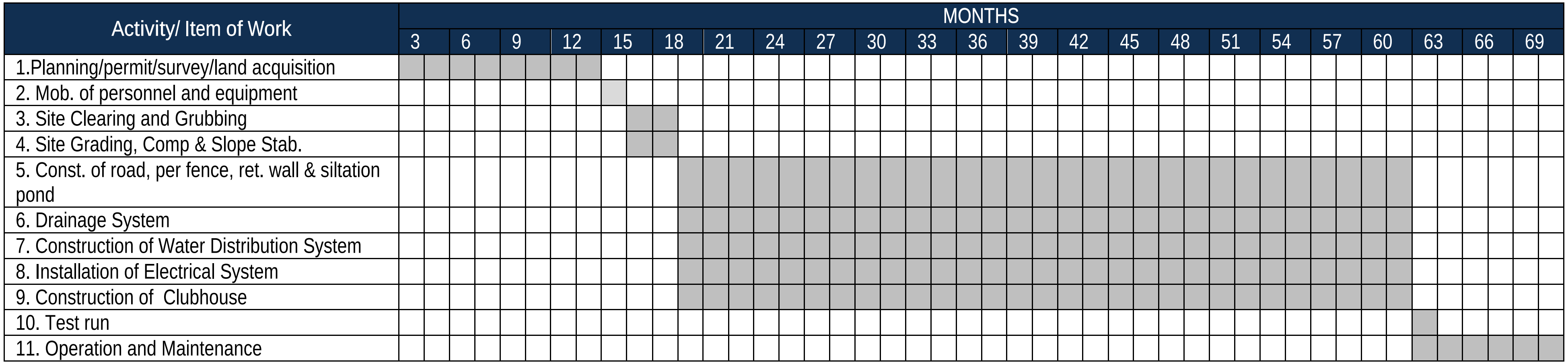


FIGURE 1-10. PROJECT TIMELINE

1.7.1 Pre-Construction Phase

To arrive at a final decision regarding the design of the project, the developer works closely with the golf course architect at this stage. The developer's engineers estimate and revise the project costs and construction timetable based on the evolving designs, which include locating key points such as centerlines and golf course boundaries. Minor field adjustments are made to improve the golf course by integrating and preserving the natural features of the terrain in the design.

The proponent secures all the necessary requirements relative thereto from the concerned government agencies. Initial mobilization and transport of construction equipment and supplies to the project site are undertaken. A golf course superintendent and other key personnel will be hired to ensure that proper management practices will be implemented during operation. Employment of workers who are preferably local residents (e.g., laborers, carpenters, etc.) for the construction phase of the project also starts at this stage.

The pre-construction phase ends with the clearing and grubbing of the golf course. This is done in stages to avert the unnecessary loss of natural features that contribute to the character of the golf course. All trees and other unique areas of vegetation that are to be preserved will be protected from disturbance, or tagged for relocation at a later stage. As soon as possible, a turf grass nursery will be developed on a flat and suitable location. After a golf hole area is cleared, the topsoil will be carefully removed and stockpiled in a strategic location before grading activities begin.

1.7.2 Construction Phase

1.7.2.1 Grading and Shaping

To avoid excessive disturbance, the golf course will be graded to produce the necessary drainage as provided by the features required by the design. The site will first undergo rough grading (i.e., bulk shaping) to accomplish the major earthwork necessary for the construction of golf hole features (e.g., tees, greens, mounding, bunkers). All slopes around tees, greens, bunkers, and mounds will not be greater than 5:1. Cut and fill slopes in fairways, roughs and non-use areas will not exceed 3:1.

During grading activities, the natural topography will be preserved as much as possible to allow minimal, balanced cut-and-fill volume for almost every hole. The total estimated cut-and-fill volume for the golf holes is 59,752.97 m^3 (**Table 1-4**).

After the bulk shaping, the drainage pipes and irrigation lines will be installed. Natural drainage swales will be used whenever possible. However, there are areas where the surfaces cannot be drained properly. Drainage will be installed by embedding a 10 cm perforated drainpipe in a trench and filled with gravel. The water draining into the perforated pipe will go to the golf course lake and utilize for irrigation purposes.

Then, each golf hole will undergo fine shaping to provide the desired strategy and character of the course. The topsoil will be spread uniformly over untopsoiled areas with the exception

of tee and green surfaces (green mixture will be evenly applied to these areas instead). The green and tee mixture shall be in accordance with the standard specifications.

1.7.2.2 Development of Course Drainage

Drainage trenches will be dug in a herringbone or semi-herringbone pattern spaced so that the water will not have to travel more than 6 meters to reach a tile drain. Trenches shall be 20 cm wide and a minimum 30 cm deep, the bottom of which shall produce a constant grade of not less than a 0.5% slope. Washed gravel of 9.5 to 6.4 mm in diameter will be evenly spread 7 cm deep at the bottom of all trenches. On top of gravel layer, the perforated drainpipe will be laid. The drainpipe, 10 cm in diameter, will be made of plastic material. All pipe joints shall be connected by impervious sleeves. Then the trenches will be filled with 10 cm of gravel. The drain tile will be joined to one or more conduit pipes, which exit the green at its low point. The conduit pipes shall extend to lakes, streams or other non-play areas.

1.7.2.3 Development of Irrigation Water Supply

One irrigation lake with a depth of approximate 2.5 meters will be developed for the entire golf course. The estimated total storage capacity of the irrigation facilities will be 15,000 cum which is enough only for half a month supply during dry months. The use of spring water for irrigation assumes an extreme scenario where the river cannot be tapped. During an El Niño year, the use of spring water will continue until May.

To minimize seepage that may lead to contamination of ground water, the lake bottom will be sealed through compaction of the base material and installation of non-permeable sheet material (high density polyethylene liner).

In order to optimize the use of water for irrigation a weather sensing, computer-controlled irrigation system that will dispense water only when the sensors detect areas with dry soil conditions will be installed.

1.7.2.4 Grassing and Landscaping

After the installation of irrigation and drainage systems, the disturbed areas will be prepared and planned with the recommended types of turf grass (e.g. *Pasphalum* for the fairways, Tiff 419 Bermuda grass for rough area and CL 2000 for the greens).

Areas that are susceptible to erosion will be planted for extra protection. All areas planted with turf grass will be fertilized with the proper mixtures of fertilizers. Achieving “soil balance” during the grow-in phase will be the first line of defense against turf grass disease. This will translate to reduced fertilizer and pesticides use during the maintenance phase. The areas of the course that will receive the most play are the greens, which will be fumigated prior to grassing to ensure optimum conditions for the turf grass growth. The golf course will also be landscaped with trees, shrubs, and other plant material to provide the desired visual quality.

1.7.2.5 Construction of Infrastructures

Associated golf course infrastructure (e.g., golf perimeter fence, concrete paths, clubhouse etc.) will undergo parallel construction with the golf course following construction methods and health and safety procedures. Asphalt or concrete cart and maintenance paths, 2.5 and 3.0 meters wide, respectively, will be constructed. Proper project management will determine the optimum scheduling of construction activities to ensure the completion of all facilities in time for the opening of the golf course.

1.7.2.6 Pre-operational Activities

Prior to the completion of construction, the maintenance and management of the golf and country club will begin. During the grow-in period, responsible management practices will be established and the golf course will be prepared for opening. A playability test will be conducted to gain feedback on the characteristic feel and playability of the course. The recruitment process for operations managers, staff, and contractual workers will begin. Preference will be given to qualified residents. Training programs will also be implemented to ensure high-quality service at all times. Once the turf grass has been established and the maintenance has achieved on desired level, the golf course will be opened for play.

1.7.3 Operational Phase

The operation and maintenance of the 9-hole golf course and country club will be under the management of the Earth, Fairways and Green Leisure Club Association Inc.

Fertilizer application, pesticide management, aeration and mowing are the maintenance activities to be conducted during operation stage.

The golf course superintendent will oversee the application of fertilizers and pesticides.

1.7.4 Decommissioning and Abandonment Phase

Activities to be conducted after construction activities are discussed in the succeeding sections.

The project, however, is expected to operate for a very long period of time. This development requires thorough maintenance and requires strict supervision to sustain its requirement in reaching its desired lifespan.

In case that the project will cease its operation for any reason, respective authorities and concerned agencies shall be informed 30 days prior to abandonment. The abandonment will follow standard policies and guidelines and shall involve implementation or rehabilitation/restoration measures to bring the areas as close as possible to its baseline condition. The area shall be left free of any hazardous materials and in a manner acceptable to DENR standards.

1.7.4.1 Plans for Removal or Disposition of Temporary Structures and Facilities

All temporary facilities installed during the construction phase of the project shall be dismantled or removed from the project site once the project is completed.

1.7.4.2 Plans for Abandoning Temporary Roads

The temporary access road from the existing road to the construction area that will be constructed during the construction phase of the project will later be paved and used for the road network of the completed project; hence, there will be minimal abandonment, if any.

1.7.4.3 Relocation and/or Termination Plans for Project Facilities

All heavy equipment used during the construction phase of the project will be pulled-out after project completion. Hired workers except for the permanent personnel of the Project Contractor will be terminated or maybe relocated to other projects of the company.

1.8 Manpower

1.8.1 Manpower Requirement

A total of 98 skilled and unskilled workers will be employed during the construction phase and 52 workers during its operation.

The development of golf course complex will generate the following employment at various implementation stages:

TABLE 1-10. MANPOWER REQUIREMENT (CONSTRUCTION)

Description	Manpower Requirement
Survey	4
Earthmoving	6
Shaping	25
Civil Works	25
Material Processing	14
Lake liner	14
Irrigation	5
Management Office	5
Total	**98**

TABLE 1-11. MANPOWER REQUIREMENT (OPERATION)

Description	Manpower Requirement
Golf Course Maintenance	
Superintendent	1
Lead man	4
Operators	5
Technician	5
Utilities	15
Sub-Total	29

Description	Manpower Requirement
Clubhouse	
Office	10
Waiters/Waitresses	15
Bartenders	4
Front Desks	4
Security Guards	6
Technicians	5
Golf Caddies	5
Utilities	3
Total	**52**

1.8.2 Scheme for Sourcing Locally from Host and Neighboring LGUs

The proponent shall give priority hiring to locals whose skills and experience match the project's specific needs. A local hiring scheme will be established in close coordination with the concerned barangay Local Government Units (LGUs). In general, the proponent will provide a list of anticipated job requirements with corresponding qualifications to the concerned barangay LGUs. These potential opportunities will be promoted by the barangay LGUs in their respective jurisdictions and potential applicants will be forwarded to the proponent, for further review and evaluation by the Human Resources office.

Consultations shall be made with the LGUs and host communities to finalize a scheme for hiring residents from host communities. Qualified local residents will be given priority in hiring. For technical positions not available in the host communities, the proponent reserves the option to source its manpower requirements elsewhere. Compensation terms and the process of hiring will comply and adhere with existing labor laws, rules, and regulations.

There is no indigenous group/people present in the project area.

1.9 Indicative Project Cost

The estimated cost of the Project is Php 76,330,000.00.

2 ASSESSMENT OF ENVIRONMENTAL IMPACTS

2.1 Land

2.1.1 Land Use and Classification

2.1.1.1 General Land Use

The municipality of Mariveles is a first class municipality located at the southernmost tip of Bataan peninsula, which is approximately 173 kilometers away from Manila in an overland trip. It is bounded by Manila Bay on the east, North Channel on the south, municipality of Limay on the northeast, municipality of Bagac on the northwest and West Philippine Sea on the west.

The municipality of Mariveles has a total land area of 15,930 ha. It represents 12% of the total land area of Bataan. Its land is classified into several land uses namely: built-in, industrial, parks or open space, forest lands and agricultural. Forestlands dominate the land use of the municipality, which covers 45% of the total land area. **Table 2-1** and **Figure 2-1** show the general land use of Mariveles.

TABLE 2-1. GENERAL LAND USE OF MARIVELES

Land Use	Area (has.)	% Distribution
Built-in	1,709.47	11%
Industrial	3,834.05	24%
Parks/open space	15.00	0.1%
Forest lands	7,231.6l	45%
Agricultural	3,129.87	20%
Total	**15,920.00**	**100%**

Source: Socio-Economic Profile of Mariveles, Bataan (2018)

The urban areas in the Municipality of Mariveles comprise of Barangays Poblacion, San Carlos, San Isidro and Balong Anito. The urban areas as classified herein have the following functional land uses: residential, commercial, institutional, parks or open space and industrial, as shown in **Table 2-2**.

TABLE 2-2. URBAN LAND USE OF MARIVELES

Land Use	Area (has.)	% Distribution
Residential	222.62	19%
Commercial	10.55	1%
Institutional	4.24	0%
Parks/Open Space	905.48	79%
Industrial	2.00	0%
Total	1,144.94	100%

Source: Socio-Economic Profile of Mariveles, Bataan (2018)

2.1.1.2 Existing Land Use and Proposed Development Plan

The proposed project site is located in titled lands own by the Earth Fairways and Green Leisure Club Association Inc. at Barangay Biaan in Mariveles, Bataan. Based on the CLUP

land use map (**Figure 2-1**) the proposed golf course sits primarily on grassland as shown in **Figure 2-2**. However, the Municipal Planning and Development Office (MPDO) of Mariveles Bataan already issued a certification that this proposed development is viable to be developed in the area as it is located within the propose eco-tourism zone of the municipality.

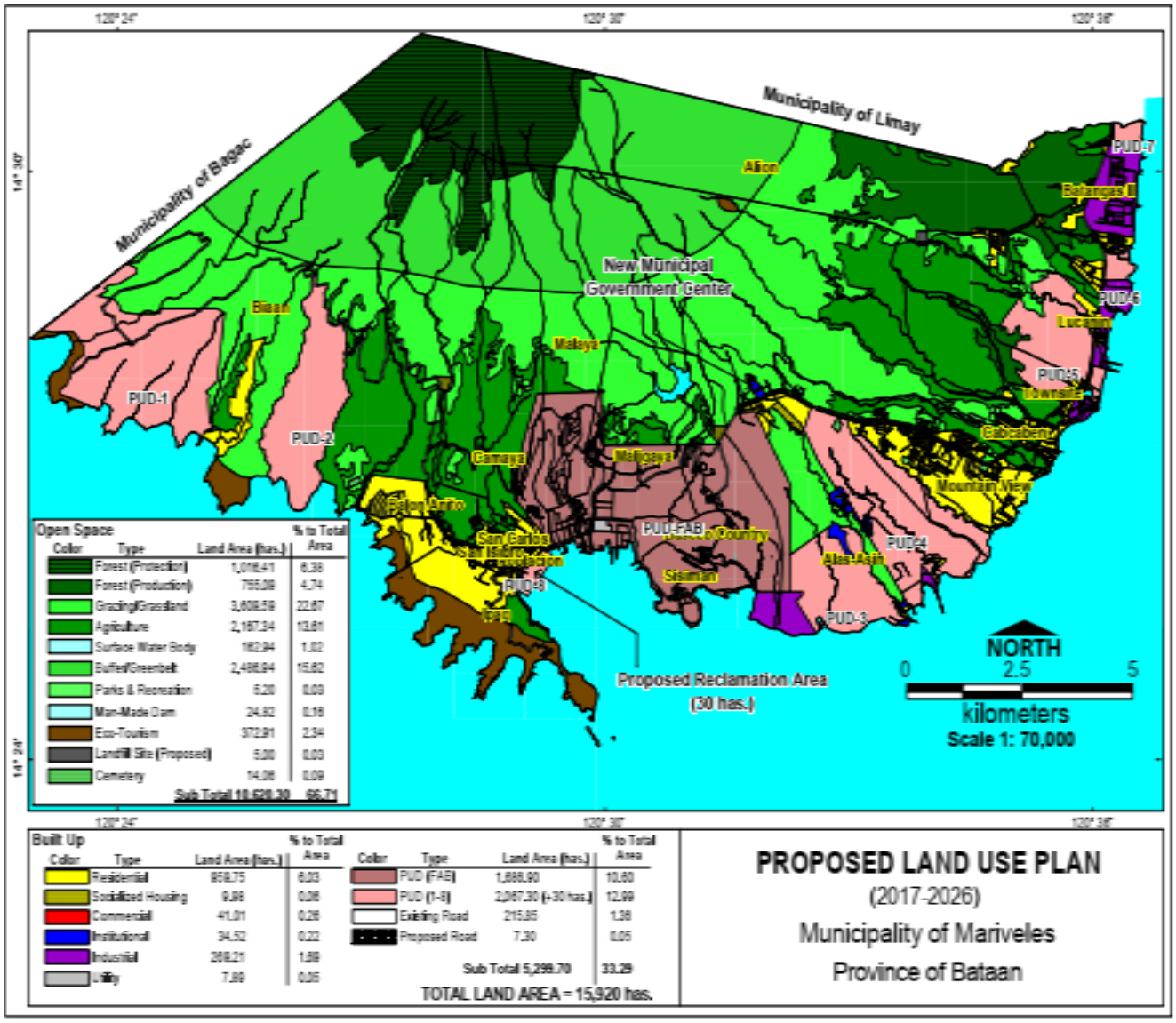


FIGURE 2-1. LAND USE MAP OF MARIVELES, BATAAN

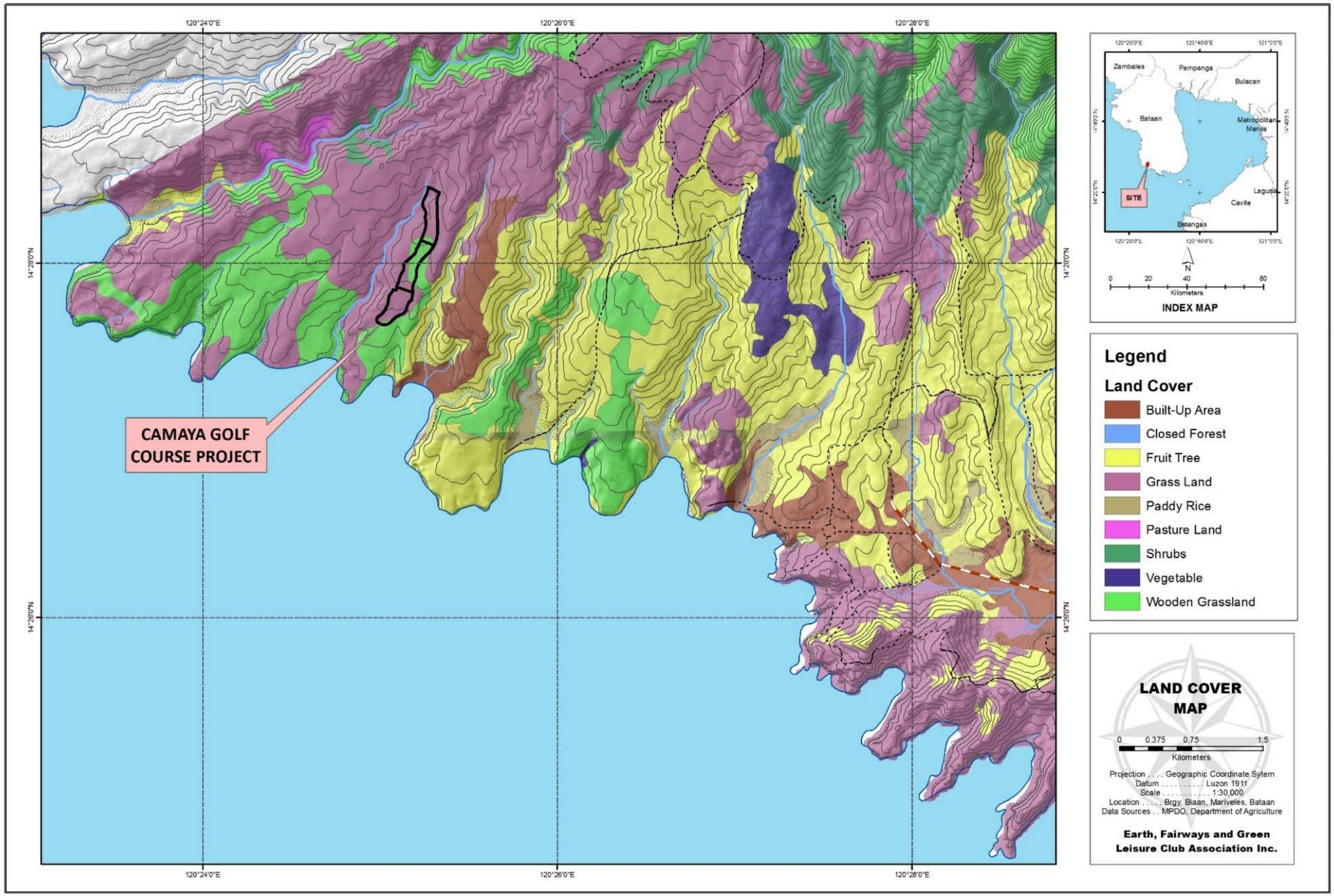


FIGURE 2-2. LAND USE MAP SHOWING THE PROJECT SITE

2.1.1.3 Environmentally Critical Area (ECA)

Environmentally Critical Areas (ECAs) are environmentally sensitive areas declared under Presidential Proclamation No. 2146 of 1982 where significant environmental impacts are expected if certain types/thresholds of proposed project are located, developed or implemented.

TABLE 2-3. ENVIRONMENTALLY CRITICAL AREAS WITHIN THE PROJECT AREA

No.	Categories	The Project Falls within ECA Description			Basis: (a) State Specific Official Declaration of ECA; (b) List Specific ECA at the Project Site	Agency from which to Get Technical Information (if not available from EMB)
		Yes	No	Uncertain		
1	All areas declared by law as national parks, watershed reserves, wildlife preserves and sanctuaries		✓		The proposed project site is located in titled lands owned by the Earth Fairways and Green Leisure Club Association Inc. The Municipal Planning and Development Office (MPDO) of Mariveles Bataan already issued a certification that the proposed project is viable to be developed in the area as it is located within the propose eco-tourism zone of the municipality (*Please see attached Certification in Annex B)*	Municipal Planning and Development Office (MPDO) of Mariveles Bataan
2	Areas set aside as aesthetic potential tourist spots	✓				
3	Areas which constitute the habitat for any endangered or threatened species of Indigenous Philippine wildlife (Flora and Fauna)	✓			Terrestrial sampling revealed that brahminy kite (*Haliastur indus*), marbled water monitor (*Varanus marmoratus*) and reticulated python (*Malayopython reticulatus*), which are categorized as Endangered, Vulnerable and Other Threatened Species under the DAO 2004-15, respectively, are present in the project area	Terrestrial ecology sampling/ DENR Administrative Order 2004-15
4	Areas of unique historic, archaeological, geological, or scientific interests		✓		The proposed project site is located in titled lands owned by the Earth Fairways and Green Leisure Club Association Inc. The Municipal Planning and Development Office (MPDO) of Mariveles Bataan already issued a certification that the proposed project is viable to be developed in the area as it is located within the propose eco-tourism zone of the municipality (*Please see attached Certification in Annex B)*	Municipal Planning and Development Office (MPDO) of Mariveles Bataan
5	Areas which are traditionally occupied by cultural communities or tribes		✓			
6	Areas frequently visited and or hard hit by natural calamities (geologic hazard, floods, typhoons, volcanic activity, etc.)	✓			There has been no renewed volcanic activity expected from Mount Mariveles. No volcanic eruption has been recorded during historic period (for the past 500 years) for Mariveles Volcano. No volcanic deposit had yet been discovered with an age younger than 10,000 years. The youngest deposit described is about 190,000 years old. These features make Mariveles an inactive volcano. The proposed Project area is not flood prone. Project site is under medium typhoon risk, and is within an area experiencing 5 cyclones in three years.	PHIVOLCS, MGB, PAGASA

No.	Categories	The Project Falls within ECA Description			Basis: (a) State Specific Official Declaration of ECA; (b) List Specific ECA at the Project Site	Agency from which to Get Technical Information (if not available from EMB)
		Yes	No	Uncertain		
					The proposed Project site is potentially high to tsunami based on the Tsunami Prone Areas in the Philippines as published by PHIVOLCS. There is a record of tsunami events in near the Project in1677.	
7	Areas with critical slope: All lands with slope of 50% or more determined from the latest official topographic map from NAMRIA		✓		The slope of the Project Site within MEZ is at 8-30% which corresponds to areas with moderate slope to steep slope.	CLUP of Municipal Planning and Development Office (MPDO) of Mariveles, Bataan
8	Areas classified as prime agricultural lands		✓		The proposed project site is located in titled lands owned by the Earth Fairways and Green Leisure Club Association Inc. and the Municipal Planning and Development Office (MPDO) of Mariveles Bataan already issued a certification that the proposed project is viable to be developed in the area as it is located within the propose eco-tourism zone of the municipality (*Please see attached Certification in Annex B)*	Municipal Planning and Development Office (MPDO) of Mariveles Bataan
9	Recharge areas of aquifers		✓			
10	Water bodies characterized by one or any combination of the following conditions: tapped for domestic purposes; within the controlled and/or protected areas declared by appropriate authorities; which support wildlife and fishery activities		✓		There are no water bodies within project boundaries.	CLUP of Municipal Planning and Development Office (MPDO) of Mariveles Bataan
11	Mangrove areas characterized by one or any combination of the following conditions: with primary pristine and dense young growth; adjoining mouth or major river systems; near or adjacent to traditional productive fry or fishing grounds; areas which act as natural buffers against shore erosion, strong		✓		There are no mangrove areas within the project boundaries	CLUP of Municipal Planning and Development Office (MPDO) of Mariveles Bataan

No.	Categories	The Project Falls within ECA Description			Basis: (a) State Specific Official Declaration of ECA; (b) List Specific ECA at the Project Site	Agency from which to Get Technical Information (if not available from EMB)
		Yes	No	Uncertain		
	winds and storm floods; areas on which people are dependent for their livelihood.					
12	Coral reefs characterized by one or any combination of the following conditions: With 50% and above live coralline cover; Spawning and nursery grounds for fish; Act as natural breakwater of coastlines.		✓		The project will not impact marine areas.	CLUP of Municipal Planning and Development Office (MPDO) of Mariveles Bataan

2.1.1.4 Potential Impacts and Options for Prevention, Mitigation and Enhancement

2.1.1.4.1 Change/Inconsistency in the Land Use

While the project sits on the grassland area based on the land use map of CLUP the proposed project site is titled land own by the Earth Fairways and Green Leisure Club Association Inc. and the Municipal Planning and Development Office (MPDO) of Mariveles Bataan already issued a certification that the proposed project is viable to be developed in the area as it is located within the propose eco-tourism zone of the municipality.

The proposed project will be constructed adjacent to the under construction retirement subdivision and the area has been identified as tourist destination due to the presence of Camaya Coast Resort along the coastline near the project site. It will be an additional leisure project in the area that will blend the environs and at the same time provide enjoyment and satisfaction to future residents and visitors of adjacent projects (Retirement Subdivision and Camaya Coast Resort).

2.1.1.4.2 Encroachment in the ECA

Under DENR DAO 2003-30, there are 12 categories for environmental critical areas (ECA). Of the 12 categories, three (3) are present within the project area (**Table 2-3**): Areas set aside as aesthetic potential tourist spots; Areas which constitute the habitat for any endangered or threatened species of Indigenous Philippine wildlife (Flora and Fauna); and Areas frequently visited and or hard-hit by natural calamities, and Under DAO 2003-30 Environmentally Critical Projects (ECP) whether located within ECA or not are required to prepare an Environmental Impact Statement (EIS), hence this report.

Areas set aside as aesthetic potential tourist spots is based on the development plan of the MPDO. This will not conflict with the proposed golf course as it also aims to cater tourists in the area. With regards to threatened fauna species in the project area, detailed mitigations are specified in terrestrial ecology section. Design of project components shall consider the natural calamities that usually and can occur in the project area. Emergency response that will guide employees during calamities is discussed in succeeding chapters.

2.1.1.4.3 Impact with Existing Land Tenure Issues

The project site is a titled land owned by the Earth Fairways and Green Leisure Club Association Inc. and the Municipal Planning and Development Office (MPDO) of Mariveles Bataan already issued a certification that the proposed project is viable to be developed in the area as it is located within the propose eco-tourism zone of the municipality hence land tenure issues are unlikely.

2.1.1.4.4 Impairment of Visual Aesthetics

This proposed project will enhance the environment in the area because the final development of a golf course project is beautification that includes planting of trees and other ornaments. An estimated 300 additional trees will be planted during landscaping activity of the area.

2.1.1.4.5 Devaluation of land value as a result of improper solid waste management and other related impacts

Construction activities such as installation of temporary facilities are set to produce solid waste such as used timber scaffoldings for the clubhouse, excavated soils, paints and others.

Solid waste to be generated by the laborers/construction workers will be very minimal and will be mainly composed of left-over food and food wrappers such as paper, cartons and plastics estimated to 10 kgs per day.

During operation phase, the project is estimated to generate an average of 100 kgs to 150 kgs per day of domestic solid waste and an estimated 5 empty boxes of fertilizers.

Significant garbage to be considered during operation phase is the “green waste” coming from the golf course area consisting of grass clippings, leaves, brush and other vegetative trimmings.

Proper solid waste management shall be implemented during construction and operation phases of the project.

The project is expected to cause an increase in the real estate values of land in the area by providing additional enjoyment and leisure destination.

2.1.2 Geology / Geomorphology

2.1.2.1 Topography and Geomorphology

The edifice of Mariveles Volcano represents a typical conical volcano with its radial symmetry capped by a large central crater. The mountain peaks at 1,388m on Pantigan Peak, found on the western rim of the 2km wide crater. The ridge that forms the crater rim shows a jagged outline with notches facing most of the major river systems that drain the volcano. To the north, the crater is breached to the crater floor where the Pantigan and Nabasag Rivers drain the summit depression into Manila Bay.

The symmetry of the slopes of Mariveles is broken by three satellite cones—Mounts Samat and Limay, and Sisiman Hill on the south. These smaller cones have small craters at their summits, with rivers draining their central portions. Mount Samat is found on the northern flank of the volcano, while Mount Limay is found on the east. The relief of Mariveles' cone is zoned, being steep near the crater-rim and becoming gentler with distance. Thus, the steepness of the slope forms concentric zones centered on the summit, having greater than 35% near the summit, bordered by a zone of 15 to 35 % at the middle slopes of the volcano, which in turn is surrounded by gentle slopes of 0 to 15% grade near the shore.

The project site is located on the southern flank of Mount Mariveles, in an area characterized by rolling hills with short steep cliffs near the streams and gentle slopes near the shore. East of the Mariveles are the Manila Bay and the extensive Central Luzon Valley, while south and north are continuations of the volcanic ridge that includes Mariveles and the other Bataan volcanoes. The project site is found on the southwest flank of the volcano, along the rising slopes that lead to the peaks of Mount Mariveles. The general trend of both the ridges and streams on this part of the volcano is northwest, following the radial drainage from the volcano's peak to the sea. **Figure 2-5** shows the general geomorphic features of the eastern part of Mariveles Volcano. This geomorphic map was derived from the digital topography to allow detailed analysis of the nature of the various landforms in the project site. This figure indicates that several landforms are recognizable in the eastern slopes of the volcano, including the deeply dissected slopes found on the upper slopes and around Mount Limay and Sisiman Hill in Mariveles, the gentler slopes found mostly on the eastern slopes of the volcano, and the deeply dissected steep slopes found along rivers.

The outline and distribution of some of these features allow us to discern their probable source processes. The broad, steep and deeply dissected slopes are likely associated with the volcanic processes that formed the edifice of Mariveles Volcano, Mount Limay and the Sisiman Hill. Some lobate flow units are also discernible on the slopes of the volcano, their lower terminations ending with arcuate outlines that spread out laterally. In most instances, the upper slope terminations of these flows appear to merge probably due to the thinned upper edges of these deposits and to the effect of erosion. Some of the flow units appear to wrap around the edifice of Mounts Limay and Samat, indicating possible generation after these small volcanoes have formed.

Also discernible from the geomorphic maps are the existence of large fans on the eastern slopes of Mariveles Volcano. At least four separate fans are recognizable, each one with the distinctive narrow apex on their upper slope, and the broad, laterally spreading fan with

semicircular contour lines. The lateral extent of these individual fans, and their juxtaposition to one another creates the apron of rolling slopes on the eastern part of Mount Mariveles. This continuity of the fans and their relatively less intense dissection indicate that these were likely created by the latest volcanic events of the volcano. The rivers on the eastern slopes of the volcano are now starting to cut into these fans, creating stretches of steep, crenulated slopes and river channels. The geomorphic map indicates, therefore, that the proposed project site is located in the southwestern edge of Mount Mariveles, and underlain by its volcanic deposits. The site is generally rolling to hilly, with small patches of narrow flatlands are found along shore forming beach deposits.

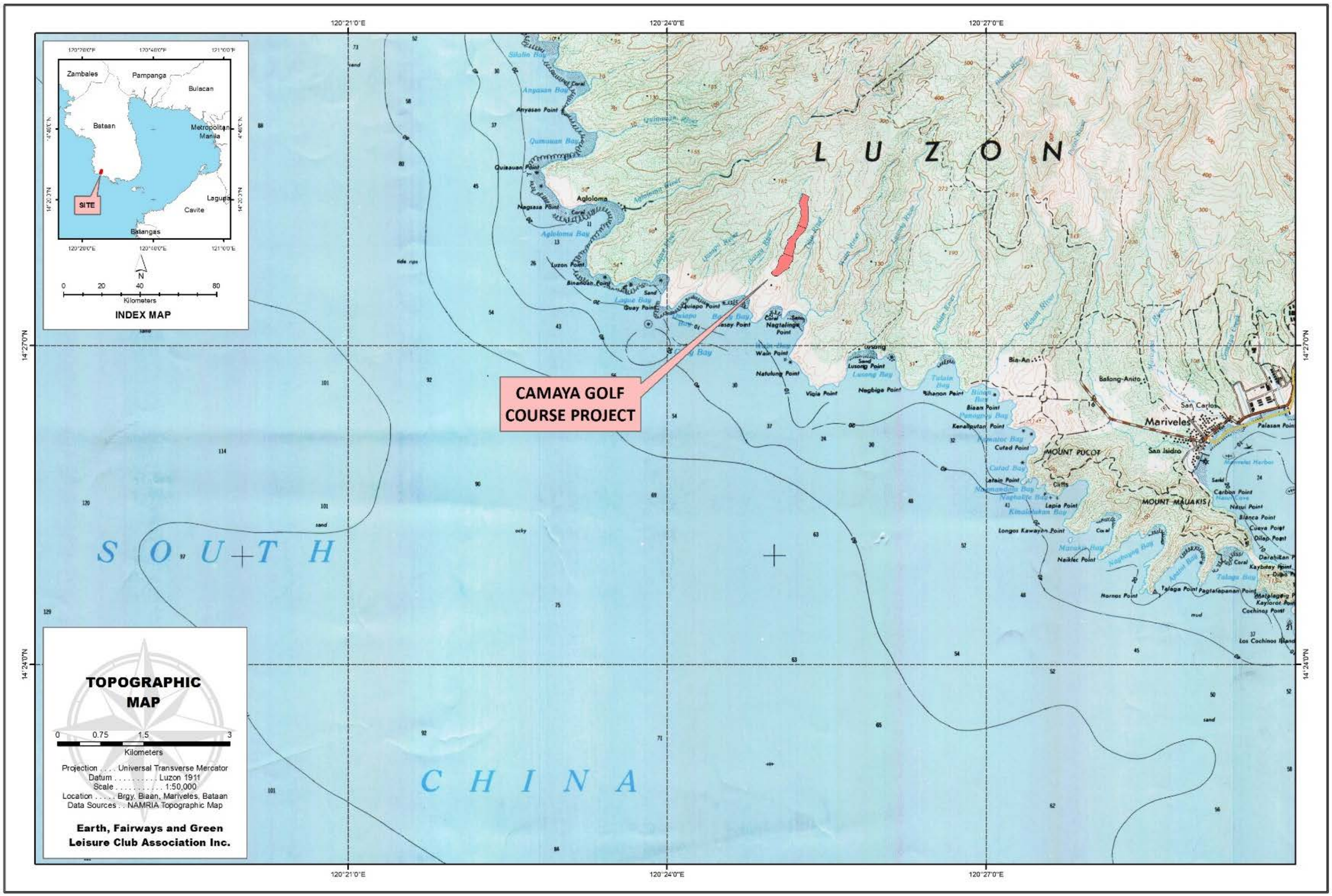


FIGURE 2-3. TOPOGRAPHIC MAP OF THE PROJECT

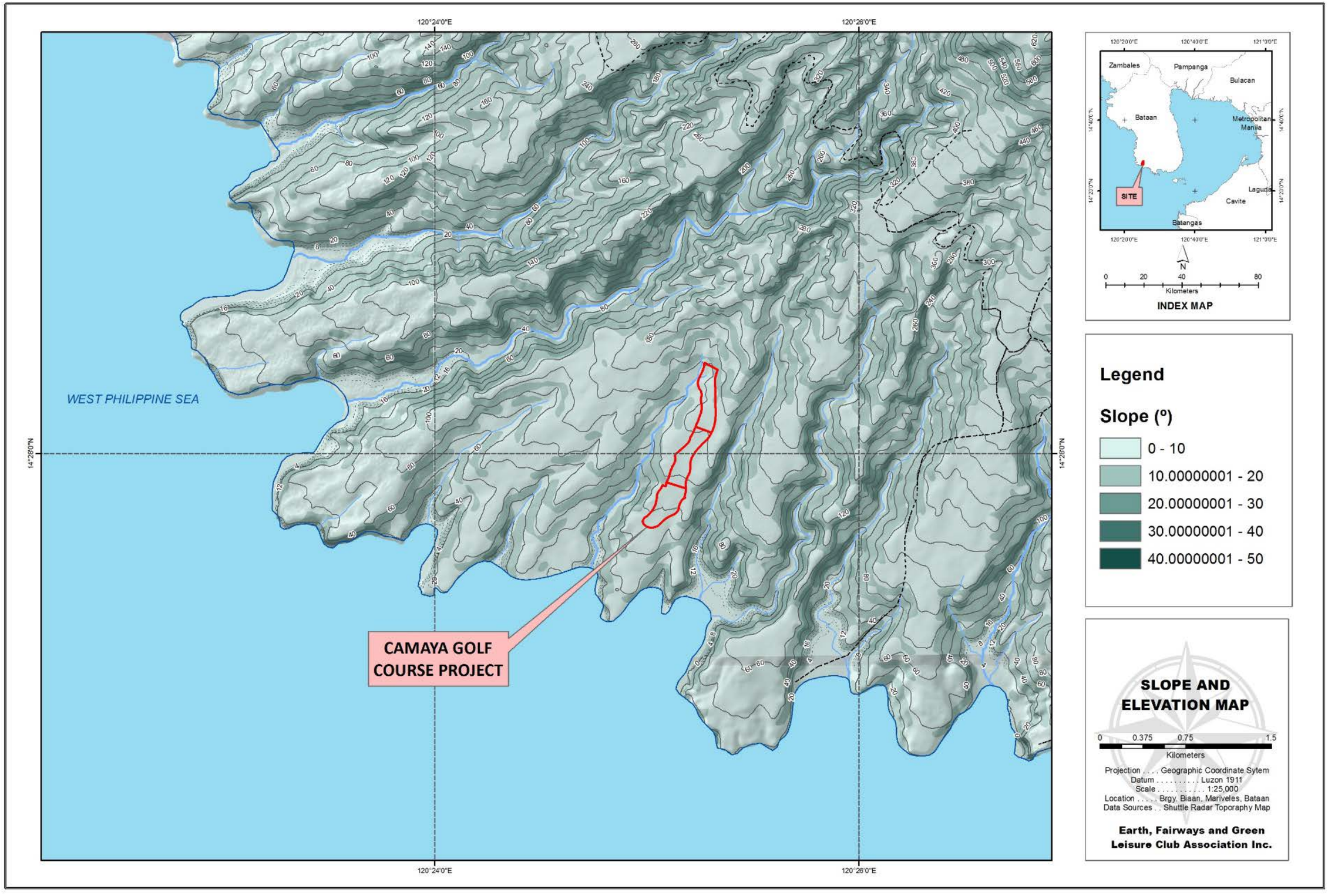
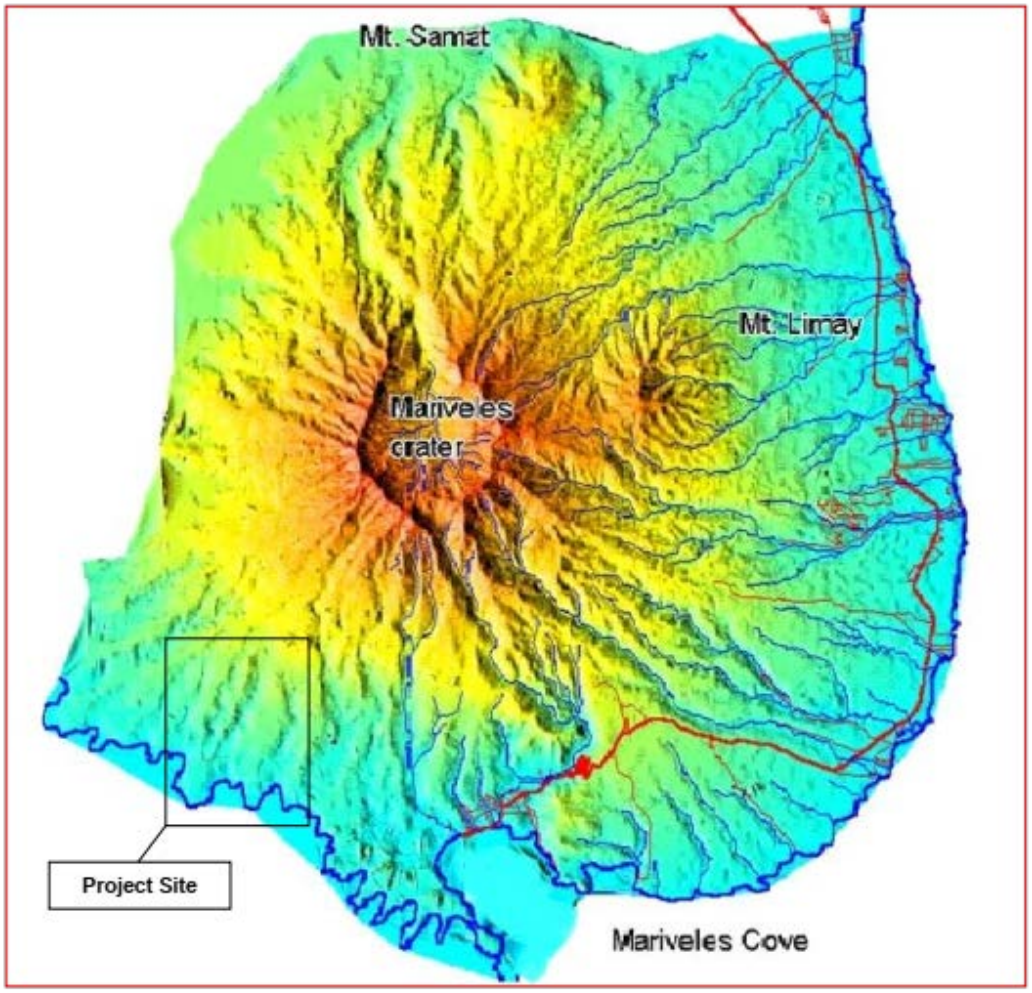


FIGURE 2-4. SLOPE MAP



Source: MEZ EISR

FIGURE 2-5. GEOMORPHIC MAP OF MARIVELES, BATAAN

2.1.2.2 Regional Geology

2.1.2.2.1 Tectonic Setting

The project site is located in the southwestern flank of Mariveles Volcano, which is part of the chain of Quaternary volcanoes formed by subduction in the Manila Trench. The chain of volcanoes extends to Pinatubo, down to Natib and Mariveles, Corregidor, Taal and Palay-palay, and on to the volcanoes in northeastern Mindoro. This volcanic chain also serves as the border Lingayen Gulf— Central Luzon—Manila Bay—Laguna de Bay lowlands. Farther north, the volcanic chain blends with the Zambales Mountains while a series of smaller volcanic cones occur in the northern part of the Central Luzon plains as it merges with the Cordillera Mountains. The project area is part of the volcanic front adjacent to an active trench where ongoing subduction leads to faulting, volcanism and, in parts, rifting, is all taking place.

There are five (5) geotectonic features on this part of Luzon: (a) the Manila Trench and its related structures; (b) The volcanoes extending from Tarlac, Bataan, Batangas and Laguna;

(c) the Philippine Fault and its branches, (d) the East Luzon Trough and (e) the local faults located in and near the project area.

The Manila Trench marks the region where the ocean floor of the South China Sea dives under the Luzon landmass. This process, called subduction, is the main source of magmatism and seismic activity that generates the volcanoes and earthquakes in western Luzon. The Manila Trench is a deep ocean trough that represents the surface expression of the eastward-dipping subduction zone. The Manila Trench and subduction zone extend from north of Luzon to west of Mindoro (20□ to 13□North latitude). The western Luzon volcanic arc is therefore part of the Luzon-Taiwan subduction system that follows the Manila Trench. The volcanic front results from partial melting of the crust due to the eastward subduction where parts of the South China Sea oceanic crust are melting after colliding with and diving down under the Luzon landmass. The volcanic arc is composed of a chain of volcanoes near the coastal area and several volcanoes behind the volcanic front. Volcanism in the coastal area, including Mount Pinatubo, Mount Natib, Mount Mariveles, and Corrigedor have very recent history of activity ranging from 2.26 million years to present. At present, the only active volcanoes on the western Luzon volcanic belt are Pinatubo and Taal Volcanoes. Mount Arayat is situated behind this active volcanic arc, and represents a line of extinct volcanoes in the Central Plains of Luzon including those on the northern end of the Central Plains in Pangasinan, where the three small cones of Amorong, Cuyapo and Balungao are found. Tarlac, Bataan, Batangas and Laguna are known for their volcanoes. Pinatubo, Natib and Mariveles are prominent peaks with large craters formed by recent activities of the volcanoes. To the south and east, Corregidor provides the geographic link between the Bataan volcanoes to the Batangas-Laguna volcanic system. The volcanoes in Batangas and Laguna are characterized by large magmatic systems, with large calderas surrounded by lower volcanic cones and smaller craters. These peaks include Mounts Banahaw and Makiling, and the large volcanic lakes Laguna and Taal.

The Philippine Fault system is a northwest-trending fault zone whose branches have been mapped for 1,200 km from the eastern part of Mindanao to northern Luzon. Its trace passes through Ragay Gulf and Alabat Island, reaching about 80 km northeast of the project area. The Philippine Fault Zone is the biggest structural element in Philippine geology, cutting across many of the islands in the east of Mindanao and Visayas, and through a major part of Luzon. Seismic activity along this fault zone is also among most destructive in the country. Slip along the Philippine Fault Zone is left lateral strike slip, accommodating the oblique convergence between the Philippine Sea and Eurasian/South China Sea plates. Several historic earthquakes in past have been clearly associated with this fault, the most recent of which are the 1973 Ragay Gulf earthquake whose epicenter is located east of the project site, and the 1990 Luzon earthquake whose epicenter is located northwest of the project site.

The East Luzon Trough is a deep oceanic trench that borders the eastern shores of Luzon, serving as a tectonic boundary between the Luzon arc and the Philippine Sea Plate which forms the western Pacific plate. The subduction along this trench is proposed by others (e.g., Hamburger, 1983) while its present seismotectonic activity is affected by the presence of the Benham Rise, the shallow oceanic platform due east of northern Luzon. The dominant tectonic process along the East Luzon trench is that of convergence, wherein the Philippine Sea Plate subducts under the Luzon arc along the East Luzon Trough. This subduction

process is marked by the depression of the ocean floor along the East Luzon Trough, and by the intense and westward-deepening region of earthquakes. Both of these mark the site where portions of the western Philippine Sea oceanic crust are colliding with the landmass of Luzon and are being forced to dive into the earth's mantle.

The other major tectonic feature near the project site is the Philippine Fault. The Philippine Fault is a zone of predominantly northwest-trending faults whose branches have been mapped for 1,200 km along the eastern part of Mindanao to northern Luzon. Its trace passes through Ragay Gulf a Quezon which is about 100 km west of the study area. It is a broad complex zone of rifting composed of a number of faults of diverse directions. The segment of the fault in the Tayabas Isthmus shows an oblique left lateral structure with horizontal displacement larger than the vertical component. Severa historic earthquakes have been clearly associated with this fault, the most recent of which are the 1973 Ragay Gulf earthquake whose epicenter is located east of the project site, and the 1990 Luzon earthquake whose epicenter is located in Nueva Ecija in Luzon. The Philippine Fault Zone is the biggest structural element in Philippine geology, cutting across many of the islands in the east of Mindanao and Visayas, and through a major part of Bicol. Seismic activity along this fault zone is also among most destructive in the country. Left-lateral slip along the Philippine Fault Zone accommodates the oblique convergence between the Philippine Sea and Eurasian/South China Sea plates. The location of the project site relative to the surrounding tectonic elements of the Philippines is shown in **Figure 2-6**.

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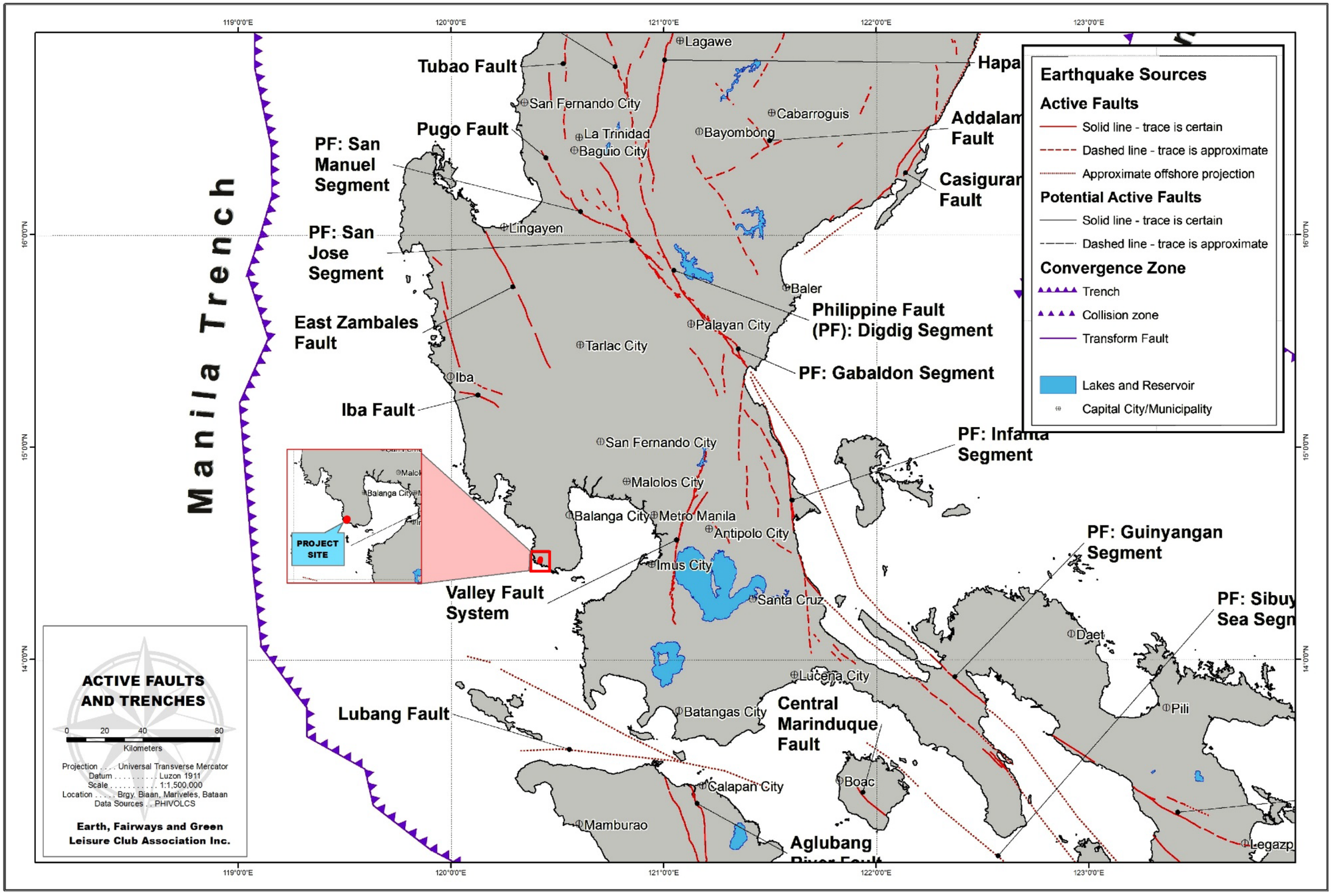


FIGURE 2-6. TECTONIC MAP OF CENTRAL LUZON

FIGURE 2-7. SEISMICITY MAP SHOWING THE PROJECT SITE VIS-À-VIS THE NEAREST FAULT LINE

2.1.2.3 Bedrock Lithology

The Project site is located on the southwestern coast of Mount Mariveles, adjacent to small volcanic plugs and pyroclastic and lava flow deposits that appear geomorphologically older than the main edifice of Mariveles Volcano.

2.1.2.4 Stratigraphy

Mount Mariveles of a stratovolcano composed mainly of lava and pyroclastic flows, with debris flows and alluvial deposits forming in the lower slopes and river channels. Parasitic cones and necks are found on the sloped of the volcano, forming lower peaks on its north, east and south sides.

The geomorphic map (**Figure 2-5**) derived from the digital topography of the volcano allows us to identify major geologic features and relative ages of the deposits in the area. Six geologic units are recognized, from oldest to youngest, namely:

a. Proto-Mariveles deposits, including the Sisiman Plug
b. Main Mariveles Volcanics
c. Satellite Volcanics: (Mount Samat and Mount Limay)
d. Post-satellite Volcanics (Post-Samat flows, Post-Limay flows and Aleon Volcanics)
e. Late-stage pyroclastic fans (Pulong Bato, Lamao, Lucanin and Alasasin Pyroclastic fans)
f. Quaternary alluvium

Proto-Mariveles Volcanics

These are the rock units found on the southern slopes of Mariveles Volcano, particularly around the municipality of Mariveles. The rocks are composed of intercalating layers of pyroclastic flows, debris flows, volcanic breccia and minor lava flows. The cross-section of the unit is well exposed on the zigzag road leading down to the cove of Mariveles. The rocks are considered to be the oldest deposits of the volcano, and predate the main volcanic units of Mariveles based on the following features:

- Non-central position of the deposits, being concentric to and radiating from an eruption center located south of the present Mariveles crater.
- Higher degree of erosion of the slopes, and
- On-lap and over-lap covering of this deposit by the Main Mariveles units

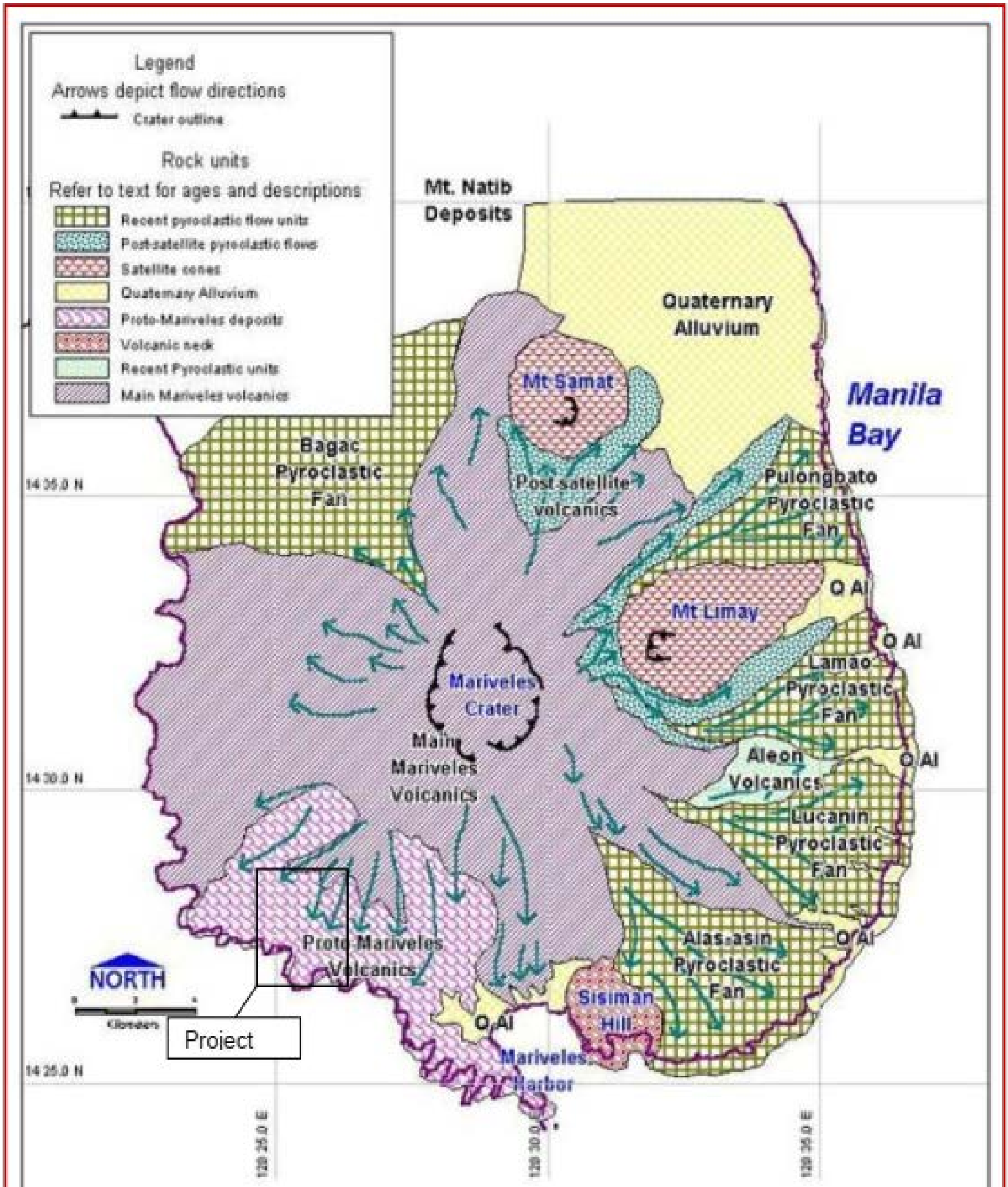
The composition of the rocks appears similar to the other Mariveles rocks, the lava being andesitic, and the pyroclastic clasts containing abundant dacite materials. A large crater is also found on the slope, possibly resulting from a non-central explosion and creating the embayment now occupied by Mariveles Bay. These rocks may represent the older units determined to be around 2.8 to 4.1 million years (EBASCO-PNPP report) found around the Mariveles Harbor. The proposed project shall be located on the area underlain by these deposits. Included in this Proto-Mariveles volcanics is the andesite volcanic plug located to the east of the Mariveles Municipality. The Sisiman Plug is a low hill composed of massive

andesite lava that may have congealed in a volcanic neck and exposed by later explosions and erosion. The plug has been quarried for concrete aggregate, and appears to be the only place on this side of the mountain where such small volcanic necks can be found.

Main Mariveles Volcanics

This unit forms the main edifice of the volcano, and is composed of lava flows, pyroclastic flows, debris flows, volcanic breccia, airfall materials (ash, agglutinates and bombs), crater deposits and various intrusive that are collectively attributed to the main crater of the volcano. These deposits are found in many areas around Mount Mariveles, from the central crater to the coasts.

The geomorphic features of the volcano reveal the form of the flow units, characterized by a continuous down-sloping ridge, often flanked with prominent valleys, and showing bulbous toes on their lower terminations. These flows radiate down from the main crater, and their relative overlapping features can be used to indicate their age. These flow structures are shown as arrows in the geologic map (Figure 2-8)



Source: MEZ EISR by E. Ramos, PHILVOCS, 1998; Modified by GTI 2016

FIGURE 2-8. GEOLOGIC MAPS OF MARIVELES VOLCANO

The summit part of the volcano is occupied by a large crater which was probably formed by the coalescence of several large craters, as suggested by the discontinuous, non-alignment of some parts of the crater rim. The large crater of the volcano may have formed a lake in the past, but is now breached to the north and drained by a river. The geomorphic features also indicate that the western half of the volcano is more dissected than the other parts, suggesting that probably the western sections may host older deposits than the other part of the Main Mariveles Volcanics. On the southern part of the volcano, the flow units are found to have interacted with the ProtoMariveles deposits, indicating that many of the flow units from the Mariveles crater encountered some promontories that held back but overrun by later volcanic flow units. This feature supports the concept that the southern part of the volcano around Mariveles Harbor hosts the older volcanic deposits.

Based on the age dating done by EBASCO for the PNPP, the ages attributed to the rocks of Mariveles range from 1.1 to 0.19 million years. Due to the geomorphic features we have mapped, we assign the older ages, from 1.1 to 0.47 million years to the Main Mariveles Volcanics.

Table 2-4 shows representative chemical composition of the Mariveles rocks, as presented by MBG (1982).

TABLE 2-4. REPRESENTATIVE CHEMICAL COMPOSITION OF THE MARIVELES ROCKS (MGB, 1982)

Component	Specimen A	Specimen B	Specimen D	Specimen E
SiO2	58.63	50.03	57.23	58.65
TiO2	0.67	0.69	0.60	0.54
Al2O3	18.09	18.97	17.83	18.23
Fe2O3	8.13	10.40	8.68	8.08
MgQ	3.42	4.84	3.81	3.29
CaO	7.32	9.98	8.18	7.73
Na2O	3.43	2.70	3.02	3.38
K2O	1.15	0.96	1.22	1.12
Total	100	84	98.57	100.57
Age Million Years	3.44 + 0.24	1.1 + 0.1	~3.9	0.19 + 0.04 years

Source: MEZ EISR

Satellite Volcanics

On the flanks of Mariveles Volcano are parasitic cones formed when magma followed conduits that stem from the main plumbing system of the volcano. Many such flank cones are smaller than their “parent” cones, and lived at a much shorter period than the main volcano. Mounts Samat and Limay, found on the north and eastern flanks of the volcano, are parasitic cones. Both these volcanoes are low, conical mountains and formed with their base overlapping with the main Mariveles cone. Both parasitic or satellite cones have formed craters of their own, which are now breached and drained by rivers that reach their central areas. Geomorphic features of the deposits around Mounts Samat and Limay indicate that some of the flows from the main Mariveles cone formed after the satellite cones were inactive. This is suggested by the flows that came down from Mariveles and encircled the satellite cones. Age dating of the rocks from Mounts Samat and Limay yielded 0.71 and 0.95 million years, supporting the notion that these parasitic cones were active during, but ceased

earlier than the main Mariveles Volcano's activity. Included in these deposits are the volcanic flows found in the middle sections of the Lamao River watershed. These younger flow units are collectively designated as the Post-Satellite Volcanics in the geologic map. **Table 2-5** shows representative chemical composition of the Limay and Samat rocks, as presented by MGB (1982).

TABLE 2-5. CHEMICAL COMPOSITION OF MOUNTS LIMAY AND SAMAT ROCKS (MGB, 1982)

Component	Limay	Samat
SiO2	4828	50.53
TiO2	073	0.84
Al2O3	18.42	18.56
Fe2O3	11.52	11.20
MgO	6.05	5.16
CaO	11.32	9.69
Na2O	2.16	291
K2O	0.63	0.90
Total	99.11	99.79
Age Million years	0.95 + 0.09	0.9+ ?

Late-stage Pyroclastic Fans

The geomorphic map of Mount Mariveles indicates that the youngest volcanic processes formed deposits that apron a large part of the eastern flank of the volcano. At least four of such fans exists on the eastern flank, forming a continuous apron that covers the middle slopes and extending down to the coastal area. The landform and outcrop features of the Late-stage Pyroclastic units suggest these to have been formed as pyroclastic flows coming from Mount Mariveles. These flows issued out from the central crater probably during large Plinian eruptions that overtopped the crater rim, causing pyroclastic materials to cascade down the slopes to fill the valleys and to form the large fans on the lower reaches of the volcano. The flows have distinctive pointed apex on their upper parts that was formed on a former river valley that channeled these flows. On the lower parts, the flows spread out into a fan when large volumes of materials covered the shallow valleys, causing the flows to radiate into overlapping flow units.

On the southern side of the volcano, the pyroclastic flows encountered the Sisiman Hill, ramped upon the low ridge and deflected to the easterly direction, forming the Alasasin Pyroclastic Fan. Around Mount Limay, these pyroclastic flows were directed around the satellite volcano by the rivers that encircled the cone, forming the Pulongbato and Lamao Pyroclastic Fans. Along the southern edge of the present Lamao River watershed, a pre-existing river channel directed the flow into a valley forming the Lucanin Pyroclastic Fan.

The Late-stage Pyroclastic Fans are the youngest volcanic processes recognizable in the geomorphic maps. Based on the geomorphic features of the fans, their surfaces are being dissected by stream erosion, but their general fan form still retains the surface structures, indicating that the deposits are as old as the other slopes of Mariveles. It is therefore probable that these flows are several tens to a few hundred thousand years in age. These deposits may represent the youngest deposits in the analysis made by EBASCO, dated at 0.19 million years.

Quaternary Alluvium

The youngest geologic units in the project site are the unconsolidated sediments found in river valleys and in the coastal plains. These deposits were formed by the recent fluvial and coastal processes and are composed of detrital materials derived by weathering and erosion from the lavas and pycroclastics of Mariveles. The sediments are made up of varying sizes from boulders to sand, silt and clay. The coarse fragments are found strewn along river beds and in river terrace deposits. Finer deposits are found near the coast where the wave processes help in reducing the size of the fragments. These alluvial deposits are found in the lower sections of volcano, near the coast and along the major rivers. Narrow beach deposits are also found along the shore. Also included in the Quaternary deposits are the patches of coral growths found along the shore and in deeper parts of the sea. The Alluvial deposits constitute the surficial deposits found at the stream channels and other shores.

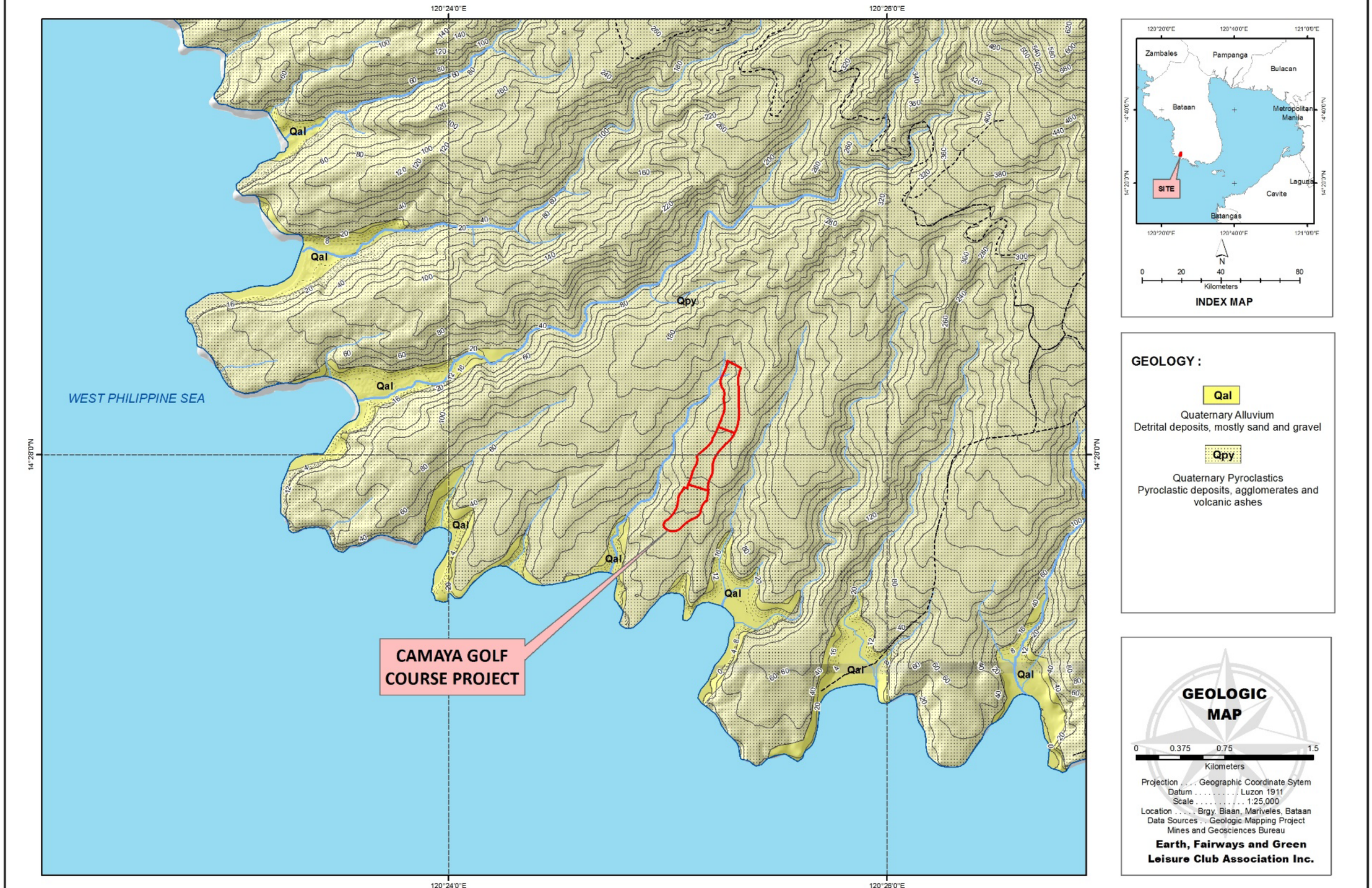


FIGURE 2-9. GEOLOGIC MAP OF PROJECT AREA

2.1.2.5 Natural Hazards

2.1.2.5.1 Seismic Hazards

Intense ground shaking is the main hazard associated with earthquakes, with ground rupture/fissuring, tsunami and landslides as collateral hazards. The degree and extent by which the area is affected by these seismic hazards will depend on the magnitude of the earthquake, proximity to the earthquake source and the site's geologic conditions.

No local fault had been encountered in outcrops nor indicated in the geomorphic maps of the area. The available geological maps also do not contain any significant structure in the southern coast of Bataan Peninsula. Many of the faults belong to either the north-south trend that cuts across the Mariveles Crater, and to the east-west set of structures that appear to traverse the geologic units both in the north and southern flanks of the volcano.

On a regional scale, there are other structures that can generate earthquakes that can affect the project site (Figure 2-12). The Philippine Fault Zone is a northwest-trending fault zone whose branches have been mapped for 1,200 km along the eastern part of Mindanao to northern Luzon. Several historic earthquakes in past have been clearly associated with this fault, the most recent of which are the 1973 Ragay Gulf earthquake whose epicenter is located east of the project site, and the 1990 Luzon earthquake whose epicenter is located north of the project site. The East Luzon Trough is a deep oceanic trench that borders the eastern shores of Luzon, serving as a tectonic boundary between the Luzon arc and the Philippine Sea Plate that forms the western Pacific plate. The Manila Trench is a subduction zone on the western coast of Luzon, where melting is attributed to cause the volcanism from Pinatubo to Taal. Also associated with the activity of Manila Trench are the tectonic earthquakes, which are the common source of seismic activity felt in the Bataan area.

The vulnerability of the middle portions of Luzon to earthquakes and other seismic activities is caused by the presence of the following geologic structures. These structures were discussed in the preceding sections and their location is shown on Figure 2-10.

a) Philippine Fault and its branches
b) Manila Trench and its related structures
c) East Luzon Trough
d) Lubang Fault
e) Casiguran Fault

The Philippine Fault is a major active geologic structure in the Philippines that is closest to Metro Manila. The fault traverses the Philippines in a northwest-southwest direction from Luzon to Mindanao. Movement along the Philippine Fault is left lateral causing land on its northeast to move to the northwest. The most recent large earthquake associated with movement along the Philippine Fault is the 1990 earthquake that affected most of northern Luzon.

The Manila Trench greatly influences the geology, volcanism and seismic activities in the central part of west Luzon. The trench marks the collision of the South China Sea Plate with the Luzon landmass causing the oceanic crust to dive under Luzon Island. The subduction

process resulted in a deep trench and the melting of crustal materials produced the volcanoes found on the western part of Luzon (e.g. volcanoes of Bataan, Pinatubo in Zambales, and Taal in Batangas). Frequent earthquakes felt in the western side of Luzon manifest the continuing movement of the colliding plates. The Manila Trench subduction zone extends from the northern coast of Luzon near Taiwan until the western coast of Mindoro and Panay. A branch of the structure appears to merge into the northern shores of Mindoro along the Verde Island Passage. The western end of this structure is called the Lubang Fault and it appears to extend further east into the Verde Island Fault. The Manila Trench and its related structures are one of the seismically active zones in the Philippines. The East Luzon Trough is a deep oceanic trench that borders the eastern shore of Luzon and serves as the tectonic boundary between the Luzon Arc and the Philippine Sea Plate. The presence of the shallow oceanic platform called Benham Rise on the east of Northern Luzon possibly affected the subduction along this trench. Convergence is identified as the dominant tectonic process along the East Luzon Trough and is manifested by faulting and crumpling of the crust along the Sierra Madre Mountain Range. Lubang Fault has been assessed by PHIVOLCS to have lower potential for generating destructive earthquakes due to its periodic release of stress. It is a strike slip fault located between Mindoro and Batangas and extends to the southern edges of Manila Bay.

Casiguran Fault is estimated to have caused 30% of the earthquakes that affected Metro Manila. It is located on the eastern side of Luzon in the vicinity of Casiguran, Aurora. Bautista (2001) states that at least 23 earthquakes during the past 400 years caused minimal damage to population areas in the region, particularly Manila while 13 earthquakes caused significant damage to the population.

Based on the list of destructive earthquakes in the Philippines published by the Phivolcs on their website, there are four damaging earthquakes that, if will happen today, may impact affect the project site.

- Laoag Earthquake; August 17, 1983; Magnitude 6.5Ms
- Luzon Earthquake; July 16, 1990; Magnitude 7.8Ms
- Casiguran Earthquake; August 2, 1968; Magnitude 7.3Ms
- Ragay Gulf Earthquake; March 17, 1973; Magnitude 7Ms

Figure 2-10 presents the location of the recorded destructive earthquakes particularly in Luzon, Philippines.

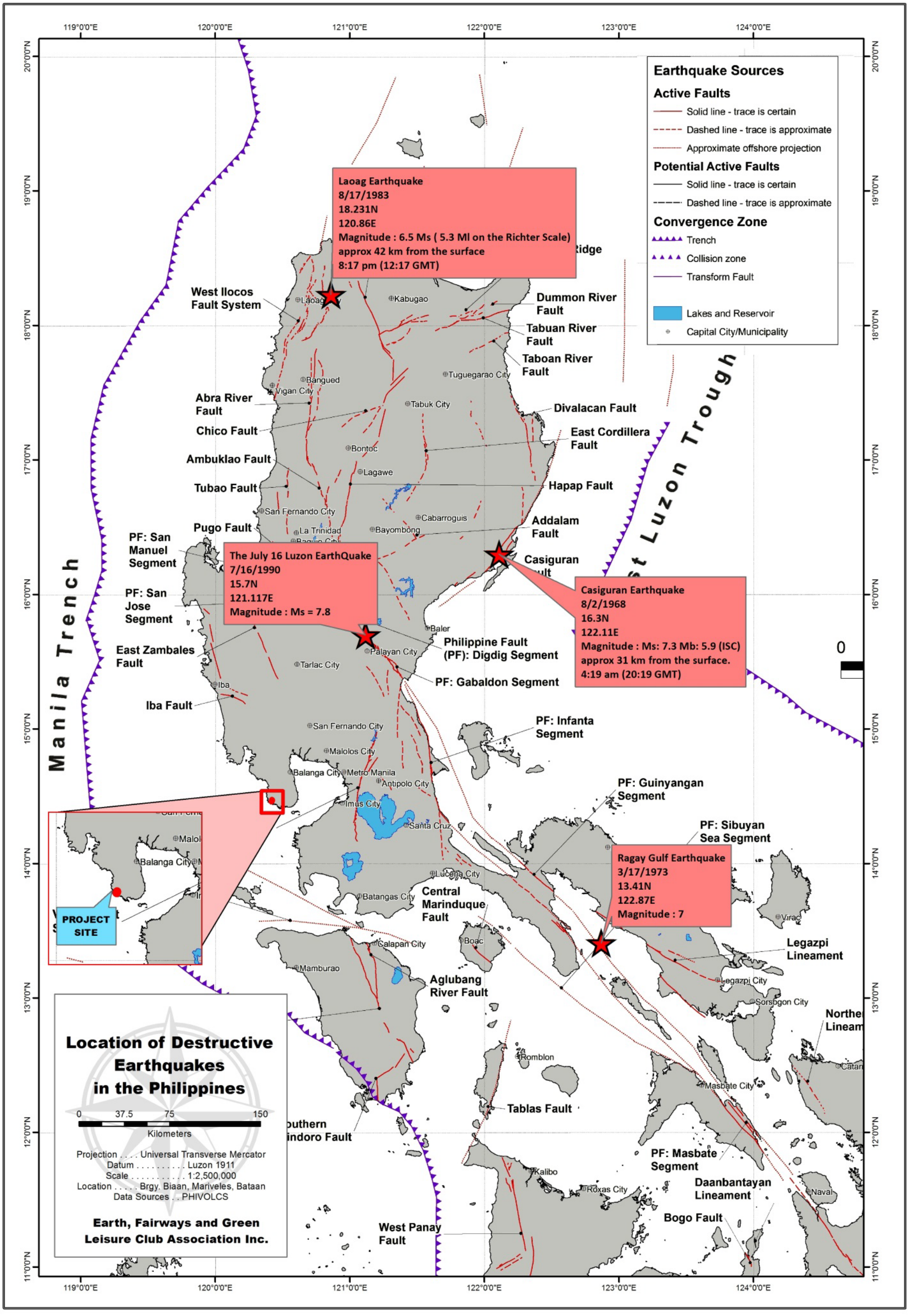
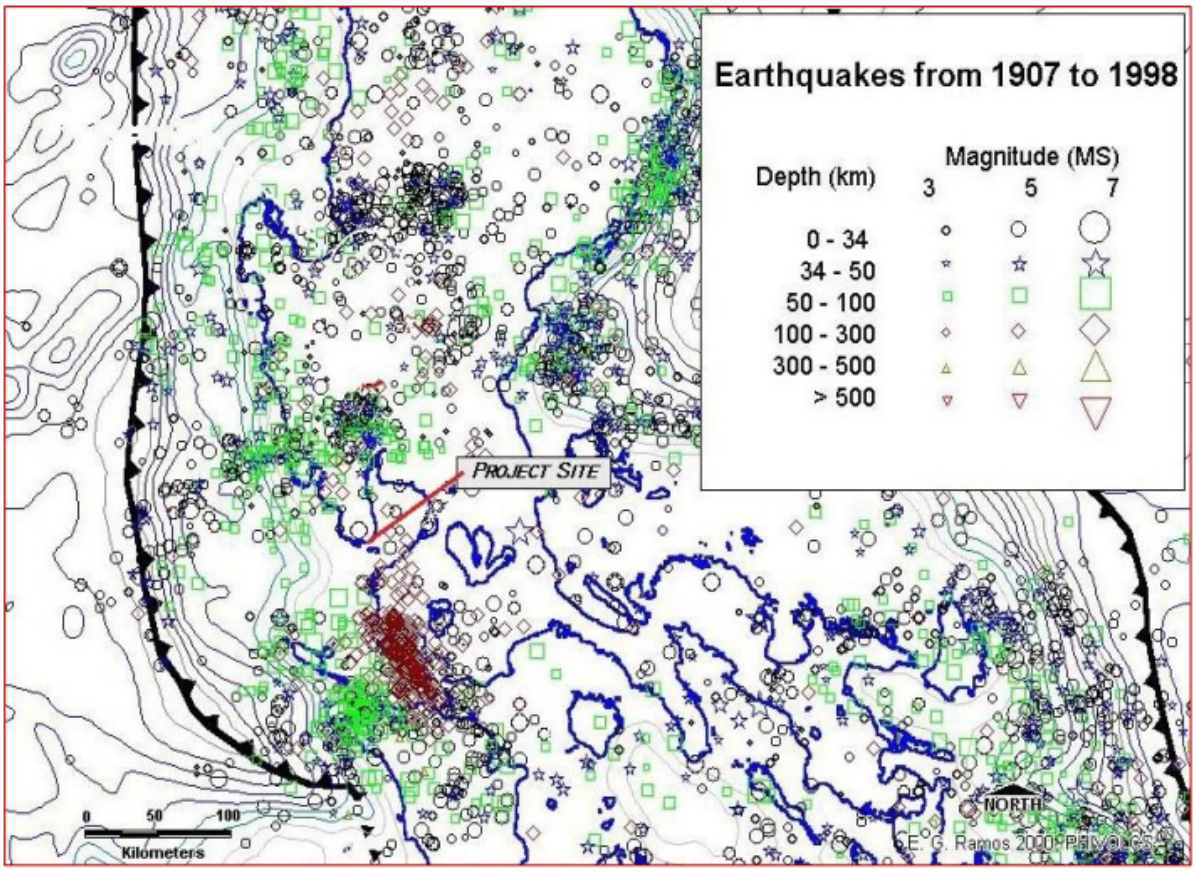


FIGURE 2-10. DESTRUCTIVE EARTHQUAKES IN LUZON PHILIPPINES

These earthquakes were caused by activities along the Philippine Fault zone, Manila Trench, East Zambales Fault, East Laguna Fault, and the Casiguran Fault-East Luzon Trench region. The damage incurred during these earthquakes was attributed to poor construction practices and unfavorable geologic conditions (i.e. soft soil and presence of thick sediments near riverbanks and reclaimed areas).

Figure 2-11 presents the seismicity map of surrounding Bataan. As shown on the map, relatively shallow and low-magnitude earthquakes have affected Bataan and nearby areas from 1907 to 1998.



Source: MEZ EISR by E.G. Ramos, PHIVOLCS 2000

FIGURE 2-11. SEISMICITY MAP OF PROJECT AREA AND VICINITY

Figure 2-11 shows the plot of the earthquakes that were recorded around the project area from 1907 to 1998. Most of the earthquakes plotted in the figure belong to three clusters, one along the eastern shores of Luzon, around Polilio Island, another cluster exists on the western coast of Luzon around Mount Pinatubo, and the third cluster is south of Taal Volcano, along the northern shore of Mindoro. Seismicity in these three clusters is influenced mostly by the subduction processes in these sites, as modified by the local volcanic and tectonic structures. Other earthquakes plotted in the map that are not related to the three clusters are generated by the major faults that cut the Philippine archipelago. Seismicity along the East Luzon Trench is characterized by a sequence of destructive earthquakes that started from 1968 and ended in 1985. These earthquakes are caused mainly by the convergence between the Benham Plateau and Luzon, and may be genetically linked to the 1990 Luzon earthquake.

Seismicity along the Manila Trench is not uniformly distributed. More earthquakes occur on the region east of Baguio whose activity commenced after the 1990 earthquake, on the region around Mount Pinatubo, and on the southern end of the trench near Lubang Island.

Some of the events are caused by faults that include the events along the Verde Island Passage, and the events along the Philippine Fault system. The earthquake in Mindoro in 1994 had a magnitude of 7.4 and caused a tsunami with severe damage to the communities in the northern coast of Mindoro. The waves from this tsunami reached about 8 meters in some parts, although most areas reported waves of around 3 to 5 meters high. The tsunami also caused scouring of the land, where debris and water rushing out caused significant erosion along old and newly-formed channels.

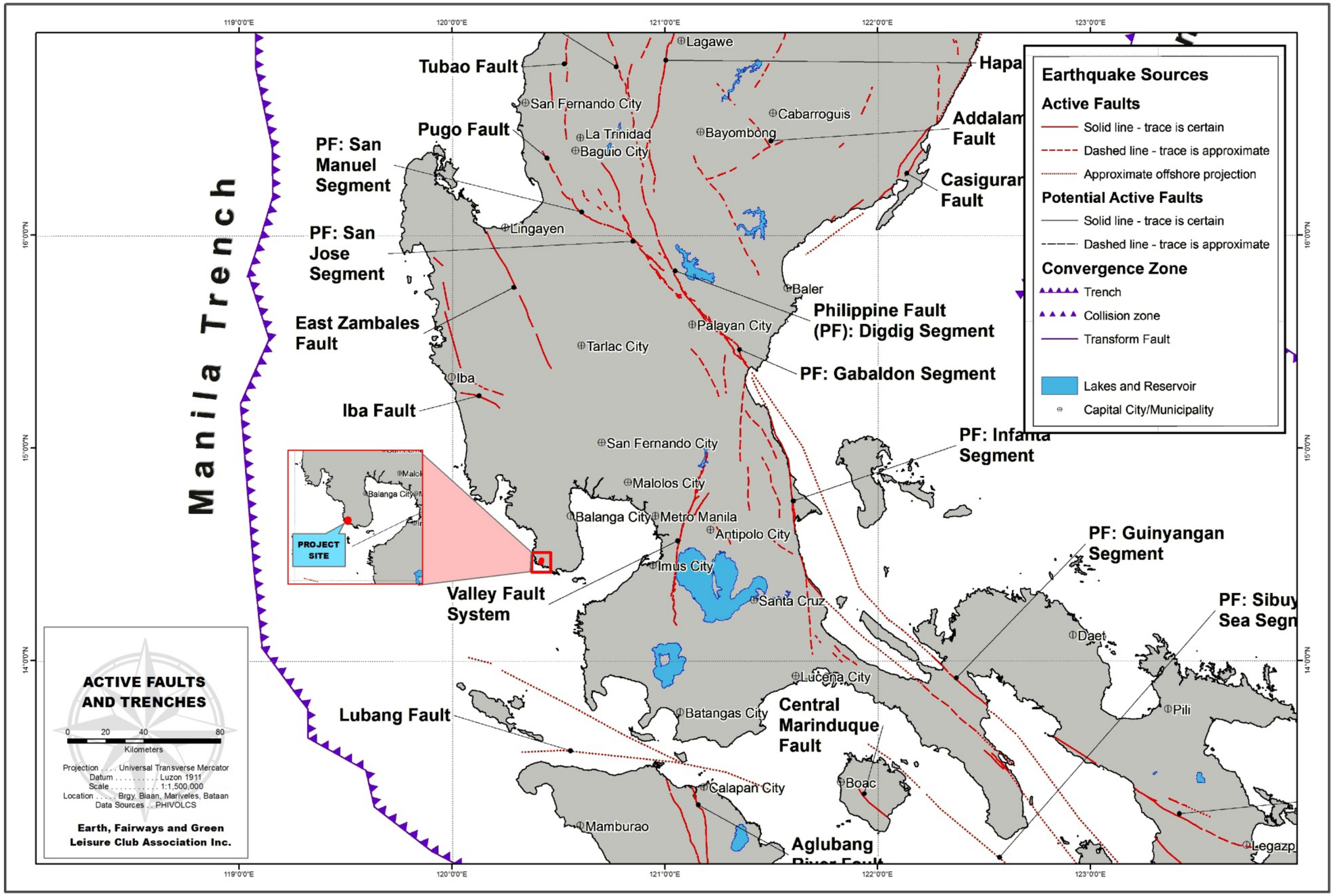
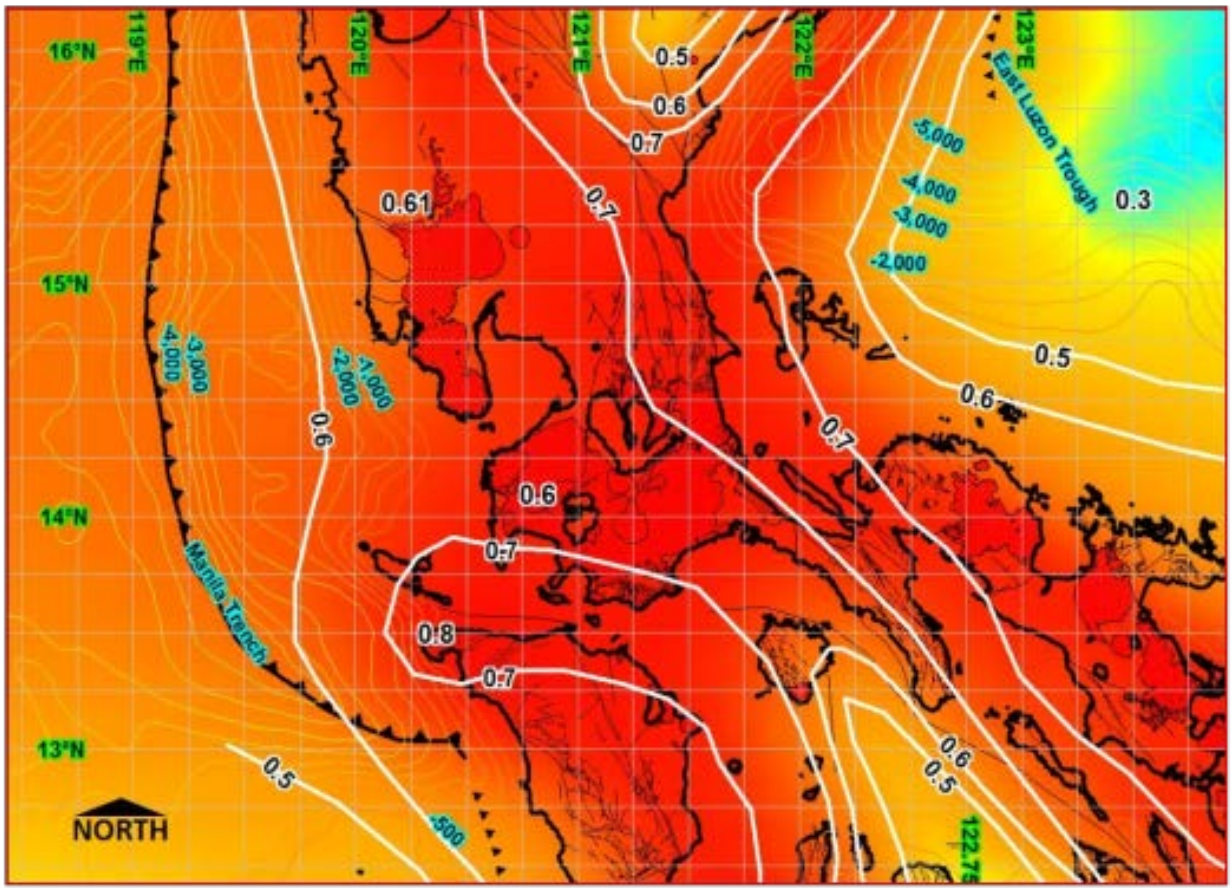


FIGURE 2-12. FAULT LINES WITHIN LUZON ISLANDS, PHILIPPINES

2.1.2.5.2 Ground Acceleration

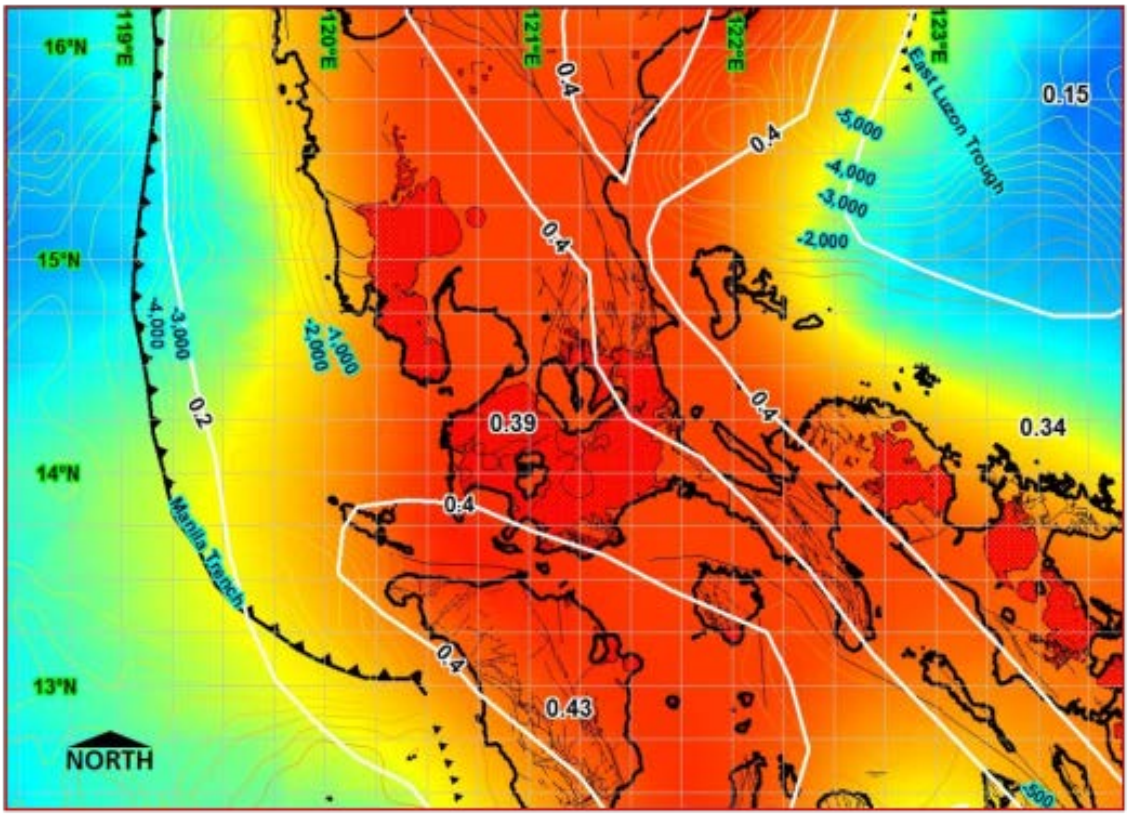
Ground shaking due to earthquake is one of the potential geologic hazards to the project site and vicinity. Ground shaking is a well-recognized geologic hazard in the Philippines considering that the country is located in a tectonically active region where seismic activities such as earthquakes normally occur. Numerous studies on ground shaking have been conducted, the most important of which is a study conducted by PHIVOLCS and USGS on the expected seismic acceleration in the country. Thenhaus, et al. (1994) used the analysis of time, space and size distribution of earthquakes to evaluate the distance-dependent distribution of seismic energy and presented the results in three soil conditions. The results of the calculations are shown in **Figure 2-13** to **Figure 2-15** for the soft soil, medium soil and rock conditions.

The maps show the influence of position of the faults and other geologic structures because the expected seismic acceleration values vary parallel to the tectonic features. The peak ground acceleration value for medium soil in Metro Manila was estimated at 0.4g while that for rock condition is estimated at 0.2g. These values have the probability of being exceeded in 50 years.



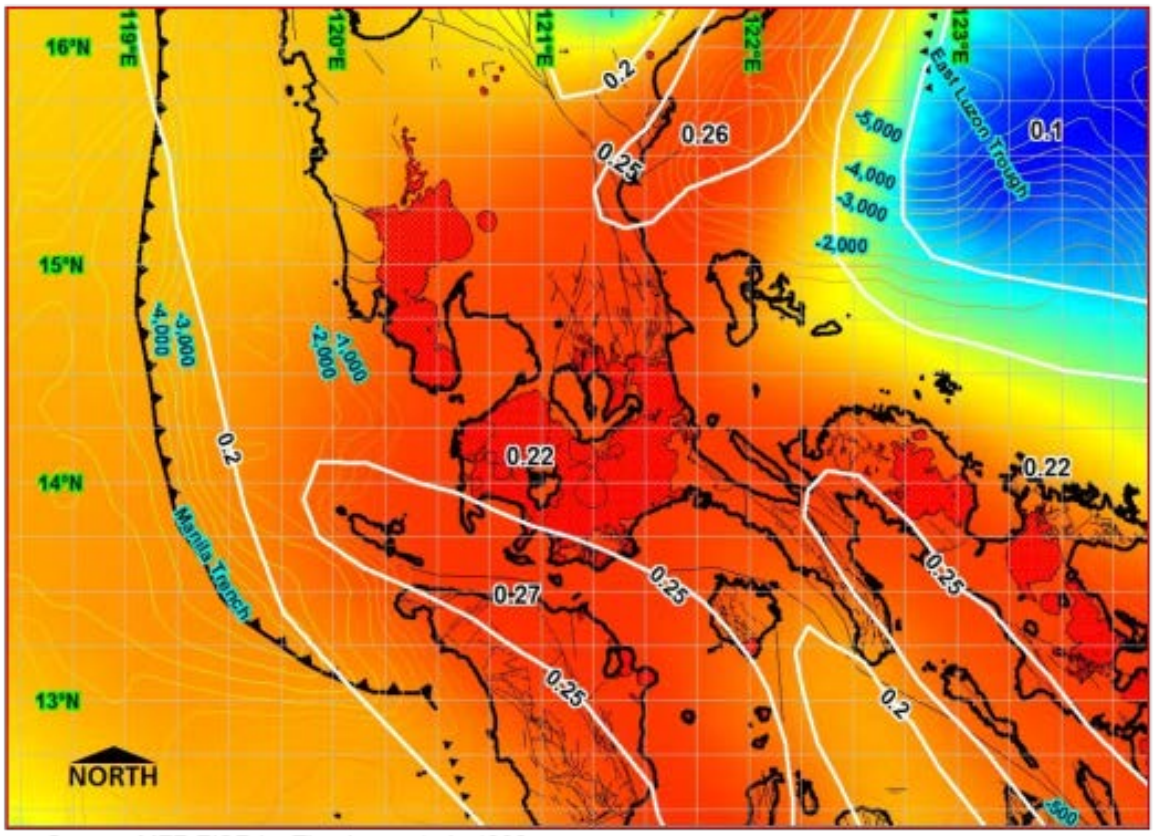
Source: MEZ EISR by Thenhaus et al., 1993

FIGURE 2-13. PEAK GROUND ACCELERATION CONTOUR MAP FOR SOFT SOIL



Source: MEZ EISR by Thenhaus et al., 1993

FIGURE 2-14. PEAK GROUND ACCELERATION CONTOUR MAP FOR MEDIUM SOIL



Source: MEZ EISR by Thenhaus et al., 1993

FIGURE 2-15. PEAK GROUND ACCELERATION CONTOUR MAP FOR ROCK

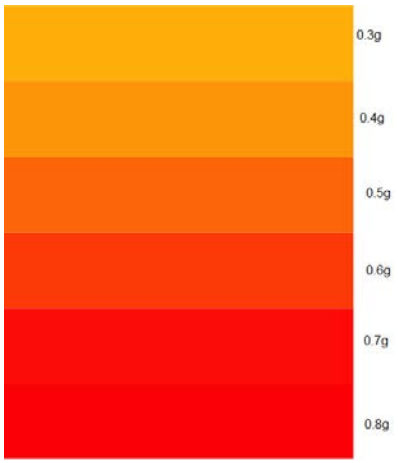


FIGURE 2-16. PEAK GROUND ACCELERATION COLOR SCALE

Figure 2-16 provides the equivalent peak ground acceleration values of each particular color scale shown in Figure 2-13, Figure 2-14, and Figure 2-15.

Deterministic estimation of expected peak ground acceleration values resulting from earthquakes generated by the three major earthquake generators, the East Luzon Trench, Manila Trench and the Philippine Fault is presented in the table below. The estimates were derived using the Fukushima and Tanaka (1990) equation and the distances to nearest faults provided by PHIVOLCS and estimated in geologic maps.

TABLE 2-6. DETERMINISTIC CALCULATIONS OF PEAK GROUND ACCELERATION ATTRIBUTED TO VARIOUS EARTHQUAKE GENERATORS AROUND THE PROJECT SITE

Seismic Generator	Distance from Site	Magnitude	Peak Ground Acceleration (PGA)	
			Medium Soil	Rock
East Luzon Trench	180 km	7.5	0023	0.016
Manila Trench	205 km	7.0	0.031	0.021
Philippine Fault	37 km	8.0	0.078	0.054

Source: MEZ EISR

Mass Movements

The terrain of the project site is mostly hilly and rolling, thus there is a probability of occurrence of landslide. The hills are usually of very steep slopes near the river channels, while the road cuts and coastal terraces are prone to rockfalls, rock slides and other forms of failure. The road cuts on the norther slopes also left behind areas that are prone to downslope movement. Monitoring for slope features should be done during the excavation for building foundation. Likewise, aggressive slope protection measures should be instituted in the areas where steep slopes are found.

2.1.2.5.3 Liquefaction

Liquefaction can occur in areas underlain by saturated sand-rich layer of soil, wherein fluids can be expelled from the sand layer resulting in subsidence of the underlying soil materials. **Figure 2-17** shows that Project area is not susceptible to liquefaction.

2.1.2.5.4 Volcanic Hazards

The project site is far from active volcanoes such as Taal and Pinatubo to be directly affected by volcanic activities (**Figure 2-18**). Tephra or ash fall may reach the project site especially during large volcanic eruptions. The size of the materials expected at the site is not to exceed a few millimeters in diameter and may be similar to that experienced during the 1991 Pinatubo eruption. The thickness of that same event may also be used as a benchmark for which ash deposits from each eruption should be in the order of a few centimeters in thickness. The worst threat for the site is the ash fall from any large volcanic eruptions from Pinatubo or Taal.

In 1991, the Mariveles area received about 10 to 20cm of thickness of volcanic ash, which may have been readily mobilized by the subsequent rainfall. In case of large eruptions of Pinatubo or Taal Volcanoes occur, volcanic ash may be blown into the site. Roofs with large areas shall be designed to have a steep pitch, and gutters and drainages shall be designed as suitable for clearing of ash deposits.

2.1.2.5.5 Landslide Hazard

Slope failures triggered by past earthquakes in the Philippines consist of several discrete landslides that occurred on moderate to steep slopes, along drainage divides, valley heads and in road cuts. The occurrence of strong aftershocks and heavy rainfall could increase the number of landslide events. However, based on the Earthquake-triggered Landslide Susceptibility Map of Region 3 provided in **Figure 2-19**, which is based on Critical Acceleration Values and Intensities, the project area is not susceptible to landslide. Even during period of continuous heavy rainfalls, landslide within the limestone area is least expected. In addition, based on geological hazard map, the project sits on low susceptibility to landslide area (**Figure 2-20**).

2.1.2.5.6 Flood Susceptibility

The project is located between 60 to 120 meters above sea level with two rivers on west and east side. Based on geological hazard map, is not flood prone area (**Figure 2-20**).

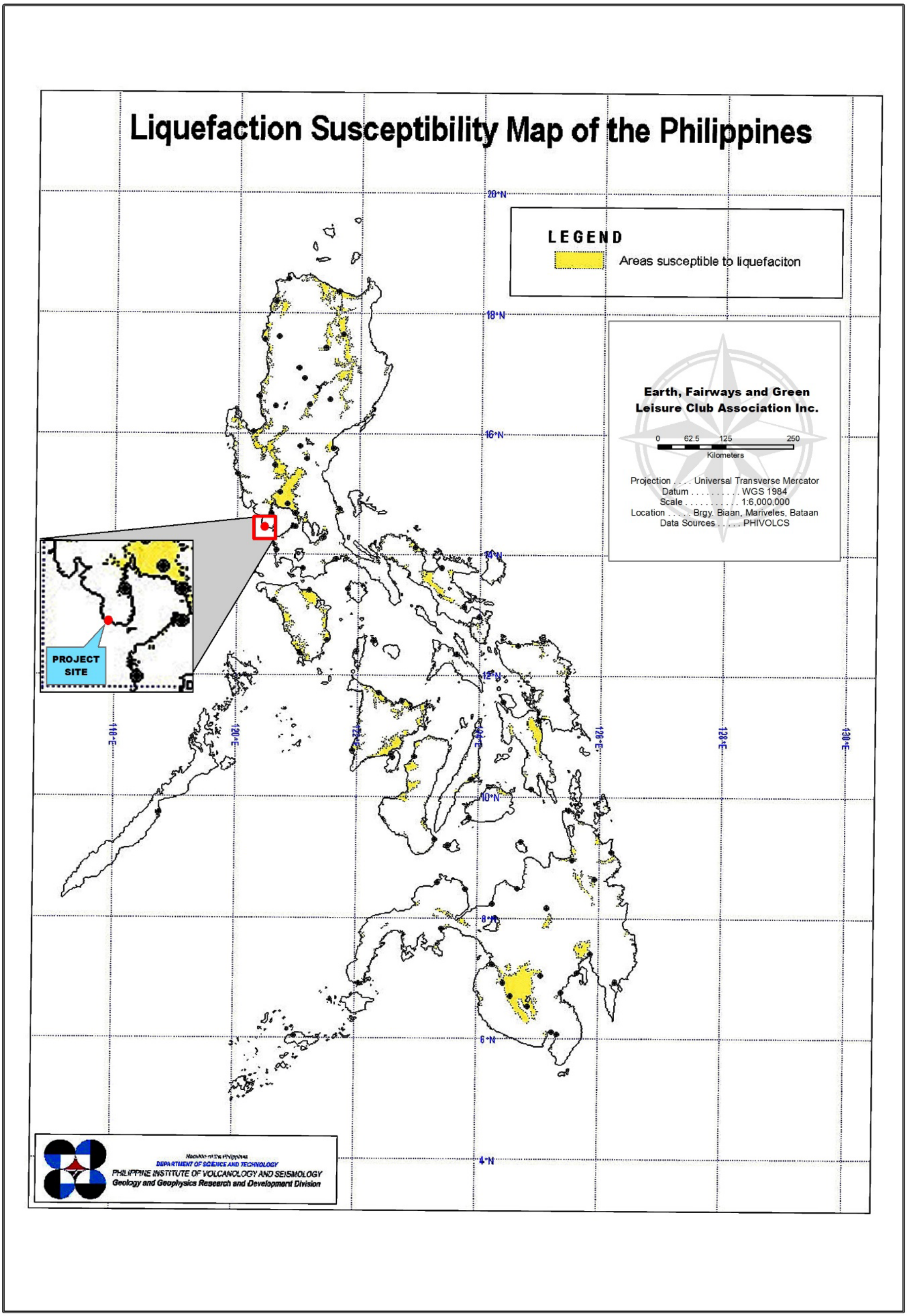
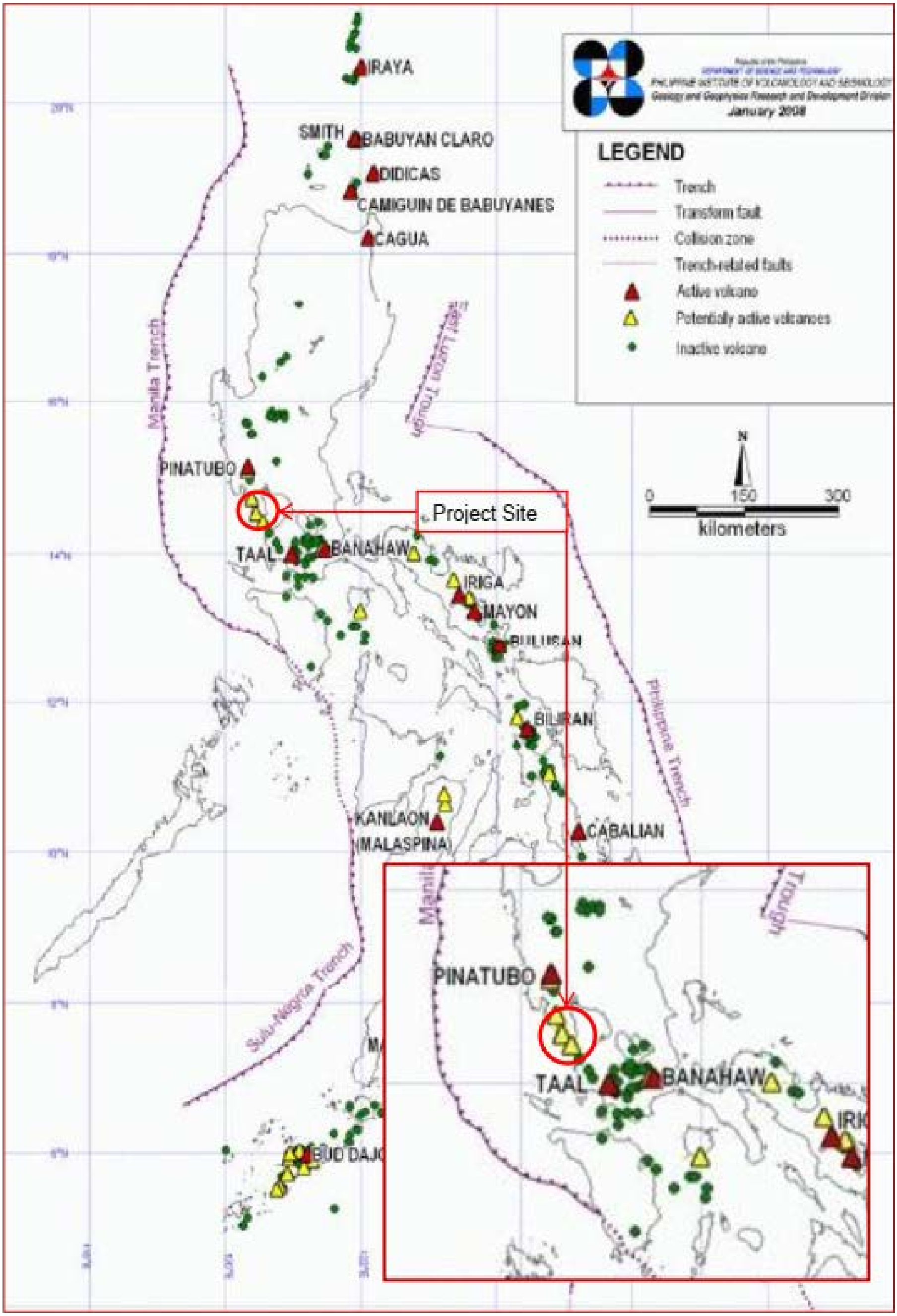


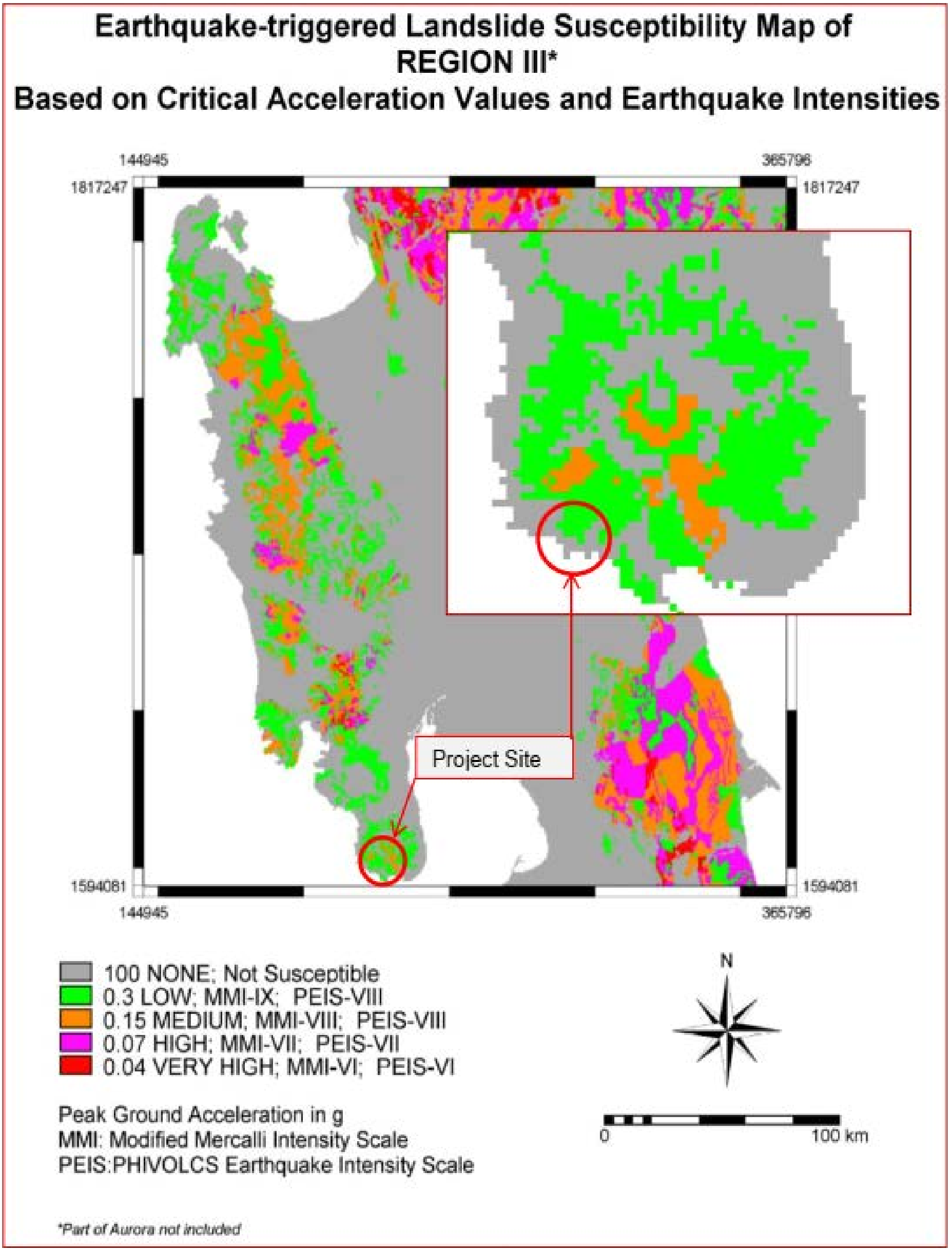
FIGURE 2-17. LIQUEFACTION SUSCEPTIBILITY MAP OF THE PHILIPPINES

(Source: Philippine Institute of Volcanology and Seismology – Geology and Geophysics Research and Development Division)



Source: MEZ EISR from PHIVOLCS

FIGURE 2-18. DISTRIBUTION OF VOLCANOES IN THE PHILIPPINES



Source: MEZ EISR from PHIVOLCS, modified by GEOSPHERE

FIGURE 2-19. EARTHQUAKE-TRIGGERED LANDSLIDE SUSCEPTIBILITY MAP OF REGION

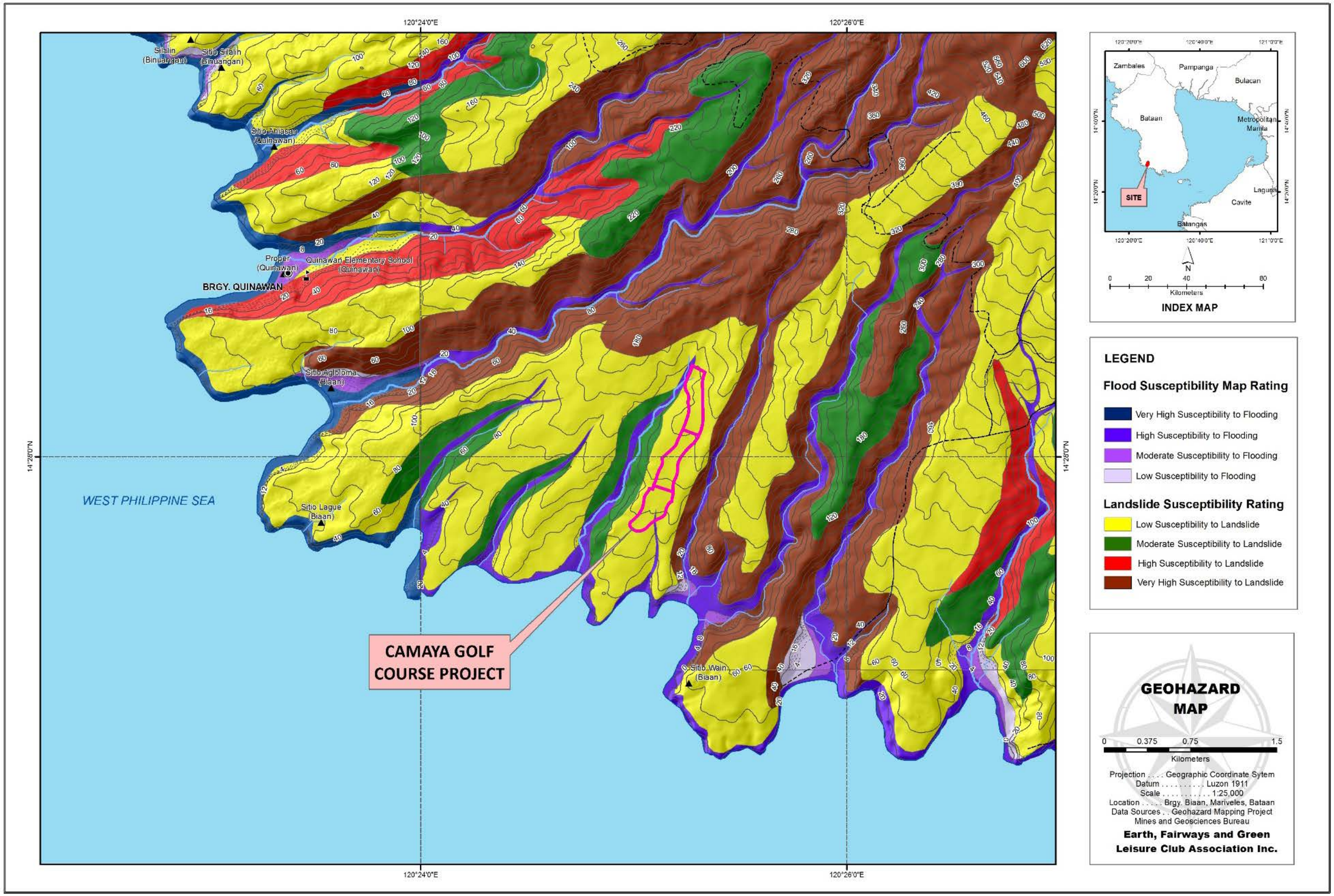


FIGURE 2-20. GEOHAZARD MAP

2.1.2.5.7 Tsunami and Storm Surge

Tsunamis are high amplitude ocean waves generated by earthquakes, volcanic eruptions or other underwater explosions. Sudden displacements in the ocean floor caused by fault movements generate these large waves, which can travel over long distances. Tsunami and storm surge are among the coastal hazards in the Philippines.

Tsunamis are giant sea waves that are produced as a result of faulting under submarine conditions (Daligdig and Besana 1993). Coastal zones are particularly vulnerable to tsunami and storm surge and the edge of Manila Bay may be exposed to potential tsunamis and storm surges. **Figure 2-21** presents the tsunami prone areas in the Philippines. **Figure 2-22** shows the location of historical tsunami events in the Philippines. There were nine (9) tsunami events which occurred in Luzon with <5m high from year 1627 to 1968 as recorded in the Philippine Tsunamis and Seiches of PHIVOLCS.

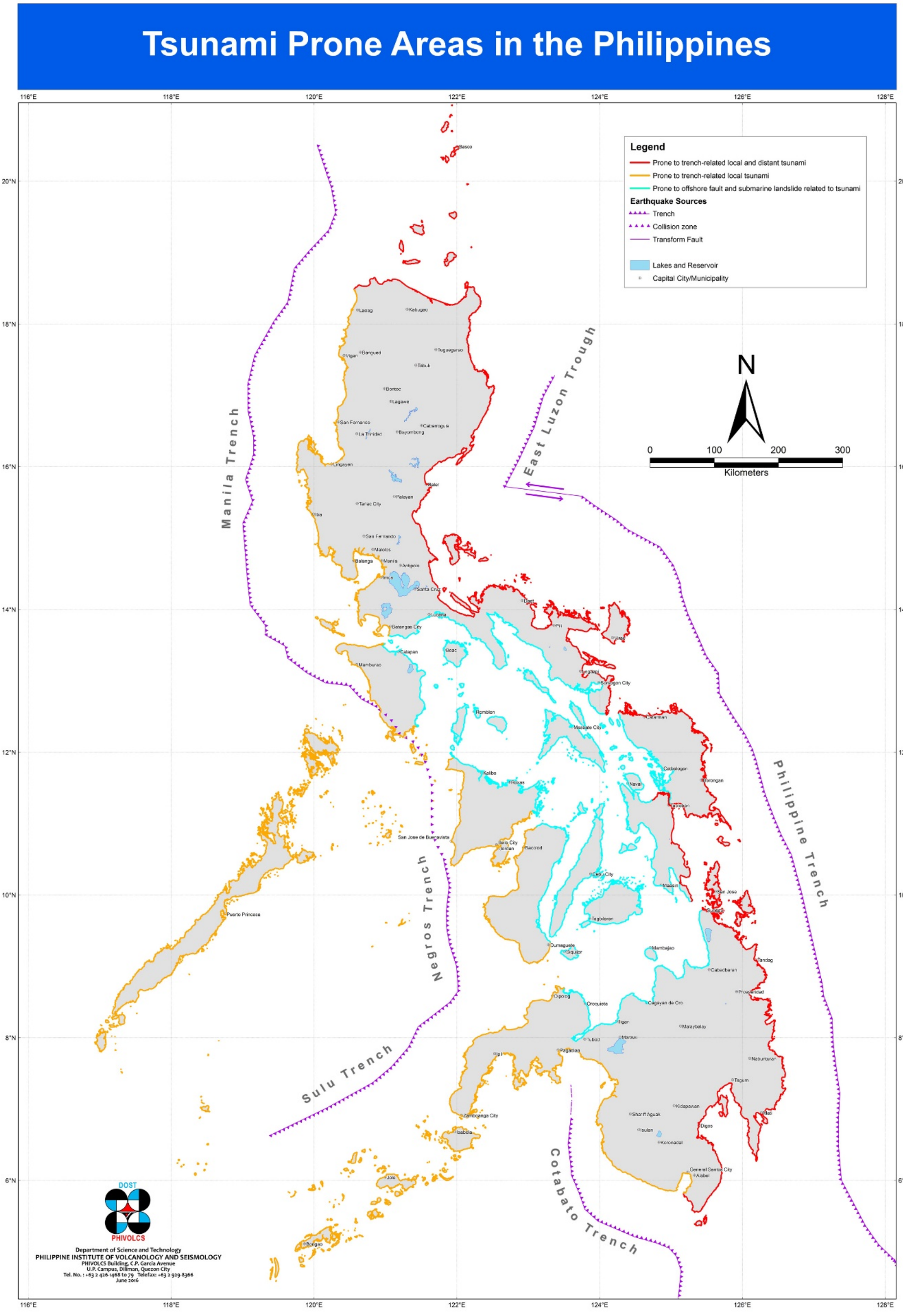
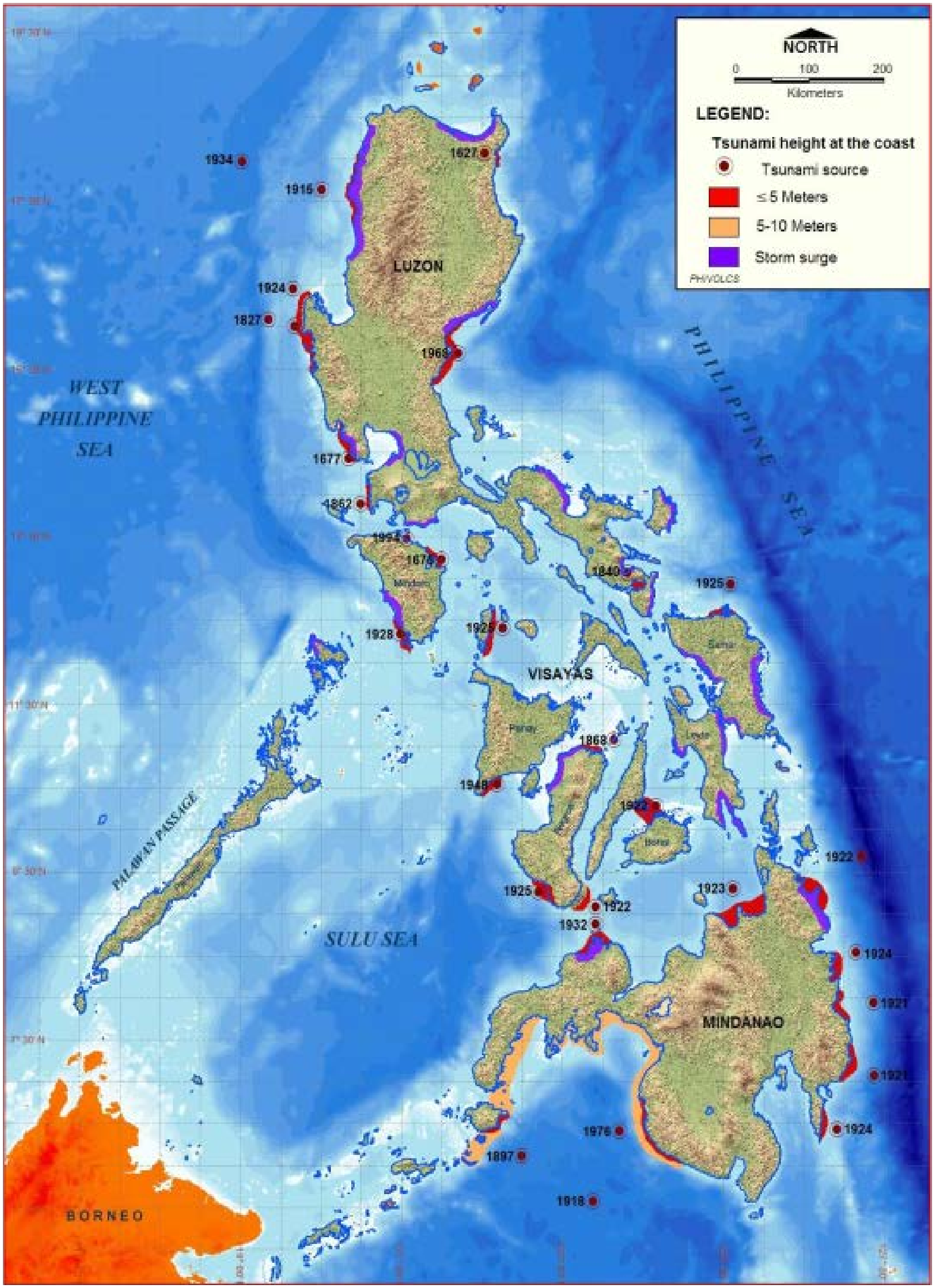


FIGURE 2-21. TSUNAMI PRONE AREAS IN THE PHILIPPINES

(Source: Philippine Institute of Volcanology and Seismology – Geology and Geophysics Research and Development Division)



Source: MEZ EISR from PHIVOLCS

FIGURE 2-22. MAP OF HISTORICAL TSUNAMI EVENTS IN THE PHILIPPINES

2.1.2.6 Potential Impacts and Options for Prevention, Mitigation and Enhancement

2.1.2.6.1 Change in surface landform/geomorphology/ topography/terrain/slope

The total estimated cut-and-fill volume for the golf holes is 59,752.97 m^3. Based on site visit the project did not cause any significant changes in surface landform of the area. The surface terrain still remains generally flat even with the grading and shaping activities done to conform with the golf course requirement/design.

2.1.2.6.2 Change in Sub-Surface Geology/Underground Condition

There will be no significant disturbance of the subsurface/underground geomorphology of the Project site. Although, excavations of lakes will cause permanent impact, the level of disturbance is considered to be low. The area of disturbance would include the footprint of the clubhouse, which includes its appurtenant facilities. Monitoring of excavation is recommended in order to identify geologic structures that may be discovered on site. Engineering designs and construction should be in compliance with the national building code and complying with the recommended seismic design all aimed to minimize the impact of ground shaking to the proposed building.

2.1.3 Pedology

2.1.3.1 Methodology

Field investigation, including collecting of soil sample within the project area on September 2016 and subsequent analysis by a testing laboratory were conducted to study and assessed the soil environment. Also, desktop review of publicly available information were gathered and reviewed in preparing this section.

2.1.3.2 Results

The area has a rolling topography; the relief is about 300m with the highest elevation at 182 above mean sea level (amsl). The slope of the project area is almost 18 percent and based on geohazard map the project can be categorized as low to moderate susceptibility to landslide. However, any manipulation of the area that requires further exposure of the soil can aggravate soil erosion.

2.1.3.2.1 Soil Types

The whole of project area's soil type is identified, characterized and mapped within an Antipolo Clay type of soil type.The same soil type that is predominant in the whole Municipality of Mariveles.

Antipolo Clay as the main soil type is subdivided into five (5) soil mapping units based on differences in slope ranges. Antipolo Clay and Antipolo Silty Clay were developed from the weathering of volcanic pyroclastic deposits. Although Antipolo Silty clay was developed from

the redeposited materials brought about by the nearby river as it incised the volcanic foot slope with pyroclastic materials.

Antipolo Clay 0-3% slopes and Antipolo Clay 3-8% slopes occur on the western and eastern parts of project area which form like a plateau in the coastal area. Antipolo Clay, 8-18% slopes occur in the northern part of the project area. Antipolo Clay, 8-18% slopes occur from the northeastern part down to southern part of the project area. Antipolo Clay, 18-30% slopes occur from north down to the southern part of the project area, adjacent to Antipolo Clay 0-3% slopes and Antipolo Clay 3- 8% slopes (western part). Beach Sand as miscellaneous land type occurs at the coastline between the Antipolo silty clay 0-3% slopes.

Figure 2-24 shows the soil type map of the entire area of the Municipality of Mariveles.

2.1.3.2.2 Soil Profile

Antipolo clay is an old soil which has undergone extensive weathering with illuvial accumulation of clay in the subsoil horizons from the overlying horizon. This can be commonly found in areas such as the Bataan that has pronounced wet and dry seasons. This is a representative of the great group of red soil (particularly Paleustalf) with low nutrient retention in its argillic horizon or upper 100cm depth.

Soil Fertility Indicators	
Inherent fertility	Moderate
Soil pH	Slightly acid (5.5 – 6.5)
Organic matter	Low
Phosphorus (P)	Low
Potassium (K)	Low
Nutrient retention (CEC)	Moderate
Base saturation	High
Salinity hazard	Low
Physical Soil Qualities	
Relief	Undulating to gently rolling
Water retention	Moderate
Drainage	Good
Permeability	Moderate
Workability / tilth	Easy
Stoniness	Weathered basaltic and tuffaceous rock fragments; few concretions
Root depth	Deep

Erosion	Moderate to severe

2.1.3.2.3 Soil Fertility

Results show that the fertility level of the soil is rated low to very low (**Table 2-7**). Most of the fertility parameter falls below the minimum level required for the soil to be classified as fertile. Under such condition, the availability of important soil nutrients is impaired. For instance, native and applied phosphorous is readily available to plants because it is fixed as aluminum or iron phosphates, compounds which are insoluble. Under conditions of low pH, the availability of bases like Ca, Mg and K is also low. Photo documentation of soil sampling activities are presented in Figure 2-23.

TABLE 2-7. CHEMICAL CHARACTERISTICS OF THE SOIL SAMPLES COLLECTED LAST SEPTEMBER 15, 2016

Test Description	Results	Units
Metals		
Calcium	11,900	mg/Kg
Magnesium	143	mg/Kg
Potassium	363	mg/Kg
Sodium	109	mg/Kg
Wet Chemistry		
Surfactants	ND	mg/Kg
Ammonia	88	mg/Kg
Nitrate	0.1	mg/Kg
Total Phosphorus	198	mg/Kg
Total Organic Matter	0.39	% w/w

FIGURE 2-23. SOIL SAMPLING DOCUMENTATION

Figure 2-25 shows the location of the soil sampling site.

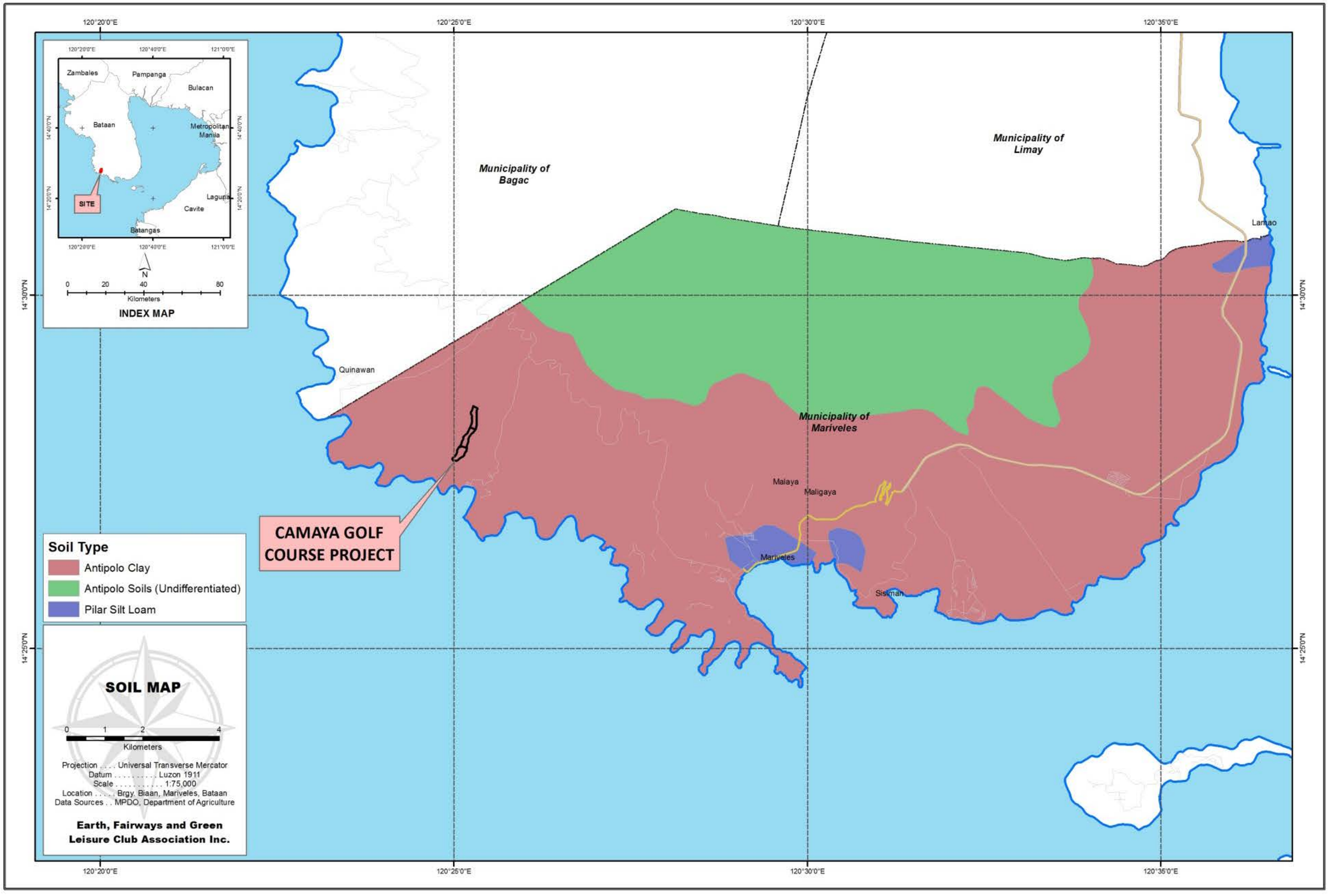


FIGURE 2-24. SOIL MAP OF THE MARIVELES MUNICIPALITY

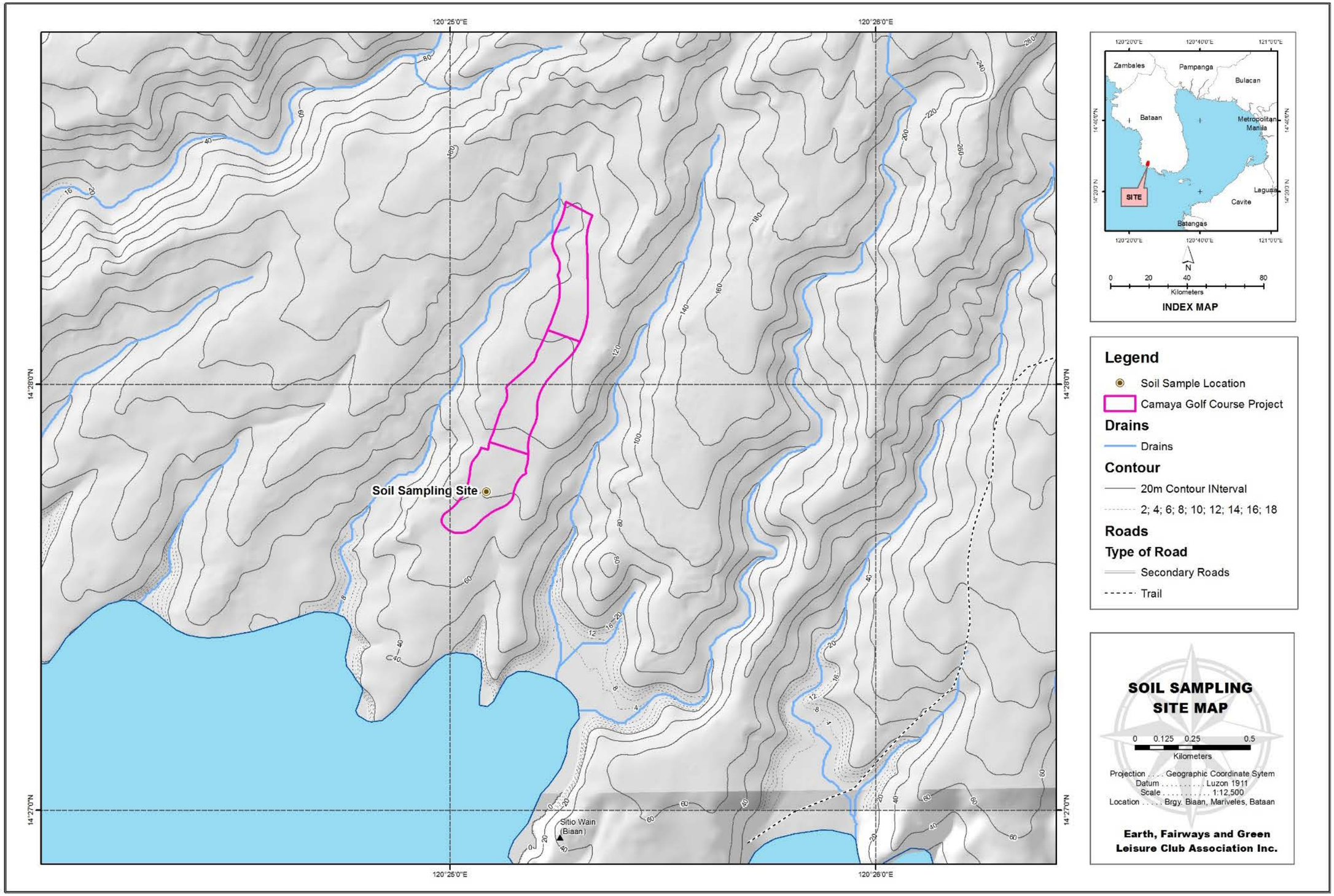


FIGURE 2-25. SOIL SAMPLING MAP

2.1.3.3 Impacts and Mitigating Measures

2.1.3.3.1 Soil Erosion/Loss of Topsoil

The project has implemented its development at the time this report was written. Disturbance of topsoil and siltation most likely occur during the development. However, it was expected that said occurrence was minimal because the project is situated in a relatively flat terrain and only the development of the artificial lakes entailed excavation works. It is recommended to conduct earthworks during dry season to minimize to possible soil erosion. Progressive clearing and earthworks moving can also be implemented to the remaining undeveloped area to minimize the said soil erosion. Immediate revegetation of carabao grass can also conducted to reduce rainfall impact to soil that cause soil erosion during wet season.

2.1.3.3.2 Change in soil quality/fertility

The project will apply fertilizer during the project operation to maintain the turf grass and vegetation, and other flora species that will be planted and maintained in the golf course. This will enhance the soil fertility of the project that has low to very low fertility prior to the project.

2.1.3.3.3 Impacts of spoils materials

During the clearing, grubbing, and stump removal operations, the cleared topsoil shall be placed in a designated area with a provision of proper drainage system to avoid possible siltation during heavy rains. Staging area for spoils materials will be designated and located in strategic areas where other project areas that require filling materials can be easily backfilled.

Stockpile management practices for temporary stockpile sites related to construction works will be in accordance with best engineering management practices and shall take into account the following general principles:

- Provision for soils erosion and sediment control measures such as establishment of diversion canals and proper drainage system.
- Controlling run-off during the construction of stockpiles (e.g. fill shaping and the construction of temporary dykes and batter drains).
- Diverting stockpile run-off through sediment traps and into pits and the stormwater drainage system as soon as practical to reduce surface flow lengths and velocities.
- Controls will be installed around all stockpiles that are in place for more than 1month in order to prevent wind and water erosion.
- Dust management measures (including for vehicle movements associated with stockpiling activities)

2.1.3.3.4 Soil quality mitigation and monitoring

Soil degradation in the project site will lead directly to water pollution by sediments and attached fertilizers and pesticides from eroded spoils and fields. Soil degradation indirectly

causes water pollution by increasing the erosive power of runoff and by reducing the soil's ability to hold or immobilize nutrients. To mitigate the possible impact of soil degradation, primarily due to erosion and consequently the pollution of downstream rivers of Tilin and Basay Rivers, progressive clearing and earthworks moving will be implemented with the aim to minimize the possible soil erosion. Critical slopes and area that are prone to landslide will be vegetated by erosion control plants such as the carabao grass that is endemic and can easily thrive in the project site. Rainfall / runoff water induced landslide will be mitigated by providing proper drainage and irrigation system of the project. Maintenance and monitoring of erosion control measures will be part of the general maintenance activity of the project.

Also, soil fertility will be part of the regular monitoring of an in-house Agronomist to ensure growth and sustainability of golf course vegetation, such as the turf grass. Among parameters that will be monitoring in the soil quality is the level of chemicals related to fertilizers and chemicals.

2.1.4 Terrestrial Ecology

2.1.4.1 Terrestrial Flora

2.1.4.1.1 Introduction

The vegetation assessment of the Camaya Golf Course Project (the Project) area is based on the signed and approved technical scoping checklist for the Environmental Impact Statement of the Project.

2.1.4.1.2 Methodology

Review of Available Documents

Desktop review of publicly available information was employed to capture the existing vegetation of the Project area. Comprehensive Land Use Plan (CLUP) of Municipality of Mariveles, Bataan and other pertinent documents served as reference for the flora section and were validated during the field assessment.

Field Sampling Methodology

A vegetation assessment for the Project was conducted on 19 January 2019 within the direct and indirect impact areas of the Project.

A forest/vegetation is usually stratified into three, namely: canopy, intermediate, and undergrowth or understorey layers. To evaluate the characteristics of the existing vegetation of the impact areas transect walk and quadrat sampling were employed. Quadrat sampling plots with 10 m × 10 m, 3 m × 3 m, and 1 m × 1 m nestled plots were demarcated to assess the three different layers. All trees greater than or equal to 15 cm diameter at breast height (DBH) were measured and recorded in the 10 m × 10 m plot for canopy layer. A 3 m × 3 m plot was established randomly inside the canopy plot for the intermediate layer. For the understorey layer, a 1 m × 1 m plot was established randomly inside the intermediate plot to account for the number of species that included wildlings, herbs, vines, grasses, and shrubs.

Flora species outside the established plots were also documented to characterize the vegetation type of the sampling area. Plants outside plots, however, were not included in the computation of ecological parameters. Details of transects and sampling plots are presented in **Table 2-8** and **Figure 2-26**.

Photographs were taken whenever possible to document the vegetation assessment activities. Geotagging of photos was also conducted to record the location of photos. Geographic coordinates of the sampling plots and points were recorded using a handheld GPS.

TABLE 2-8. SAMPLING LOCATIONS

Plot	Latitude	Longitude	Elevation (masl)
Plot 1	14°27'35.32"N	120°25'21.49"E	22
Plot 2	14°27'56.02"N	120°25'13.52"E	114
Plot 3	14°28'9.90"N	120°25'30.50"E	147
Plot 4	14°28'17.63"N	120°25'21.28"E	116

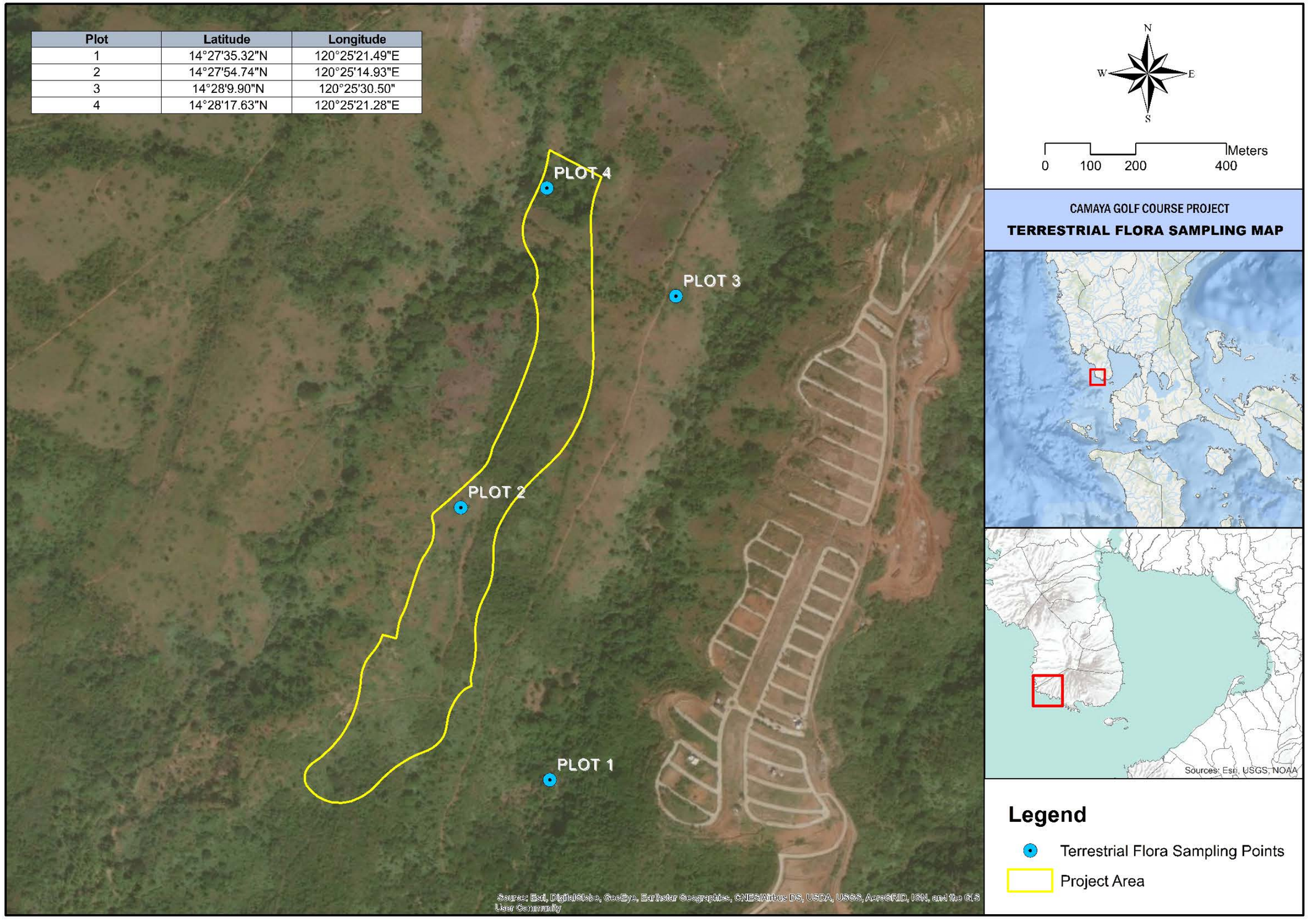


FIGURE 2-26. FLORA SAMPLING MAP

Vegetation Characterization and Site Description

The vegetation cover was evaluated and the sites were characterized (i.e., secondary forest, grassland, and agroforestry type) for the study. Plants found in each sampling plot were identified and classified either as trees or saplings using the criteria presented in Table 2-9. For plant species that could not be identified onsite, gross morphological features of the plant using key characteristics (such as stipules, exudates, indumentums, domatia, and bast fiber, among others) were thoroughly documented. Available published taxonomic literature and verification to the type images of the National Herbarium were used to identify the species. The updated species botanical names were verified using records from the following websites:

- www.philippineplants.org
- www.theplantlist.org
- www.ipni.org.

After species identification, conservation status of each plant species was checked using the list generated by the DENR Department Administrative Order (DAO) 2017-11 as well as the latest available IUCN Red List of Threatened Species.

TABLE 2-9. TREE AND SAPLING CLASSIFICATION CRITERIA

Classification	DBH (cm)	Height (m)
Trees	≥ 15 DBH	≥ 3
Saplings, intermediate species*	< 15 DBH	≥ 1
Saplings, undergrowth species**	< 15 DBH	≤ 1

Note: * Tree species and shrubs
** Wildlings of trees, herbs, shrubs, vines, and grasses

Measurement of ecological parameters

Ecological parameters of sampling stations were measured using the formulas adapted from Magurran (1988) to compute for the following parameters:

$$\text{Species Richness}(n) = \frac{\text{number of species}}{\text{Transect line}}$$

$$\text{Diversity Index}(H') = -\sum n_i \ln\left(\frac{n_i}{N}\right)$$

$$\text{Evenness Index}(e') = \frac{H'}{\ln(S)}$$

where:

n_i = the importance value (IV) of individual species
N = the importance value (IV) of all species
S= total number of species

On the other hand, indices for plant species diversity and evenness were classified using Fernando 1998 diversity relative values categories presented in **Table 2-10**.

TABLE 2-10. RELATIVE VALUES FOR PLANT SPECIES DIVERSITY (FERNANDO 1998)

Relative values	Species diversity (H')	Evenness index (e')
Very high	3.500 – 4.000	0.750 – 1.000
High	3.000 – 3.499	0.500 – 0.740
Moderate	2.500 – 2.999	0.250 – 0.490
Low	2.000 – 2.499	0.150 – 0.240
Very low	1.999 and below	0.140 and below

2.1.4.1.3 Baseline Results

General Description of Vegetation of Project Area

Based on 2010 Land Cover Map from the DENR-FMB, the land cover of the project is 58% grassland, 35% wooded grass land and 6% perennial crop (**Figure 2-27**). This has been validated during the sampling activities on 19 January 2019. Grassland with patches of trees was observed. Cogon (*Imperata cylindrica*) and talahib (*Saccharrum spotaneum*) are the abundant grass species while rain tree (*Samanea saman*), binayuyu (*Antidesma ghaesembilla*) and kupang (*Parkia timoriana*) are the abundant tree species were recorded. Agroforestry species mixed with remnants of secondary growth forest tree species were also observed adjacent to the project located in riparian areas. Coconut (*Cocos nucifera*), mangga (*Mangifera* sp), kasoy (*Anacardium occidentale*), *Canarium* sp, kupang, tibig (*Ficus nota*), and tanglin (*Adenanthera pavonina*) are the species noted in this area. During the site visit it was also observed that the project development has already started. It was noted that the undergrowth of vegetation in some portion of the project has already been removed while other portion has already been replaced with preferred grass species for the golf course. It was observed that trees were left standing and some are incorporated with the landscaping of the project. Photo documentation of the general vegetations of the project is presented in **Figure 2-27**.

FIGURE 2-27. GENERAL VEGETATION OF THE PROJECT AREA

a) grassland with patches of trees, b) agroforestry species in riparian areas, and c) portion with removed undergrowth vegetation and replaced with preferred grass

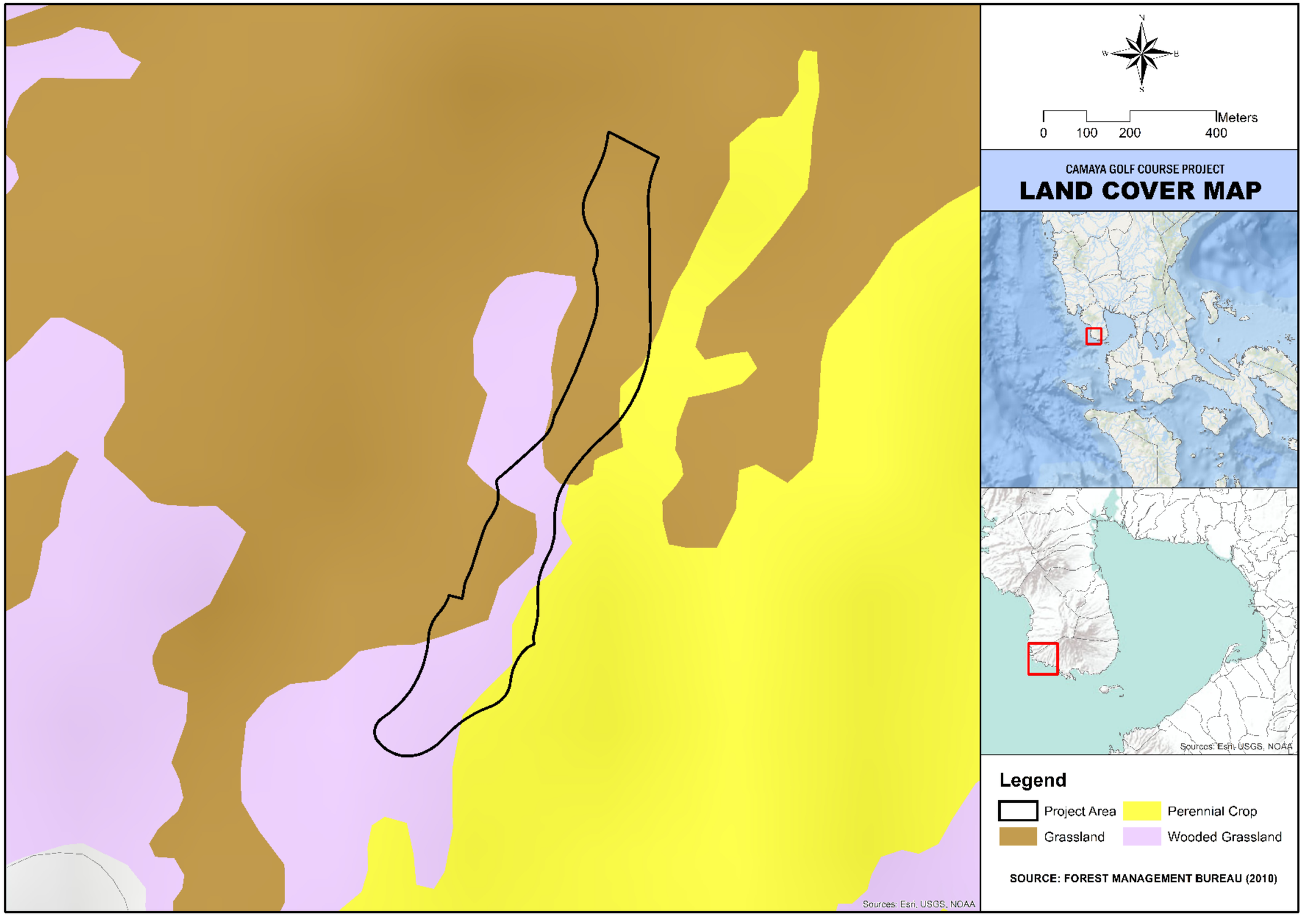


FIGURE 2-28. LAND COVER MAP

Sampling Site Description

To capture the vegetation within project area, sampling stations (Figure 2-26) were located within the existing land cover of the project. Succeeding discussions describe the sampling stations during the fieldwork activities.

- **Plot 1**

Plot 1 is within indirect impact are located southeast of the project with riparian ecosystem. The land cover of the area is perennial crops. Based on site visit, agroforestry species mixed with forest tree species are present within and outside this plot. Agroforestry species include perennial crop such as kasoy, coconut, manga while forest tree species includes *Canarium* sp., sablot (*Litsea glutinosa*), antipolo (*Artocarpus blancoi*), and amamali (*Leea aculeata*). **Figure 2-29** presents photo documentation of plot 1.

FIGURE 2-29. VEGETATION IN PLOT 1

- **Plot 2**

Plot 2 is located within the direct impact area west side of the project. Land cover of the area is wooded grassland. Based on site visit, this area is mainly composed of cogon and talahib with recorded trees such as binayuyu and kakawate (*Gliricidia sepium*). Figure 2-30 presents photo documentation of plot 2.

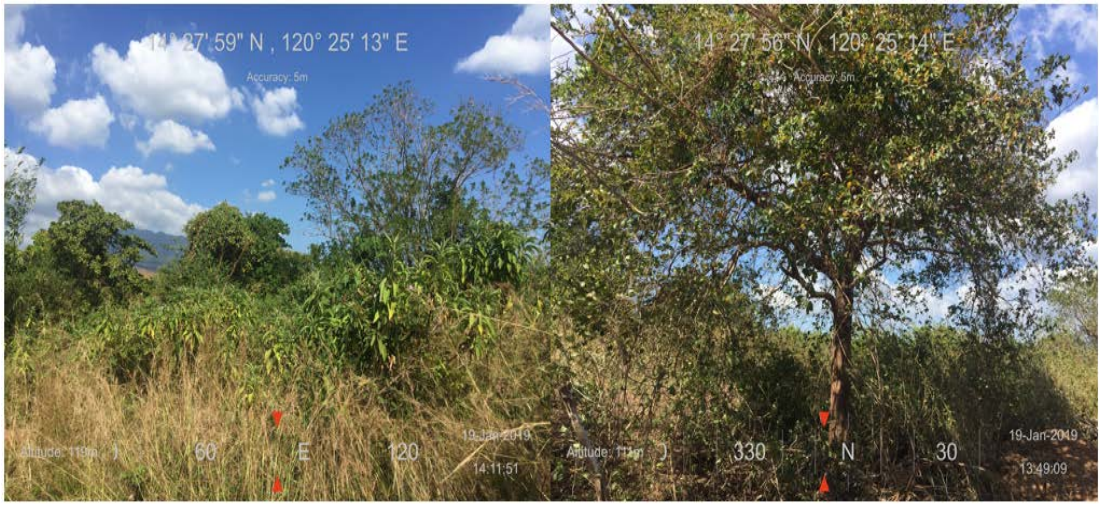


FIGURE 2-30. VEGETATION IN PLOT 2

- **Plot 3**

Plot 3 is located within a grassland area dominated with cogon and talahib on the east portion of the project. Invasive species were also recorded in the undergrowth layer including coronitas (*Lantana camara*), ipil-ipil (*Leucana leucocephala*) and hagonoi (*Chromolaena ododrata*). Dita (*Alstonia scholaris*) is the only recorded tree species in the canopy layer of this plot. Figure 2-31 presents photo documentation of plot 3.

FIGURE 2-31. VEGETATION IN PLOT 3

- **Plot 4**

Plot 4 is located in the north portion of the project with grassland as land cover. It is composed of large diameter kupang and acacia trees ranging from 52 to 67 cm dbh. Banaba and binayuyu were recorded in the intermediate layer while hagonoi, anabiong (*Trema orientalis*) and dilang butiki (*Centrosema pubescens*) were listed as undergrowth. Figure 2-32 presents photo documentation of plot 4.

FIGURE 2-32. VEGETATION IN PLOT 4

Other species listed outside sampling plot during the transect walk includes kasoy, rain tree, kupang, kakawate, binayuyu, avocado, sablot, bayok-bayokan (*Pterospermum clebicum*), anabiong, binunga (*Macaranga tanarius*), kawayan tinik (*Bambusa blumeana*) and ipil-ipil.

Complete list of species observed during the sampling activities is presented in Table 2-11.

TABLE 2-11. LIST OF SPECIES OBSERVED DURING SAMPLING ACTIVITIES

Common name	Scientific Name	Family
Amamali	*Leea aculeata*	LEEACEAE
Anabiong	*Trema orientalis*	CELTIDACEAE
Antipolo	*Artocarpus blancoi*	MORACEAE
Banaba	*Lagerstroemia speciosa*	LYTHRACEAE
Bangkal	*Nauclea orientalis*	RUBIACEAE
Bayok-bayokan	*Pterospermum celebicum*	MALVACEAE
Binayuyu	*Antidesma ghaesembilla*	PHYLLANTHACEAE
Binunga	*Macaranga tanarius*	EUPHORBIACEAE
Buri	*Corypha utan*	ARECACEAE
Canarium	*Canarium* sp	BURSERACEAE
Carabao Grass	*Paspalum conjugatum*	POACEAE
Coconut	*Cocos nucifera*	ARECACEAE
Cogon	*Imperata cylindrica*	POACEAE
Coronitas	*Lantana camara*	VERBENACEAE
Dilang Butiki	*Centrosema pubescens*	FABACEAE
Dita	*Alstonia scholaris*	APOCYNACEAE
Hagonoi	*Chromolaena odorata*	ASTERACEAE
Hauili	*Ficus septica*	MORACEAE
Ipil-ipil	*Leucana leucocephala*	FABACEAE
Kakawate	*Gliricidia sepium*	FABACEAE
Kalios	*Streblus asper*	MORACEAE
Kasoy	*Anacardium occidentale*	ANACARDIACEAE
Kupang	*Parkia timoriana*	FABACEAE

Common name	Scientific Name	Family
Manga	*Mangifera* sp	ANACARDIACEAE
Rain Tree	*Samanea saman*	FABACEAE
Sablot	*Litsea glutinosa*	LAURACEAE
Talahib	*Saccharum spotaneum*	POACEAE
Tanglin	*Adenanthera pavonina*	FABACEAE

Floral Taxonomy

- **Taxa richness**

There were at least 28 flora species belonging to 17 flora families recorded. Majority of the species are members of FABACEAE (21%), POACEAE (11%) AND MORACEAE (11%) families. Distribution of flora families is presented in Figure 2-33. Majority of the canopy layer is composed of FABACEAE species while undergrowth layer is mainly from the grass family or POACEAE. MORACEAE species were mostly from riparian areas outside the project boundary.

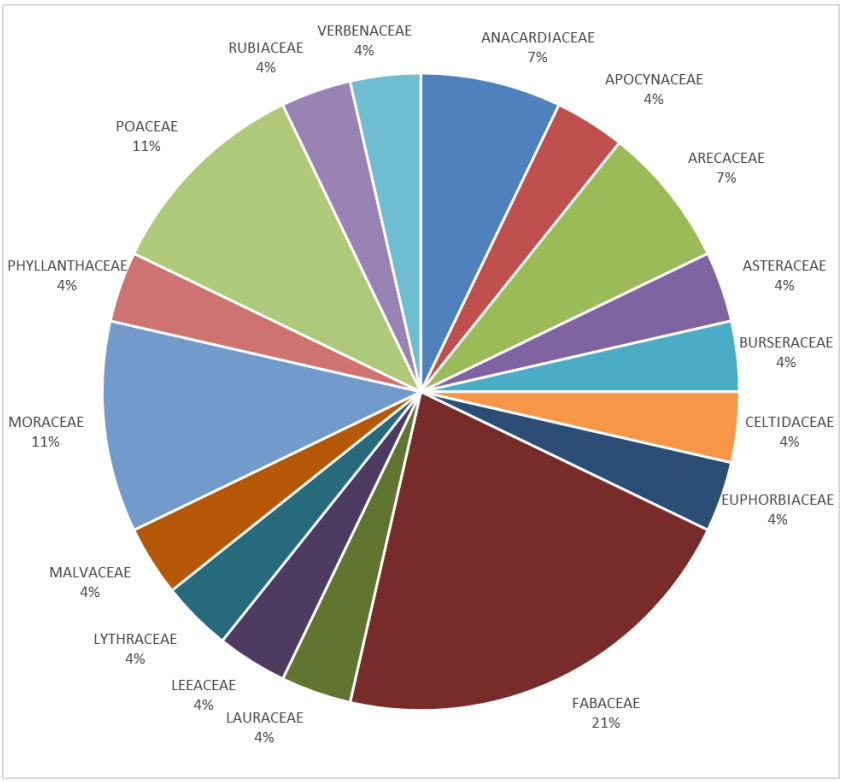


FIGURE 2-33. FAMILY DISTRIBUTION OF FLORA SPECIES RECORDED

- **Importance Value**

Importance value (IV) is a measure of how dominant a species is in a given vegetation. The IV of each recorded species within the sampling plot were also computed to identify the dominant species in the project.

Results revealed that the canopy layer of the project is dominated by FABACEAE species such as kupang and rain tree (Table 2-12). The intermediate and undergrowth

layer, on the other hand, were dominated by grass species (POACEAE) including cogon and talahib and invasive species including hagonoi, coronitas and ipil-ipil (Table 2-13).

TABLE 2-12. COMPUTED IV OF CANOPY LAYER SPECIES

Species	IV
Kupang	87.99561
Rain tree	45.80858
Canarium sp.	36.54019
Dita	31.65935
Antipolo	25.01311
Banaba	24.57695
Binayuyu	24.57695
Ipil-Ipil	23.82925

TABLE 2-13. COMPUTED IV OF INTERMEDIATE AND UNDERGROWTH LAYER SPECIES

Species	IV
Cogon	33.896
Hagonoi	25.065
Talahib	22.987
Coronitas	21.299
Ipil-ipil	20.260
Carabao grass	11.948
Banaba	7.532
Binunga	6.494
Anabiong	6.494
Hauili	5.584
Dilang butiki	5.584
Amamali	4.675
Kakawate	4.675
Bangkal	4.675
Canarium	3.766
Kalios	3.766
Sablot	3.766
Tanglin	3.766
Binayuyu	3.766

- **Invasive species**

There are at least five (5) species recorded in the area that are considered as invasive by Global Invasive Species Database (http://www.iucngisd.org/gisd/index.php). Invasive species are species which colonize an area that usually outcompete the natural growing vegetation. They tend to spread rapidly resulting to a potential damage to the environment, human economy or human health. Recorded invasive species were present in all established plots. Among the recorded invasive species, hagonoi (*Chromolaena odorata)* is the most distributed in the Project. The list of invasive species recorded in the Project area is presented in Table 2-14.

TABLE 2-14. LIST OF INVASIVE SPECIES RECORDED IN THE PROJECT AREA

Common Name	Scientific name	Plot
Hagonoi	*Chromolaena odorata*	1,2,3&4
Coronitas	*Lantana camara L.*	1,2&3
Ipi-ipil	*Leucaena leucocephala*	1&3
Cogon	*Imperata cylindrica*	2&3
Tanglin	*Adenanthera pavonina*	2

- **Floral Conservation status and Endemicity**

The conservation status of each species was assessed using DAO 2017-11 and the latest available IUCN red list. Among the 28 species recorded, only one species was identified as threatened. This species is antipolo (*Artocarpus blancoi*) which was categorized as vulnerable by IUCN. However, this species is not listed in the local list of threatened plant species or DAO 2017-11. Vulnerable species are those that are neither critically endangered nor endangered but is under threat from adverse factors throughout their range and is likely to move to the endangered category in the near future. It should be noted that Antipolo was observed in the indirect impact area of the project.

On the other hand, most of the species or 21 species out 28 recorded (75%) are indigenous or naturally growing in the area but are also found in other geographical location. Furthermore, exotic or introduced species composed of 6 species (21%) of the total species observed in the project area. Only Antipolo tree in Plot 1 was recorded as endemic to the Philippines or can only be found in the country.

- **Ecological Parameters**

Based on Fernando (1998) relative measure of diversity scale, the diversity of the Project area can be considered as very low (H' > 2.00). It indicates that the variation of species in the Project area is marginally diverse. The diversity indices of each transect is presented in **Figure 2-34**.

On the other hand, the evenness of the species recorded in the Project area is considered as high to very high (e'= 0.50 and above). It indicates that flora species is well distributed in the area. The species evenness of each established transect is presented in **Figure 2-35**.

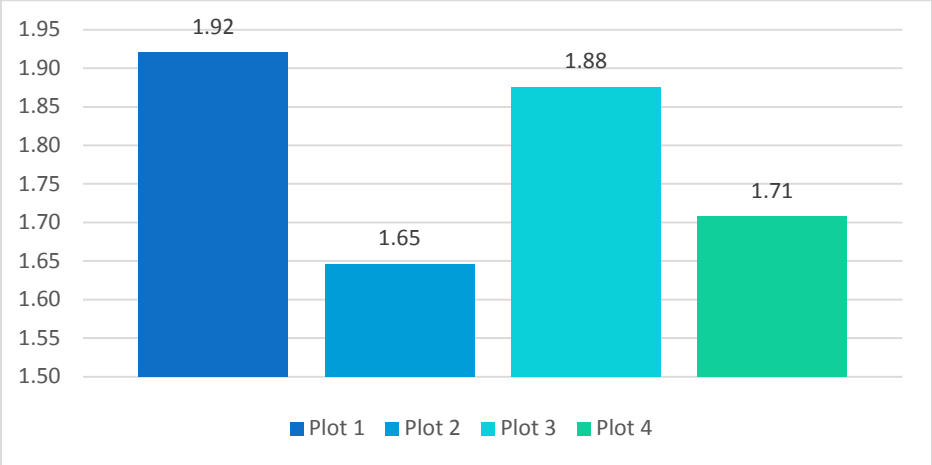


FIGURE 2-34. DIVERSITY INDICES OF ESTABLISHED TRANSECT

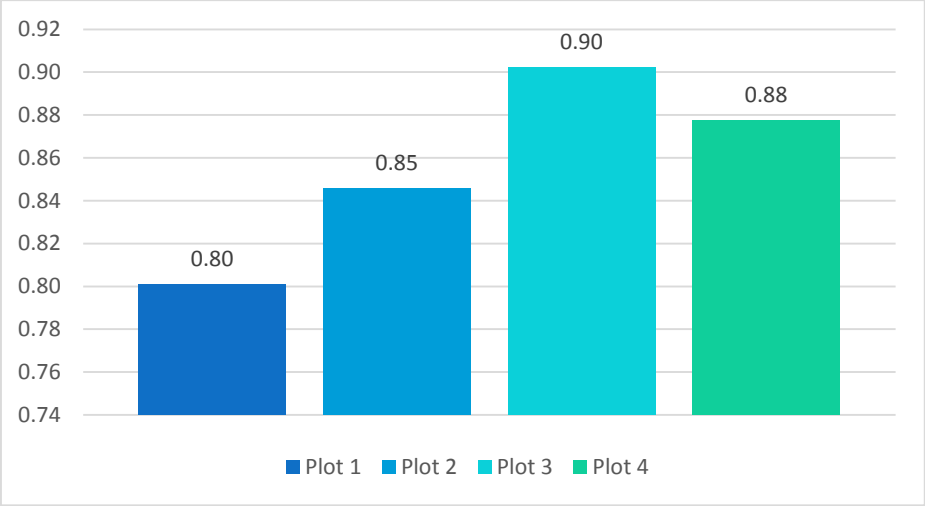


FIGURE 2-35. EVENNESS OF ESTABLISHED TRANSECT

2.1.4.1.4 Impact Assessment – Terrestrial Flora

The potential key impacts to terrestrial flora vis-à-vis project related activities are discussed in this section. Pre-construction phase activities will include planning, permitting, detailed design and engineering, and contracting. Therefore, these activities entail no potential impact that may significantly affect terrestrial flora. Summary of impacts and their corresponding mitigating measures are listed in Table 2-15.

Vegetation removal and loss of habitat

The project involves grading and shaping during the construction stage, hence damage to existing vegetation is inevitable. Most of the undergrowth plant species that will be affected during construction are from grass family of POACEA. This includes cogon and talahib grass. Other dominant species that will be affected by the construction are invasive species such as hagonoi, coronitas and ipil-ipil. Tree species that are abundant in the project area that can be affected by construction activities are kupang and raintree.

Majority of the abundant species in the undergrowth layer are considered as invasive by Global Invasive Species Database, hence removal of these species during construction stage may lower its population and reduce competition with indigenous species in the area. This will benefit naturally growing flora species in the project site. Trees that can be affected during grading and shaping can be minimized by incorporating the existing trees with the landscape design of the project. If cutting of trees cannot be avoided, all necessary permits (e.g. tree cutting permit) from DENR and other concerned government agencies should be secured prior to tree cutting. Conditions of the said permit should also be complied by the proponent.

Threat to existence and/or loss of important species

Among the 28 species recorded during the sampling activities, only antipolo (*Artocarpus blancoi*) falls under the “vulnerable” category of IUCN Red List of Threatened Species. This

species has also been found to be endemic in the country. However, antipolo was recorded outside the impact area (Plot 1), hence removal is unlikely. Loss of this species due to the project is also unlikely as it is well distributed in the country.

Even if no threatened and endemic species were recorded within the direct impact area, securing a tree cutting permit from DENR before any cutting of trees will still be implemented. All conditions of tree cutting permit (e.g. 1:100 replacement ratio) shall be followed the proponent.

Threat to abundance, frequency, and distribution of important species

No threatened or endemic flora species within the project area has been recorded during site visit. Antipolo (*Artocarpus blancoi*) was recorded outside the project area located at the riparian areas. The project will confine all activities within the project boundary to avoid the threat to abundance, frequency, and distribution of this important species.

In addition, several studies abroad also revealed that golf courses promote biodiversity as researchers found that golf courses have the same or higher biodiversity than its original landscape (*Terman 1997, Lindsay and Schofield 2003, and Colding, Lundberg, Lundberg, Andersson 2009 as cited by Guzman and Fernandez 2014*). One study also claims that golf courses represent a promising measure for restoring and enhancing biodiversity in ecologically simplified landscapes (*Colding and Folke 2009*).

TABLE 2-15. SUMMARY OF IMPACTS AND CORRESPONDING MITIGATION MEASURES

List of Key Impacts	Phase Occurrence				Discussion/Proposed Mitigation Activities
	Pre-Construction	Construction	Operation	Abandonment	
• Vegetation removal and loss of habitat		✔			- Most of the abundant species in the undergrowth layer are considered as invasive by Global Invasive Species Database, hence removal of these species during construction stage may lower the its population and reduce competition with indigenous species in the area. - Trees that can be affected during grading and shaping can be minimized by incorporating the existing trees with the landscape design of the project. - If cutting of trees cannot be avoided, all necessary permits (e.g. tree cutting permit) from DENR and other concern government agencies should be secured prior to tree cutting. Conditions of the said permit should

List of Key Impacts	Phase Occurrence				Discussion/Proposed Mitigation Activities
	Pre-Construction	Construction	Operation	Abandonment	
					also be complied by the proponent.
• Threat to existence and/ or loss of important local species • Threat to abundance, frequency and distribution of important species		✔			- No threatened or endemic flora species has been recorded within the project boundary. - Antipolo (*Artocarpus blancoi*) a vulnerable species according to IUCN is located outside the project boundary and well distributed in the country, hence loss of this species due to the project is unlikely. - Even if no threatened and endemic species were recorded within the direct impact area, securing a tree cutting permit from DENR before any cutting of trees will still be implemented. All conditions of tree cutting permit (e.g. 1:100 replacement ratio) shall be followed the proponent.

2.1.4.2 Terrestrial Fauna

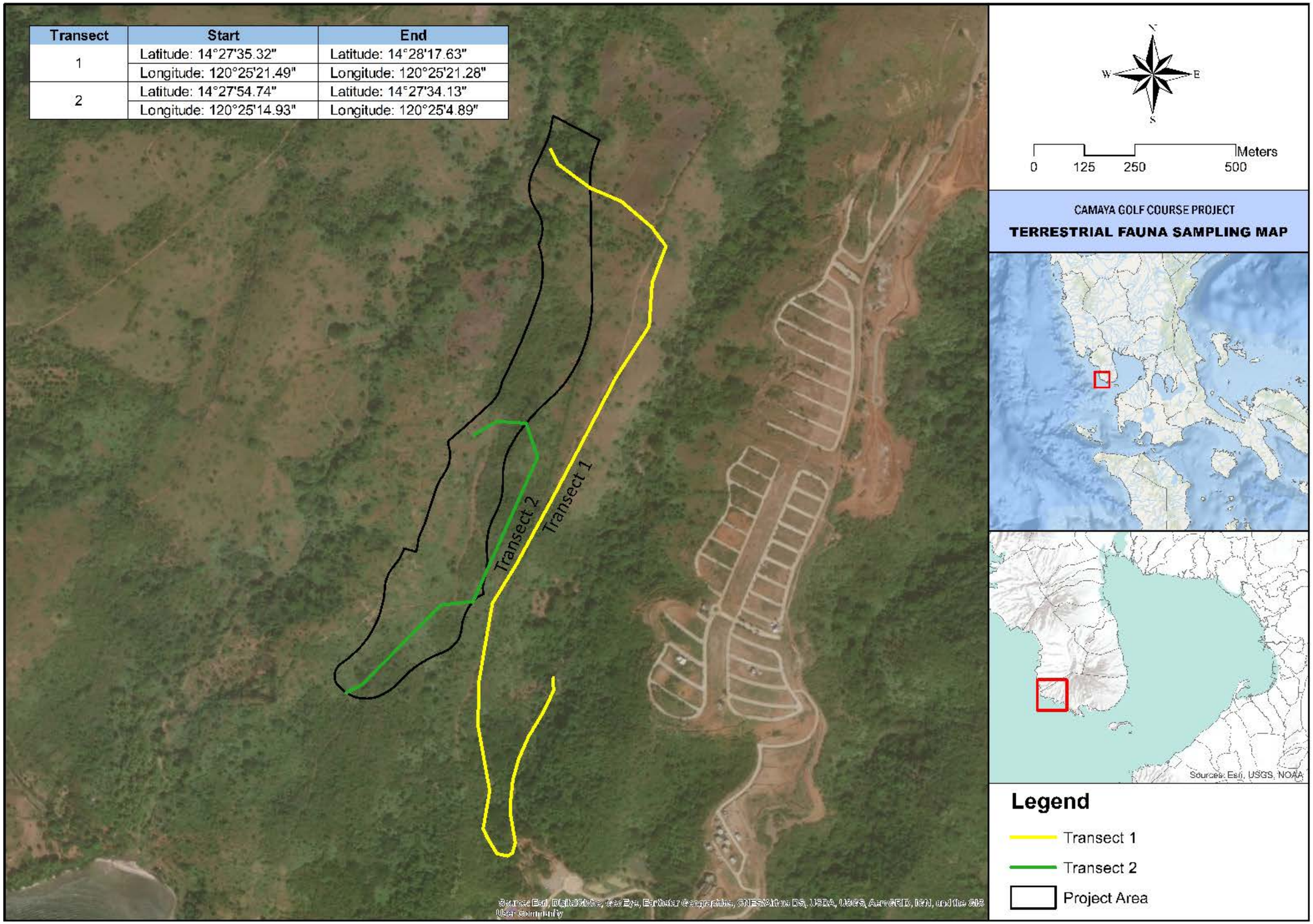
2.1.4.2.1 Methodology

Site Description and Sampling Transect

The project site is characterized by grasslands, wooded grasslands, and remnants of secondary growth forests along the gullies. This type of vegetation is the result of previous land use which is a grazing land for cattle. To assess the existing fauna assemblage of the project site, two transects were established (**Table 2-16**). **Figure 2-36** shows the location of the sampling transects in relation the proposed project.

TABLE 2-16. DESCRIPTION OF SAMPLING TRANSECTS

Transect	Starting point	Endpoint	Description	Photos
1	14°25'32.32" N 120°25'21.49" E	14°28'17.63" N 120°25'21.28" E	This is the direct impact area characterized by grasslands and wooded grasslands.	
2	14°27'54.74" N 120°25'14.93" E	14°27'34.13" N 120°25'4.89" E	This is an indirect impact area characterized by grasslands, wooded grasslands and remnants of secondary growth forests.	



Transect	Start	End
1	Latitude: 14°27'35.32"	Latitude: 14°28'17.63"
	Longitude: 120°25'21.49"	Longitude: 120°25'21.28"
2	Latitude: 14°27'54.74"	Latitude: 14°27'34.13"
	Longitude: 120°25'14.93"	Longitude: 120°25'4.89"

FIGURE 2-36. LOCATION OF SAMPLING TRANSECTS

Sampling Method

Transect line survey was employed to characterize the bird assemblage in the direct and indirect impact areas of the project site on 19 January 2019. An observer walked along the established transects at a pace of 250 meters in every 15 minutes from 6AM to 9AM and 3PM to 5PM. All birds seen and heard were identified up to the lowest possible taxa, counted and recorded. Other fauna groups if there were any were also listed during the transect walks through opportunistic observation. Interview with locals was also conducted to supplement the transect line and opportunistic observation survey.

2.1.4.2.2 Results/Baseline

Species Composition

Fourteen (14) fauna species represented by 64 individuals were recorded during the fauna assessment conducted within and adjacent the project site. It is composed of 12 birds observed on site and two reptiles recorded through interview with locals. Of the 14 species recorded, 11 are resident species while there is only one species for each of the endemic, migrant and introduced species (**Figure 2-37**). Resident species are indigenous species that reproduce in the Philippines but can also be found in other countries. The abundance of resident species may indicate the grassland habitat and disturbed conditions on site as an effect of the previous land use of the area as grazing land for cattle. Resident species are common and widespread as they are very adapted in occupying a wide range of habitats and are more tolerant to disturbances than endemic species. An endemic species, the marbled water monitor (*Varanus marmoratus*), was still recorded on site despite the project site being a disturbed habitat. This is due to the tolerance of the marbled water monitor to disturbed habitats. The record of a migrant species, the grey wagtail (*Motacilla cinerea*) is expected as the sampling falls within the migration period. While the introduced species observed, Eurasian tree sparrow (*Passer montanus*), is the most common introduced species in the Philippines.

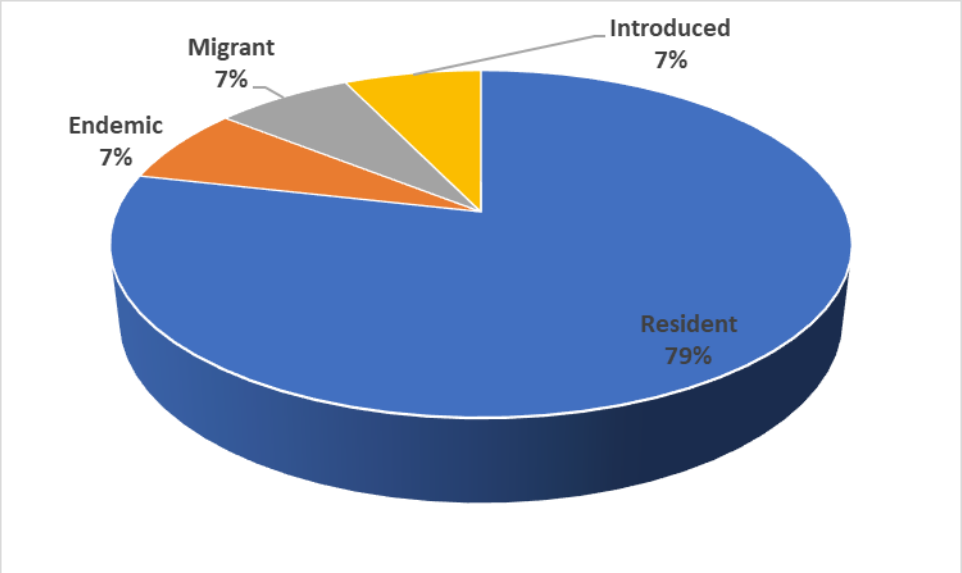


FIGURE 2-37. DISTRIBUTION OF FAUNA SPECIES RECORDED WITHIN THE PROJECT SITE DURING THE FAUNA ASSESSMENT

Birds recorded have a Shannon diversity index of 2.11 which indicates low diversity based on the biodiversity scale developed by Fernando (1998). This was expected as the project is a disturbed early successional habitat not able to provide a wide range of niche that various fauna species could occupy. On the other hand, evenness of birds recorded was very high with an index of 0.85 and dominance index was low with an index value of (0.16). These values may indicate that the populations are likely to be equally distributed across species. Further, it could mean that there is no species dominating other species.

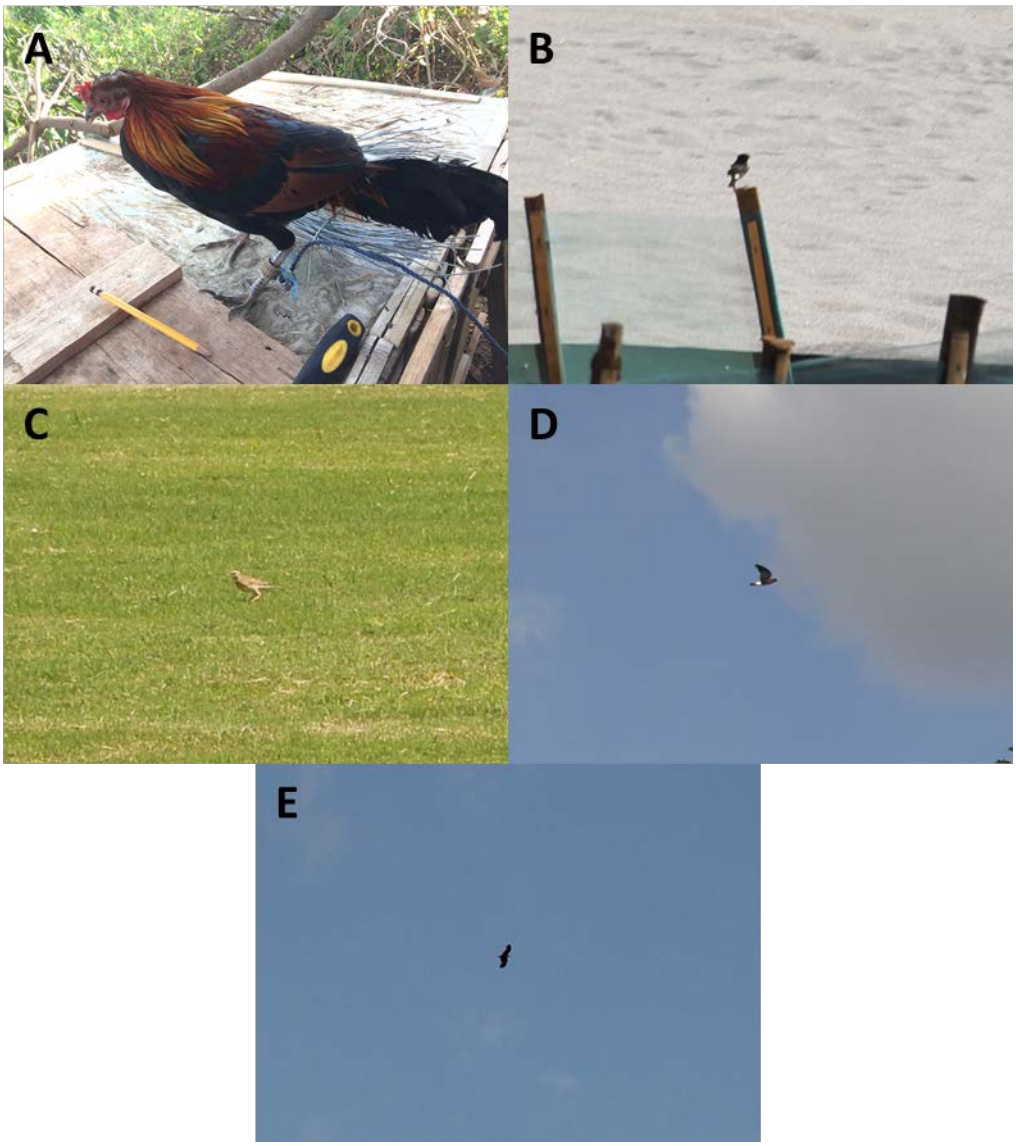


FIGURE 2-38. SOME OF THE FAUNA SPECIES RECORDED DURING THE SURVEY.
A - red junglefowl (*Gallus gallus*), B – pied bushchat (*Saxicola caprata*), C – Richard's pipit (*Anthus richardi*), D – white-breasted wood swallow (*Artamus leucoryn*), E – brahminy kite (*Haliastur indus*)

Noteworthy Species

Noteworthy species are ecologically important species which usually include sensitive species, threatened species, indicator/keystone species, and endemic species that are of conservation importance. There were three noteworthy species recorded to occur within and adjacent the project site. These are the brahminy kite (*Haliastur indus*), marbled water monitor (*Varanus marmoratus*) and reticulated python which are categorised as

Endangered, Vulnerable and Other Threatened Species under the DAO 2004-15, respectively. All these species were listed in Appendix II of the CITES (2018). Threats affecting the population of these species include illegal pet trade, overhunting, and habitat disturbance and degradation.

2.1.4.2.3 Impact Assessment - Fauna

Vegetation Removal and Loss of Habitat

Vegetation removal through undergrowth clearing is inevitable in order to give way for the proposed project but this impact will be localised. All plants in the undergrowth will be stripped off from the land and replaced with the preferred grass cover. Ground features such as decaying logs, stumps, rocks, and burrows, which could serve as microhabitat of fauna species will also be cleared. To mitigate this impact to the existing fauna assemblage, delineation of areas to be cleared should done prior to clearing to limit unnecessary disturbance. Project-related disturbances should be confined within the project boundaries. Clearing and disturbance of potential microhabitats of fauna species should be done properly. Microhabitats with young individuals and or slow-moving fauna species should be relocated in suitable habitats that will not be affected by the project.

Threat to Existence and/or Loss of Local Important Species

There were only three threatened species recorded to occur on site during the survey and these are very vagile species. They can easily disperse and seek refuge to the suitable habitats surrounding the project site especially during the construction phase of the project. With the implementation of a no hunting policy for all personnel working on site, threat to existence and/or loss of local important species by the project will be unlikely.

Threat to Abundance, Frequency and Distribution of Important Species

During the construction phase of the project, the abundance, frequency and distribution of the three important species observed on site will likely be affected. Particularly for the marbled water monitor (*Varanus marmoratus*) and the reticulated python (*Malayopython reticulatus*), it is expected that individuals of these elusive species will flee from the construction areas and seek refuge to nearby habitats such as the gullies with remnant secondary growth forests while construction activities are ongoing. However, these species are likely to return and access the project area once construction is completed. It is recommended that during the construction phase of the project, any form of hunting will be prohibited to all personnel working on site and allow all wildlife to flee to suitable habitats in case these are spotted. As much as possible, any injured and/or less mobile wildlife seen on site should be rescued and relocated in suitable habitats.

Hindrance to Wildlife Access

The proposed project will not hinder wildlife access as there will be no barrier or any obstruction that will be built on site. Naturally grown trees will be kept as part of the project's landscape. Wildlife can still pass through the project and/or divert their passage along the adjacent areas with natural habitats.

2.2 Water

2.2.1 Hydrology / Hydrogeology

2.2.1.1 Drainage Morphology

A coastal town with 42 kilometers of shoreline, Mariveles has the longest shoreline in the whole of Bataan. There are three major rivers in Mariveles, two of these are located in Mariveles town proper; the Buloc and Santol Rivers. The other one is the Paniquian River which is the source of water of the Freeport of Bataan. There are a total of 25 rivers (including its tributaries) in the municipality where 15 are draining directly in Manila Bay and 10 in the West Philippine Sea.

There are two rivers adjacent to the Camaya Golf Course - Basay and Tilin Rivers. Tilin River converge with Wain River and flows south going to Wain Bay facing the West Philippine Sea. In the same way, Basay River flows south going directly to Basay Bay facing West Philippine Sea. Both river watershed areas are relatively small.

Figure 2-39 shows that the project site, that is located in a ridge between the two rivers, drains directly to the two rivers.

2.2.1.2 Water Resources

Surface Water

There are two rivers adjacent the proposed Camaya Golf - Basay River and Tilin River. Tilin River converge with Wain River and flows south going to Wain Bay while Basay flows south going directly to Basay Bay. Basay river is an intermittent stream that is dominantly dry during el Niño season. While Tilin River is a stream that has flowing water all throughout the year. Tilin River is northeast of Wain Bay and west of Nagbiga Bay.

Springs

There are plenty of springs near the adjacent rivers (Basay and Tilin). The locations of these springs are not within the confines of the golf course development, but are within the properties also owned by the same property owner. The springs flow perennially and are of the contact-type where they occur at the geologic contact of pyroclastic and volcanic rocks. Recharge to these springs is through direct rainfall infiltration and intra-basin recharge though fractures.

One of the springs flows at about 6 liters per second (lps) and is located about upstream of the proposed site and another spring near the proposed clubhouse and it will be utilized as water source of the proposed project. A concrete box will be constructed to confine the spring water and control valves to direct the pumps that will lift water flow to the golf course.

Wells

There are no existing or proposed deep wells within project site.

2.2.1.3 Impact Assessment – Hydrology

Change in drainage morphology / Depletion of water resources

The project is not expected to induce flooding nor reduce stream volumetric flow as the project will implement systematic and effective irrigation system critical to its operation. The irrigation system will be able to direct and store runoff water from rain that will be used by the daily water requirement of the golf course operation.

Domestic water for the club house will be supplied by the springs relatively adjacent to the site. No groundwater extraction through deep well is proposed or foreseen.

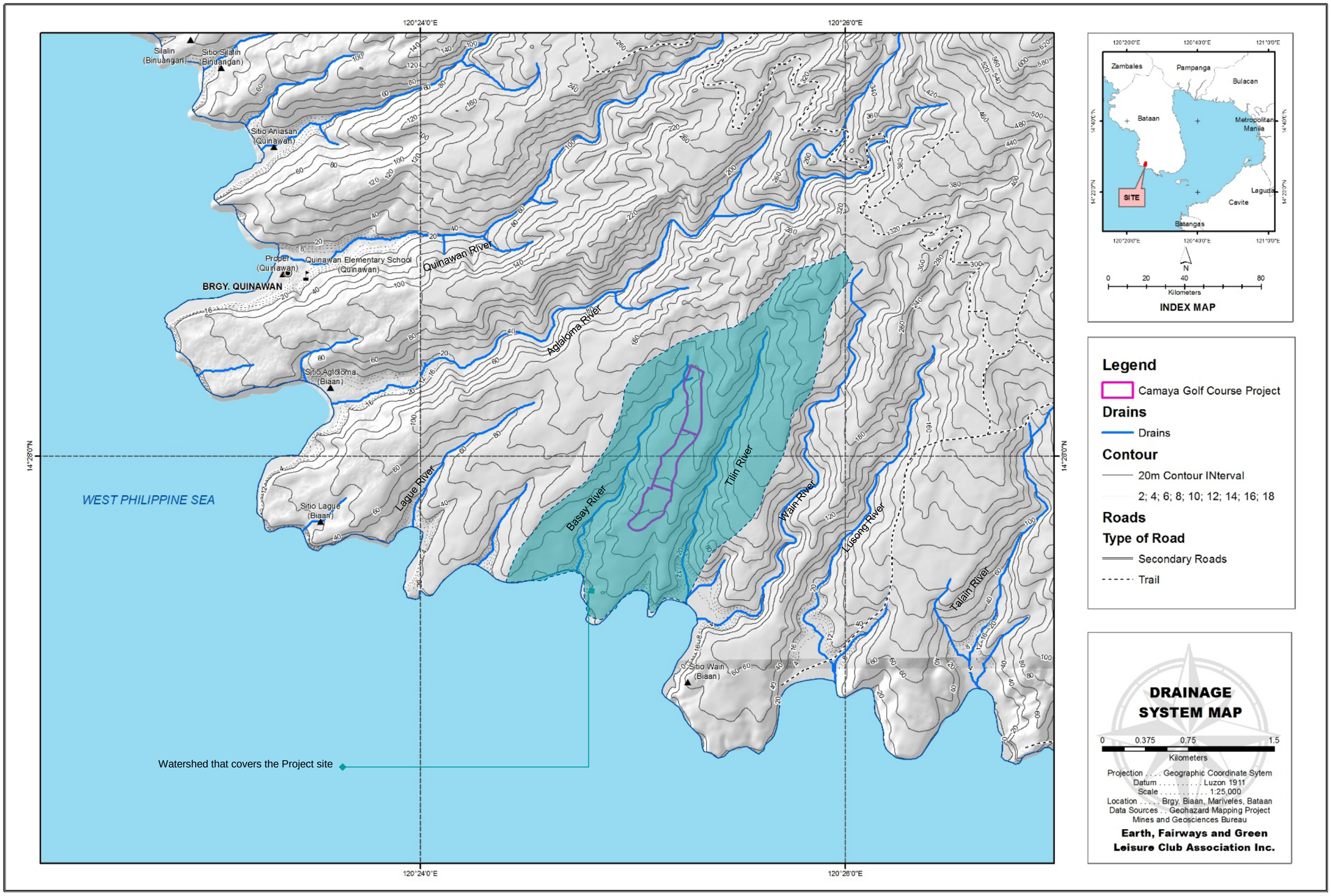


FIGURE 2-39. WATERSHED MAP SHOWING THE PROJECT SITE

2.2.2 Water Quality

This section presents the results of the water quality baseline study conducted on January 19, 2019. The NAMRIA topographic map was used for initially identifying the possible locations of water sampling stations. The assessment of water quality focused on the freshwater bodies within the project area.

2.2.2.1 Methodology

Four (4) surface water samples were taken from strategically located sampling stations within and adjacent to the project area. Parameters tested were: Arsenic (As), Mercury (Hg), Fecal Coliform, pH, Dissolved Oxygen (DO), Biological Oxygen Demand (BDO), Total Dissolved Solids (TDS), Surfactants, Total Suspended Solids (TSS), Oil and Grease, Ammonia and Nitrate. All water samples were brought to DENR-accredited laboratory – CRL Environmental Corporation - for analysis.

The sampling station map of water quality is presented in **Figure 2-40**. Photo documentation of water sampling is presented in **Figure 2-41**.

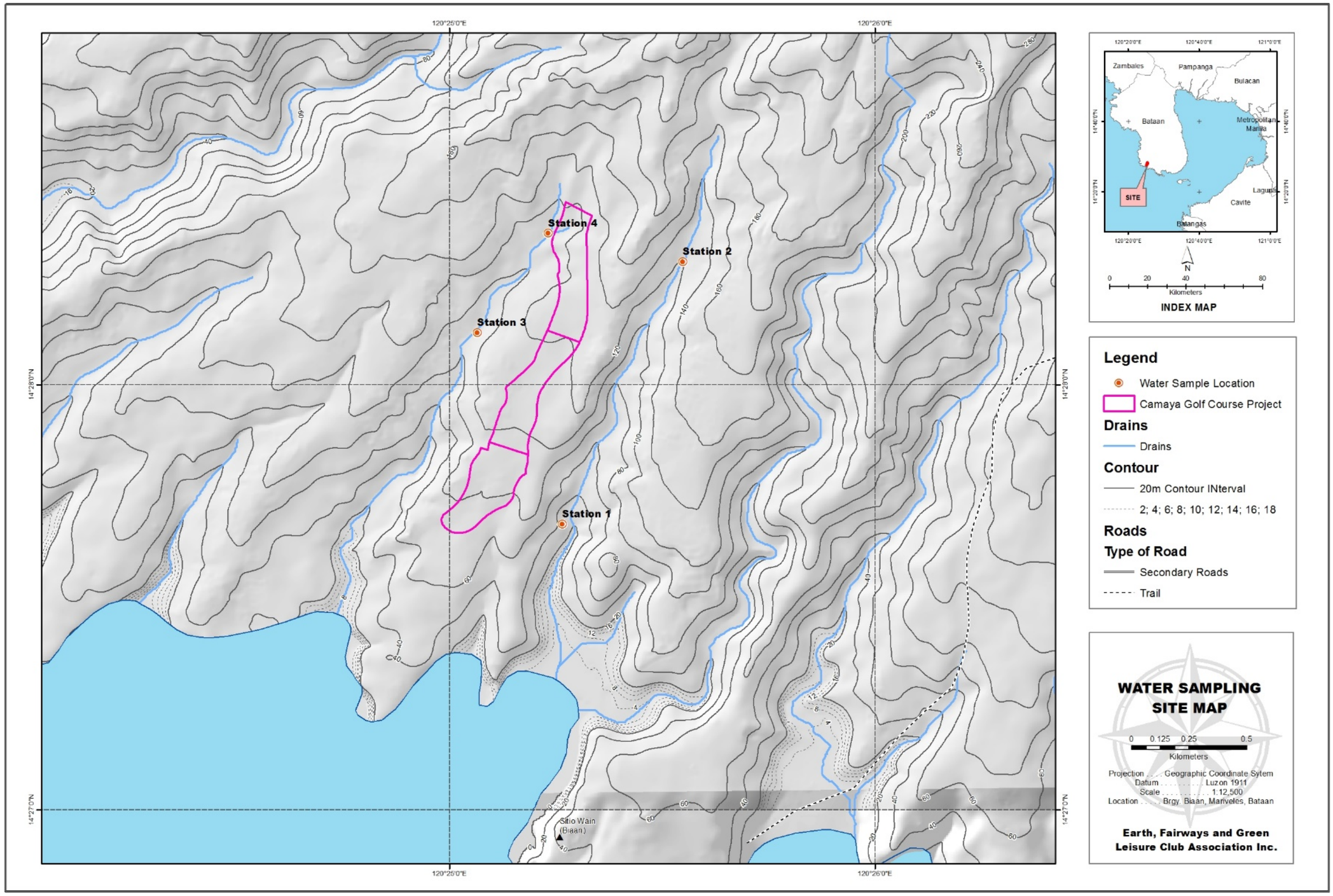


FIGURE 2-40. WATER SAMPLING MAP

Photo 1. Water Sampling at Station 1

Photo 2. Water Sampling at Station 2

Photo 3. Water Sampling at Station 3

Photo 4. Water Sampling at Station 4

FIGURE 2-41. PHOTO DOCUMENTATION DURING WATER SAMPLING

The guidelines stipulated in DENR Administrative Order No. 2016-08 – Water Quality Guidelines and General Effluent Standards of 2016 were used in the assessment of the current status of surface water quality in the study area.

2.2.2.2 Results

Based on DENR Administrative Order No. 2016-08, the freshwater within the project area can be classified to Class B or Recreational Water Class I intended for primary contact recreation such as swimming and bathing, and other recreational purposes.

The results of water quality analysis as compared to DAO No. 2016-08 shows that almost all parameters, with the exemption of fecal coliform, are within the standards set by the DENR.

Fecal coliform counts in Stations 3 and 4 exceeded the standard level of 100MPN/100mL having results of 170MPN/100mL and 920 MPN/100mL, respectively. These results can be attributed to the presence of cattle farm adjacent to the project site. The project site and adjacent sites was used to be utilized as a cattle farm due to its grassland environment. Basay River, where water quality sampling station 4 is located, is one of the sources of water of the cattle. Manures from livestocks may have contributed to the increase in fecal coliform counts of the river system.

Results of water quality analysis as compared to DAO 2016-08 standards are presented in **Table 2-17**. Scanned copy of the water quality laboratory results from CRL laboratory is presented in **Annex F**.

Among the parameters analyzed, Fecal Coliforms, Biological Oxygen Demand, Surfactants, Total Suspended Solids, Oil & Grease, Ammonia and Boron are not within the minimum parameters for Class B Freshwater Classification.

TABLE 2-17. RESULTS OF WATER QUALITY SAMPLING

Test Description	Units	Test Methods	Results				DAO 2016-08: Class B
			STN 1 14°27'35" N 120°25'21" E	**STN 2** 14°28'12" N 120°25'38" E	**STN 3** 14°28'2" N 120°25'9" E	**STN 4** 14°28'16" N 120°25'19" E	
Fecal Coliforms	MPN/100mL	Multiple Tube Fermentation Technique	49	170	920	No data	100
pH	-	Electrometric Method	7.1	7.0	7.2	6.8	6.5-8.5
Dissolved Oxygen	mg/L	Wrinkler/Titrimetric	9	9	10	20	5
Biological Oxygen Demand	mg/L	Azide Verification Winkler (SM 52108)	3	1	No data	1	5
Total Dissolved Solids	mg/L	Gravimetry (SM2540 C)	60	123	51	61	
Surfactants	mg/L	Colometry - Chloroform Extraction	<0.02	<0.02	<0.02	<0.02	0.3
Total Suspended Solids	mg/L	Gravimetry (SM2540 D)	2.5	3.5	3.0	3.5	65
Oil & Grease	mg/L	Gravimetry (n-Hexane Extraction)	0.68	0.75	0.56	0.90	1
Ammonia	mg/L	Phenate Method (SM4500-NH3 F)	<0.003	<0.003	<0.003	<0.003	0.05
Boron	mg/L	Curcumin Method	<0.1	0.1	<0.1	<0.1	0.5
Nitrate	mg/L	Colorimetry - Brucine	0.2	0.1	0.2	0.2	
Total Phosphorus	mg/L	Ascorbic Add	0.07	0.05	0.07	0.02	
Metals							
Arsenic	mg/L	ICP - OES	< 0.008	< 0.008	< 0.008	< 0.008	0.01
Mercury	mg/L	Manual Cold Vapor AAS	< 0.0002	< 0.0002	< 0.0002	< 0.0002	0.001

2.2.2.3 Impact Assessment – Water Quality

Degradation of Groundwater/Surface Water Quality

One of the environmental concerns for golf course projects is the large inputs of fertilizers, pesticides, fungicides, and other chemicals that are required to maintain vigorous and attractive greens that has potential to contaminate both ground and surface waters.

Excessive application of fertilizers would result to leaching of nutrients to both surface and groundwater in the form of nitrates and phosphates. Excess nitrogen and phosphorus in streams can cause accelerated plant growth and algae blooms which the cause rapid oxygen depletion or eutrophication in surface water. Generally, phosphorous is the limiting nutrient in freshwater aquatic system. That is, if all phosphorous is used, plant growth will cease, no matter how much nitrogen is available. The natural background levels of total phosphorous are generally less than 0.03 ppm. The natural levels of phosphate usually range from 0.005 to 0.05 ppm. Phosphate level of more than 0.05, particularly in the range of 0.08 to 0.10 ppm, may trigger periodic blooms and may further lead to long-term eutrophication if not properly mitigated.

The surge in plant growth can increase turbidity and hence light attenuation in water and also exacerbates the deoxygenation of affected areas. It is thought that anoxic conditions may lead to the release of phosphate from bottom sediments and hence allow the eutrophication to become self-perpetuating, regardless of future inputs into these water bodies (*Morris and Therivel, 2000*).

High nitrate levels in drinking water can cause methemoglobinemia or blue baby syndrome, a condition especially found in infants. Pesticides are known to cause various acute and long-term negative health effects on humans. The Philippine National Standard for Drinking Water sets the Standard values for Nitrate as NO_{3-} and Nitrate as NO_{2-} to a maximum level of 50mg/L and 3mg/L, respectively.

To mitigate this impact a schedule of applications of fertilizers and herbicide will be prepared for a whole year operation. The schedule will also indicate the volume and frequency of application. This will help the maintenance personnel to follow the specific schedule of application, which will avoid excess application of chemicals. A Project Agronomist will be employed on a full-time basis by the company in order to ensure that the projects fertilizers and pesticides management plan are properly carried-out.

2.2.3 Freshwater Ecology

During the fieldwork activity, no significant fishing activity was observed at Basay and Tilin River. This may be likely due to the characteristic of the river where water flow is intermittent in the case of Basay River and relatively minimal water flow in Tilin River compared to adjacent rivers such as Lusong River to the east.

2.2.3.1 Plankton Communities

Secondary data was used to identify baseline information of the freshwater ecology of Basay and Tilin Rivers. Based on the Environmental Impact Statement report of Mariveles Economic Zone where plankton sampling was conducted at three (3) stations adjacent to the project site. Plankton samples were collected by passing a total volume of 100 Liters of water through plankton net with a mesh size of 64µ and a mouth diameter of 0.3 meters.

Two replicate samples of zooplankton and phytoplankton were collected from each station. Samples were placed in properly- labelled plastic containers, immediately fixed in formalin (5% by volume) and brought to the laboratory for processing and further analysis. Plankton enumeration was done using the Sedgewick counting chamber and observed under a binocular microscope.

2.2.3.2 Phytoplankton

Phytoplankton taxa richness and mean densities were low at surveyed stations. Algal taxa were recorded where Six (6) taxa belong to Bacillariophyta (diatoms), four to Chlorophyta (green algae) and three to Dinophyta (dinoflagellates). The sampling arear was largely comprised of Bacillariophyta and Chlorophyta representing, 52.89% and 42.98%, respectively, of the total count. Mean algal densities at surveyed stations were highly variable. One of the sampling station had moderate algal density (20 cells/l), dominated by Spirogyra (11 cells/l) and Melosira (8 cells/l). Low mean phytoplankton densities were recorded at FW 3 (7 cells/l). Melosira also dominated at this station with a mean abundance of 4 cells/l. Stations FW 1 and FW 4 had low mean algal densities with values of 1 cell/l and 3 cells/l, respectively.

Most of the phytoplankton taxa recorded have wide distribution and are generally common in shallow waters (Bellinger and Sigee, 2010). Spirogyra for instance is a broad-spectrum organism occurring in a wide range of habitats usually attached to a substratum (Bellinger and Sigee, 2010). On the other hand, the presence of Melosira at some stations of Lusong River may indicate eutrophic condition as this taxon is known to frequent shallow, small eutrophic waters (Bellinger and Sigee, 2010). The dominance of certain species of phytoplankton may be generally attributed to nutrient levels favouring their proliferation.

2.2.3.3 Zooplankton

Only one zooplankton taxon, Testudinella belonging to Phylum Rotifera was recorded at sampling stations. This taxon was recorded in two stations with mean densities of 1 ind./l and 2 inds./l, while none was recorded at the some stations. The occurrence of Rotifera at surveyed stations may indicate the presence of bacteria, detritus and phytoplankton. Rotifera feed primarily on this prey/ food items (Suthers and Rissik, 2009), hence their dominance suggest the presence of these food items at the study site.

2.3 Air Quality

2.3.1 Meteorology / Climatology

This section presents the climatological normal and extreme values of rainfall, temperature, and prevailing winds recorded at PAGASA's synoptic stations in the vicinity of the Project, the potential impact of the Project in local climate and the impact of medium to long term climate change projects in the region. The projected greenhouse gas (GHG) emissions of the project and corresponding mitigation and/or sequestration measures were also discussed in this section.

2.3.1.1 Methodology

The climate at the proposed project site was described using the Climate Map of the Philippines while the meteorological condition at the Project site was described using the Sangley Point Synoptic Station, the nearest meteorological station of Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) to the proposed project site.

2.3.1.2 Baseline Conditions

2.3.1.2.1 Climate

Climate of Mariveles Bataan belongs to the Type I under the Modified Coronas Climate Classification used by Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) depending on the rainfall pattern as shown in **Figure 2-42**. It is characterized by two pronounced seasons: dry season from November to April and wet during the rest of the year. Maximum rain period is from June to September.

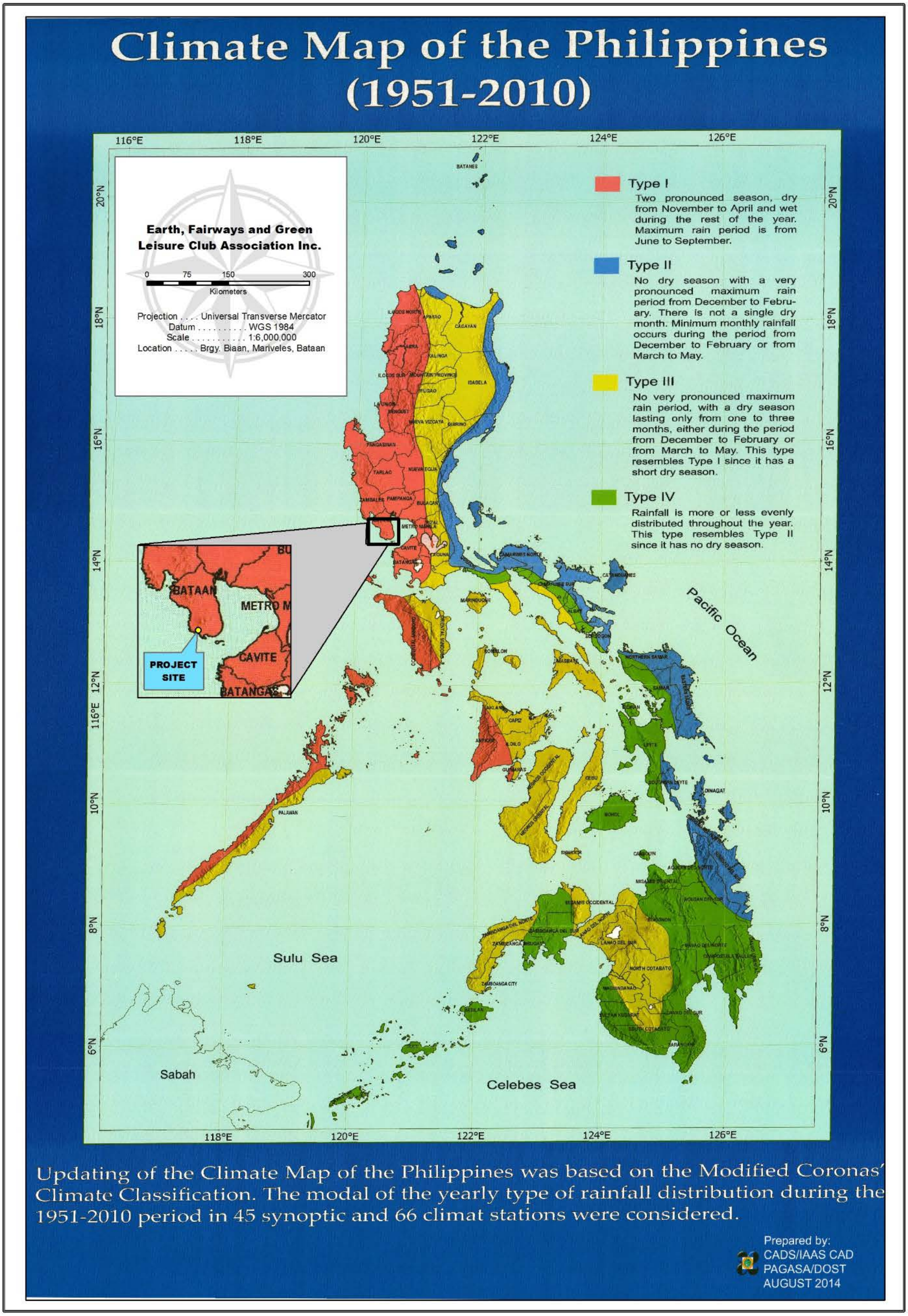
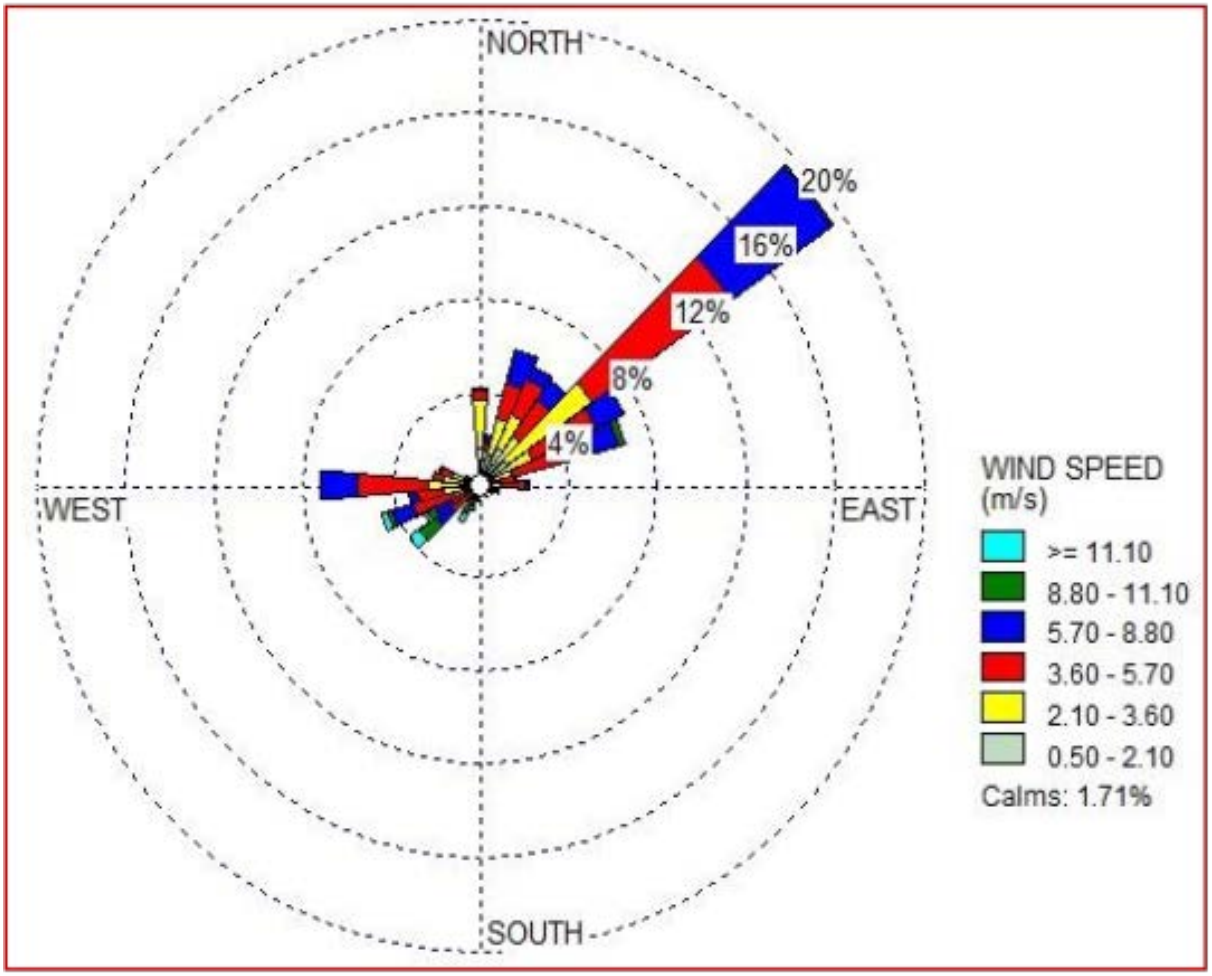


FIGURE 2-42. CLIMATE MAP OF THE PHILIPPINES

2.3.1.2.2 Wind Regime

Based on Sangley Point Synoptic Station the windrose plot from the station, as shown **Figure 2-43**, shows that winds prevailing from northeast comprises of about 19.5% followed by east-northeast comprises of about 6%, a significant event produces north-northeast and westerly comprises of about 12% over the site. Of all hourly wind direction with an average wind speed of 2.10 meter per seconds, few winds exceed 11 meter per seconds and winds less than 0.5 meter per seconds occur from all directions. Calm conditions were observed 1.71% of the time. Strongest winds come from southwest and south southwest occupying 1.7 % of the time.

The tropical condition can be attributed to the location of the project, which is between 14 to 15 degrees north of equator. The monsoonal condition, on the other hand, refers to two seasonal wind regimes, the northeasterly winds and the southwesterly winds. From November to May the wind blows on a northeasterly direction with an average wind velocity of 3.08 meters per seconds. From June to October the southwesterly winds prevail with an average wind velocity of 1.96 meters per second.



Source: Plotted by WRPLOT View Version 7.0.0 Lakes Environmental

FIGURE 2-43. WINDROSE FOR BATAAN FROM SANGLEY POINT SYNOPTIC STATION (*ADAPTED FROM MPCC EIS*)

2.3.1.2.3 Tropical Cyclone

Based on the 2011 Report on Climate Change in the Philippines by PAGASA, trends of tropical cyclone occurrence within the Philippine Area of Responsibility (PAR) show an average of 20 cyclones per year. Although there is still no indication of increase in the number of frequency, a slight increase in the number of tropical cyclones with maximum sustained winds greater than 150 kilometer per hour (kph) is observed. **Table 2-18** presents a list of recent tropical cyclones with maximum sustained winds above 150 kph.

TABLE 2-18. LIST OF TROPICAL CYCLONE WITH MAXIMUM SUSTAINED WIND OF ABOVE 150 KPH IN THE PHILIPPINES AREA OF RESPONSIBILITY

Local Name of Tropical Cyclone	Period	Maximum Sustained Winds (kph)
Reming (“Durian)	November 2006	193
Frank (“Fengshen”)	June 2008	165
Pablo (“Bopha”)	December 2012	185
Yolanda (“Haiyan)	November 8, 2013	235
Nina (Nock-ten)	December 25, 2016	175

Source: PAGASA-DOST/Climate Monitoring and Prediction Center
Note: (“”) International Name

2.3.1.2.4 Rainfall

PAGASA station in Sangely Point, Cavite recorded an annual rainfall amount of 2,078.4 millimeter (mm) representing a long term averages over a 30-year period. The rainy months of the area starts at June up until October. The Months of July to August have the greatest number of rainy days.

Based on the Report of PAGASA on Climate Change in the Philippines (February 2011), the projected seasonal rainfall change will generally show that there is reduction in rainfall in most parts of the country during the summer (March –April- May) season. However, rainfall increase is likely during the southwest monsoon (June-July-August) season until the transition (September October-November) season in most areas of Luzon and Visayas, and also, during the northeast monsoon (December-January-February) season, particularly, in provinces/areas characterized as Type I climate in 2020 and 2050 (**Figure 2-44**).

There are varied trends in the magnitude and direction of the rainfall changes, both in 2020 and 2050. What the projections clearly indicate are the likely increase in the performance of the southwest and the northeast monsoons in the provinces exposed to these climate controls when they prevail over the country. Moreover, the usually wet seasons become wetter with the usually dry seasons becoming also drier; and these could lead to more occurrences of floods and dry spells/droughts, respectively.

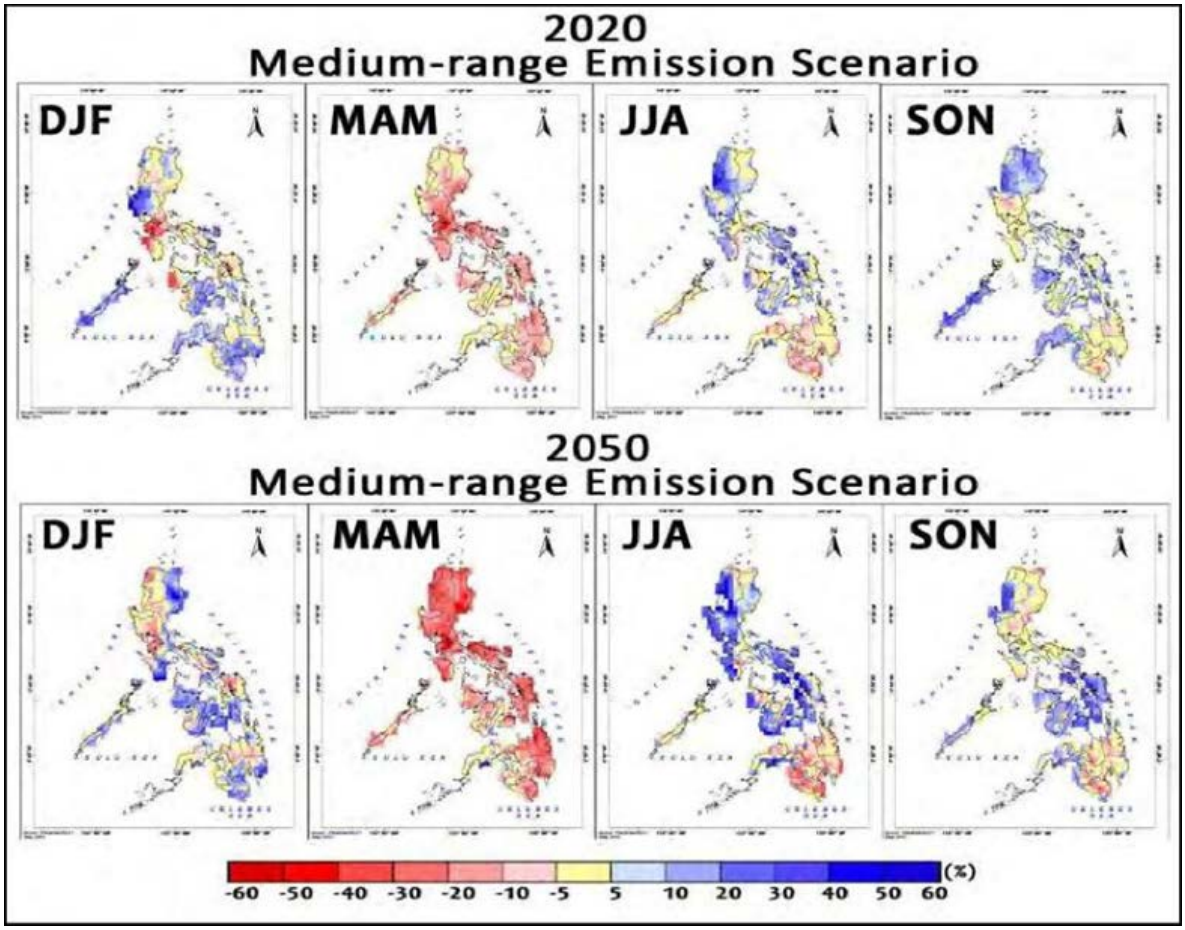


FIGURE 2-44. PROJECTED RAINFALL CHANGE (INCREASE/DECREASE) IN % IN 2020 AND 2050 IN THE PHILIPPINES.

Based on the trends in the extreme rainfall intensity of the Philippines (1951-2008 data from PAGASA), as shown in **Figure 2-45**, the intensity of rainfall in the area is increasing but statistically not significant. However, in the past five years, extreme rainfall events that caused severe flooding in the country have been recorded, as listed in **Table 2-19**.

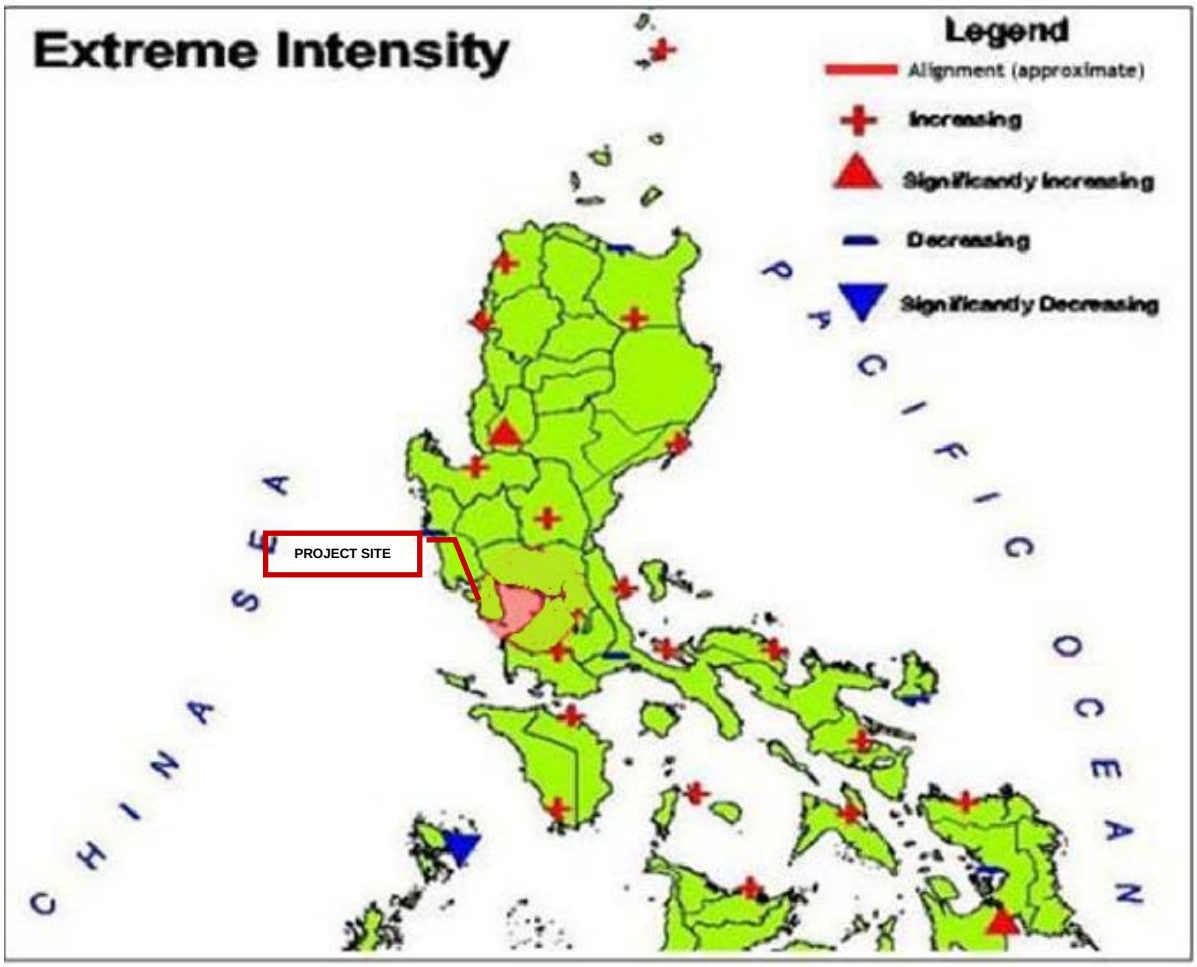


FIGURE 2-45. TRENDS IN THE EXTREME RAINFALL INTENSITY OF THE PHILIPPINES

Source: PAGASA-DOST/Climate Monitoring and Prediction Center

TABLE 2-19. LIST OF EXTREME RAINFALL EVENTS THAT CAUSE SEVERE FLOODING

Event	Period	Highest Measured Accumulated Rainfall
Ondoy ("Ketsana")	Sept. 24-27, 2009	556.1 mm of rain (4-day period)
Habagat 2012 (enhanced by Typhoon Haiku)	August 6-8, 2012	1,0007.4 mm of rain (3-day period)
Habagat 2013 (enhanced by Tropical Storm Maring)	August 17-21, 2013	1,120.2 mm of rain (5-day period)

Source: *www.rappler.com/newsbreak/39948-by-the-numbers-ondoy-habagat-2012-2013*

2.3.1.2.5 Relative Humidity

The mean annual relative humidity recorded at the PAGASA Sangley Point Synoptic Station is 78% with seasonal variation (i.e. mean monthly relative humidity range of 71% to 83% based from 1981- 2010 meteorological data). The months of July to November are the most humid months of the year. Factors affecting humidity are changes in temperature and atmospheric circulation. The air is said to be saturated when it contains the maximum amount of water vapor possible at a given temperature. When the temperature of the air falls

below the dew point, some of the water vapor contained in the air condenses, clouds form, and precipitation can result in the form of rain.

2.3.1.2.6 Temperature

The annual mean average temperature is 28.4°C with January being the coldest month having an average temperature of 26.6°C while the month of April and May are the warmest with an average temperature of 30.1°C.

The highest and lowest temperatures occur in the months of April to May and December to February, respectively. The mean maximum and mean minimum temperatures ranges from 30–30.8°C and 23.3–23.6°C, respectively.

The Climatological Normals recorded at Sangley Point Synoptic Station are presented in **Table 2-20**.

TABLE 2-20. CLIMATOLOGICAL NORMALS RECORDED AT SANGLEY POINT SYNOPTIC STATION (1981-2010)

Month	Temperature (°C)							No. of Days with	
	Max	Min	Mean	Dry Bulb	Wet Bulb	Dew Point	RH (%)	Thunder	Lightning
January	30	23.3	26.6	26.8	23.9	22.8	79	0	0
February	30.8	23.6	27.2	27.4	24.1	22.9	76	0	0
March	32.7	24.6	28.6	28.7	25	23.7	74	1	1
April	34.4	25.9	30.1	30.3	26	24.6	71	2	5
May	34.1	26.1	30.1	30.3	26.5	25.3	74	11	16
June	32.8	25.8	29.3	29.5	26.4	25.4	78	14	18
July	31.7	25.3	28.5	28.6	26	25.1	81	16	17
August	31.3	25.2	28.3	28.2	25.8	25	83	13	14
September	31.4	25.2	28.3	28.4	25.9	25.1	82	15	16
October	31.4	25.3	28.4	28.4	25.8	24.9	81	9	14
November	31.1	25	28.1	28.1	25.3	24.3	80	4	5
December	30	23.9	27	27.1	24.3	23.3	79	1	1
Annual	**31.8**	**24.9**	**28.4**	**28.5**	**25.4**	**24.4**	**78**	**86**	**107**

Source: PAGASA Sangley Point Synoptic Station

Climatological extreme values from the 42-year monthly and annual summaries of temperature, rainfall, and wind speed are presented in **Table 2-21**. The recorded annual extreme high and low temperatures are 38.5°C and 18°C, respectively. The amount of extreme greatest rainfall is 475.4mm while the annual average extreme highest wind is 54m/s.

TABLE 2-21. CLIMATOLOGICAL EXTREMES RECORDED AT SANGLEY POINT SYNOPTIC STATION (AS OF 2018)

MONTH	TEMPERATURE (°C)				GREATEST DAILY RAINFALL (mm)		STRONGEST WINDS (mps)			SEA LEVEL PRESSURES (mbs)			
	HIGH	DATE	LOW	DATE	AMOUNT	DATE	SPD	DIR	DATE	HIGH	DATE	LOW	DATE
JAN	34.8	01-25-1999	19.0	01-03-1982	94.0	01-12-1977	17	ESE	01-19-2010	1023.4	01-16-1999	1001.9	01-31-2001
FEB	35.2	02-28-1998	18.0	02-01-1982	45.8	02-06-2016	15	ESE	02-27-1992	1020.3	02-14-2017	1005.4	02-21-2001
MAR	36.6	03-29-1981	19.1	03-25-1980	102.2	03-21-2018	24	ESE	03-23-1998	1020.5	03-05-2005	1003.9	03-06-1999
APR	37.8	04-07-1983	21.5	04-03-2007	53.9	04-24-1975	16	ESE	04-05-1996	1017.5	04-14-1993	1002.0	04-30-1988
MAY	38.5	05-16-1987	22.0	05-15-1980	237.1	05-26-1997	27	SW	05-22-1976	1015.5	05-25-1983	993.4	05-22-1976
JUNE	38.4	06-04-1987	22.0	06-16-1981	172.4	06-27-1985	25	SE	06-08-2011	1014.3	06-08-1997	997.6	06-28-2004
JULY	36.3	07-25-2007	21.2	07-15-1982	231.4	07-20-2002	54	E	07-13-2010	1013.8	07-29-1983	986.1	07-15-2014
AUG	36.5	08-16-2009	22.0	08-02-1994	475.4	08-19-2013	30	W	08-18-1990	1014.5	08-13-2005	998.1	08-17-1990
SEP	35.6	09-02-1996	21.0	09-16-1979	275.4	09-22-2013	44	NNW	09-28-2006	1015.6	09-18-2005	984.3	09-28-2006
OCT	35.8	10-08-1996	21.0	10-24-1988	260.7	10-05-1986	45	NW	10-21-1994	1016.4	10-27-1993	990.3	10-21-1994
NOV	36.4	11-08-1978	21.5	11-26-1982	171.2	11-02-2000	49	NW	11-03-1995	1017.5	11-30-1989	977.0	11-03-1995
DEC	34.0	12-06-1998	20.0	12-24-1985	131.3	12-10-2006	22	NNW	12-05-1993	1019.1	12-31-1992	997.9	12-02-2004
ANNUAL	**38.5**	**05-16-1987**	**18.0**	**02-01-1982**	**475.4**	**08-19-2013**	**54**	**E**	**07-13-2010**	**1023.4**	**01-16-1999**	**977.0**	**11-03-1995**
Period of Record	**1974 - 2018**				**1974 - 2018**		**1974 - 2018**			**1974 - 2018**			

Source: PAGASA Sangley Point Synoptic Station

2.3.1.2.7 Change in the Local Micro-Climate

Temperature Change

The historic average annual ambient air temperature of Bataan is 28.4°C. The data indicate that there is little monthly or seasonal variation in the average temperatures. On a daily time-step, temperatures can vary by 5°C to 8°C on the average during a day, peaking above 30s and dropping to the low 20s overnight.

The climate change scenario for the Philippines as published by PAGASA in February 2011 indicates that the province of Bataan will experience an increase in temperature (**Table 2-22**).

TABLE 2-22. SEASONAL TEMPERATURE INCREASE (IN °C) IN 2020 AND 2050 UNDER MEDIUM RANGE EMISSION SCENARIO

Observed Baseline (1971-2000)				Change in 2020 (2006-2035)				Change in 2050 (2036-2065)			
DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
26.4	28.7	27.6	27.3	1.0	1.1	0.8	1.0	2.0	2.1	1.7	1.9

Source: Climate Change in the Philippines, 2011 PAGASA

It is projected that the average monthly temperature over the period of 2006–2035 will increase by 0.8°C to 1.1°C while temperatures for the period of 2036-2065 will increase by 1.7°C to 2.1°C. The annual average temperature covering the period of 2006-2035 will rise to 31.2°C while 2036-2065 will rise to 32.2°C. **Table 2-23** and **Figure 2-46** present the projected monthly average temperature with climate change and without climate change.

TABLE 2-23. PROJECTED AVERAGE TEMPERATURE

Month	Baseline (1971-2000)	2020 Projection (2006-2035)	2050 Projection (2036-2065)
DJF	26.4	27.4	28.4
MAM	28.7	29.8	30.8
JJA	27.6	28.4	29.3
SON	27.3	28.3	29.2

Source: PAGASA Sangley Point Synoptic Station, 1971-2000
Note: Calculated based on the PAGASA Climate Change in the Philippines, 2011

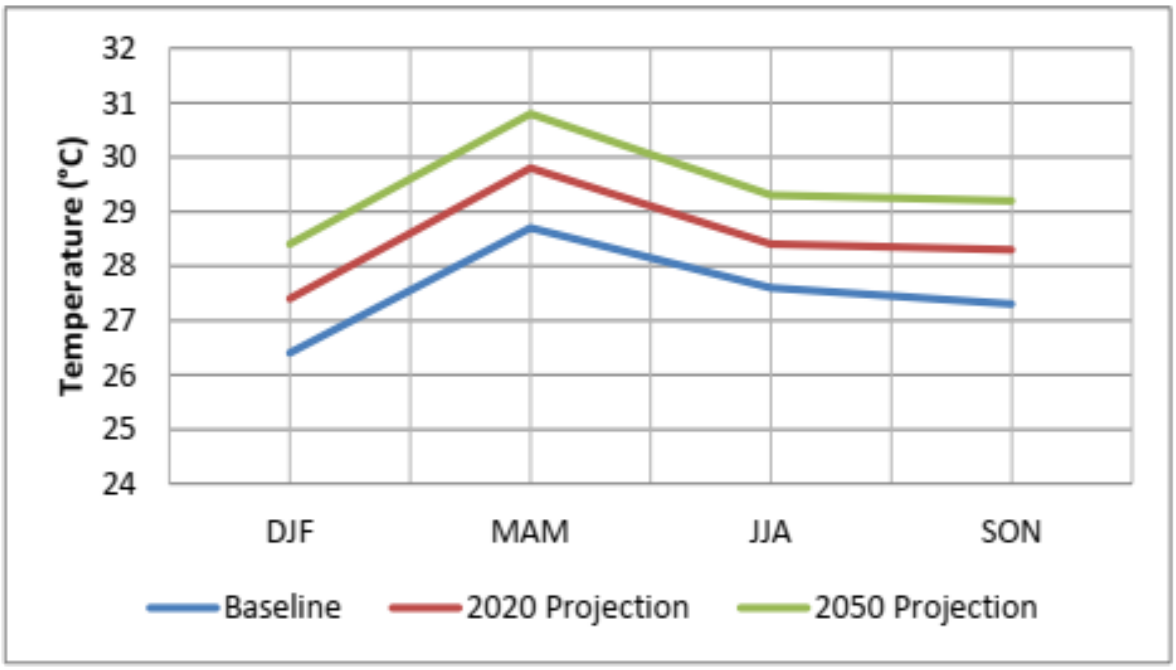


FIGURE 2-46. CHANGE IN MONTHLY AVERAGE TEMPERATURE FOR THE PERIOD OF 2006-2065

Rainfall Change

The historic average annual rainfall of Bataan is 2,078.4mm. Based from the climate change scenario for the Philippines as published by PAGASA in February 2011, the province of Bataan will have an increased and decreased rainfall in 2020 and 2050. It is projected that the average monthly rainfall over the period of 2006–2035 will increase by 2.78% to 9.4% and will decrease by 0.4% to 5.2%; while the rainfall for the period of 2036-2065 will increase by 1.5% to 29.1°C and will decrease by 8.1% to 8.2% (**Table 2-24**).

TABLE 2-24. SEASONAL RAINFALL CHANGE (IN %) IN 2020 AND 2050 UNDER MEDIUM RANGE EMISSION SCENARIO

Observed Baseline (1971-2000)				Change in 2020 (2006-2035)				Change in 2050 (2036-2065)			
DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
71.7	368.7	1326.2	872.6	2.7	-5.2	9.4	-0.4	-8.2	-8.1	29.1	1.5

Source: Climate Change in the Philippines, 2011 PAGASA

The annual average rainfall covering the period of 2006-2035 will rise to 500.2mm in August and will decrease to 8.9mm in March; while the rainfall for the period of 2036-2065 will rise to 590.2mm in August and will decrease to 8.6mm in March. **Table 2-25** and **Figure 2-47** present the projected the monthly average rainfall with climate change scenario for 2006-2035; and the monthly average rainfall with climate change scenario for 2036-2065.

TABLE 2-25. PROJECTED MONTHLY AVERAGE RAINFALL

Month	Baseline (1971-2000)	2020 Projection (2006-2035)	2050 Projection (2036-2065)
DJF	71.7	73.6	65.8
MAM	368.7	349.5	338.8
JJA	1326.2	1450.9	1712.1
SON	872.6	869.1	885.7

Source: PAGASA Sangley Point Synoptic Station, 1971-2000

Note: Calculated based on the PAGASA Climate Change in the Philippines, 2011

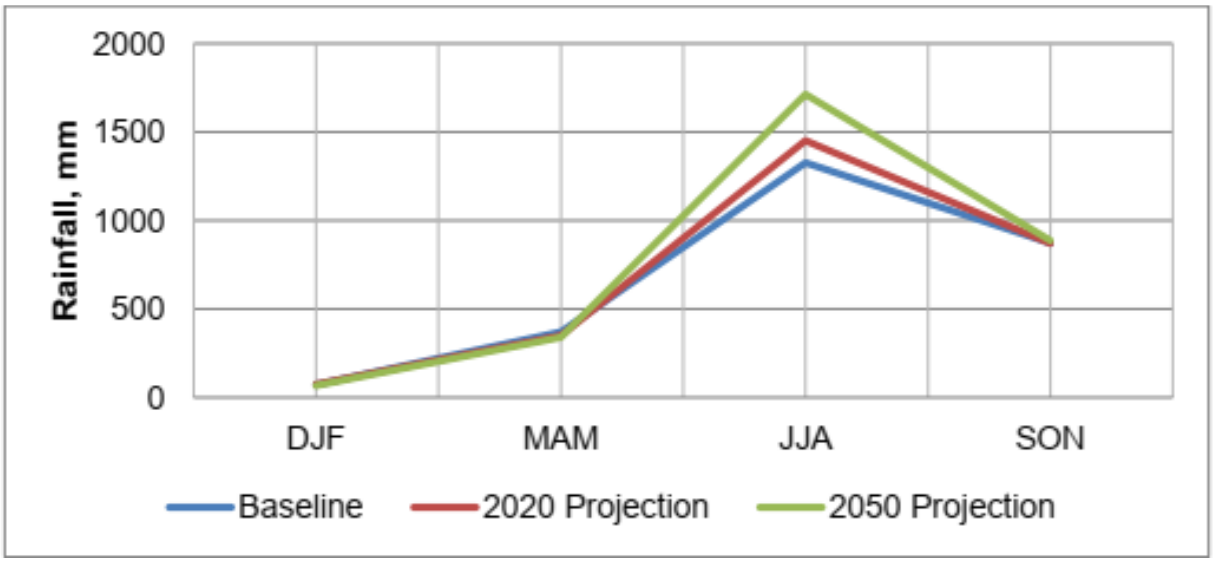


FIGURE 2-47. COMPUTED AVERAGE RAINFALL WITH AND WITHOUT CLIMATE CHANGE SCENARIOS

Frequency of Extreme Events

Based from the climate change scenario for the Philippines as published by PAGASA in February 2011, the province of Bataan will have 1,855 days with maximum temperature of >35°C during the 2006-2035 period and 3,108 days during the 2036-2050 period; 5,701 dry days during the 2006- 2035 period and 5,754 dry days during the 2036-2050 period; and 12 days with rainfall >200mm during the 2006-2035 period and 12 days during the 2036-2050 period, as presented in **Table 2-26**.

TABLE 2-26. FREQUENCY OF EXTREME EVENTS IN 2020 AND 2050 UNDER MEDIUM RANGE EMISSION SCENARIO

No. of Days w/ Tmax >35°C			No. of Dry Days			No. of Days w/ Rainfall >200mm		
OBS (1971-2000)	2020	2050	OBS	2020	2050	OBS	2020	2050
355	1855	3108	889	5701	5754	8	12	12

Note: Based from the Frequency of Extreme Events in 2020 and 2050 under Medium Range Emission Scenario in Pampanga, a nearby province of Bataan Source: Climate Change in the Philippines, 2011 PAGASA

2.3.2 Greenhouse Gas Emissions

Greenhouse gases (GHGs) are gaseous constituents of the atmosphere, either natural or anthropogenic (as a result of human activity), that absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. These gases surround the planet preventing the loss of heat into outer space. By trapping the heat, they contribute to the warming of the earth's

surface causing changes in weather condition, sea levels, and land use patterns, commonly referred to as “climate change” (IPCC, 2007).

As early as 1991, the Philippines have been proactive in responding to the impact of climate change, which include the reduction of GHG emissions in the atmosphere. As of 2000, the Philippine GHG emission is approximately 32,936.45 Gg of CO_2, 1,968.56 Gg of CH4 and 43.11 Gg of N2O as shown in the table below:

TABLE 2-27. PHILIPPINE GHG EMISSIONS IN Gg (2000)

Sector	CO2, Gg	CH4, Gg	N2O, Gg	*CO2 Emission, Gg
Energy	62,499.10	304.14	2.52	69,667.24
Industrial	8,604.74	0.24	-	8,609.78
Processes				
Agriculture	-	1,209.79	37.41	37,002.69
LUFC	(104,040.29)	(46.28)	(0.32)	(105,111.37)
Waste	-	500.67	3.50	11,599.07
Total	**(32,936.45)**	**1,968.56**	**43.11**	**21,767.41**

Note: CH4 GW Potential – 21; N2O GW Potential-310; * - CO2 + (CH4*21) + (N2O*310)

Majority of Greenhouse Gas (GHG) emissions from the golf course project are expected to be generated from its construction activities (fuel/electricity use for the operation of construction vehicles and equipment). The GHGs that are typically generated from fuel/electricity use for the operation of construction vehicles and equipment are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Out of these gases, the major gas emitted is CO_2. Methane and nitrous oxide emissions have a very low share in terms of emissions. Hence, this report only focused on CO_2 emissions.

2.3.2.1 Methodology

The CO_2 were calculated using emission factor-based estimation method. The methodology estimates the CO_2 emissions by multiplying a level of activity data (AD) by an emission factor (EF). Activity data is a quantified measure of activity resulting in emissions during a given period of time (e.g. data on fuel consumption (liters/km) and purchased electricity (kWh) while the emission factor is the average emission rate of a given GHG for a given source, relative to units of activity. The general equation is shown below. This is based on The Greenhouse Gas Protocol, A Corporate Accounting and Reporting Standard, Revised Edition, World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI), 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National GHG Inventories and 2014 IPCC Assessment Report.

Equation: GHG Emissions = AD x EF

2.3.2.2 Results

The sources of carbon dioxide emission in the project are the fuels used in the operation of heavy machinery and equipment such as trucks and backhoes during its construction. The table below presents the CO2 emission by source:

TABLE 2-28. ESTIMATED CO2 EMISSION BY SOURCES DURING CONSTRUCTION

Equipment	No. of Units	Fuel Type	Fuel Consumption (L/100 km) per Unit[A]	Assumed Distance Travelled (km/yr) per Unit	Fuel Consumption (L/yr) per Unit	Emission Factor (kg CO_2/L) per Unit[B]	Total Calculated CO_2 Emission (MT CO_2/yr)
Backhoe	6	Diesel	31.6	5,000	1,580	2.68	25
Dump truck	12	Diesel	31.6	5,000	1,580	2.68	51
Pay Loader	4	Diesel	31.6	5,000	1,580	2.68	17
Compactor	2	Diesel	31.6	5,000	1,580	2.68	8
Water Tanker	1	Diesel	31.6	5,000	1,580	2.68	4
Bulldozer	2	Diesel	31.6	5,000	1,580	2.68	8
Concrete Mixer	2	Diesel	31.6	5,000	1,580	2.68	8
Service vehicle	5	Diesel	31.6	5,000	1,580	2.68	21
Total Calculated CO_2 Emission (MT CO_2/yr)							**144**

Notes:

[A] Source: Reduction and Testing of Greenhouse Gas (GHG) Emissions from Heavy Duty Vehicles. AEA, Ricardo: s.n., 2010

[B] Source: Emission Factors for Greenhouse Gas Inventories (last modified: 9 March 2018), US EPA

The construction of the Project is expected to contribute an approximately 0.00043% of the total CO_2 emission based on the 2000 GHG emission data of the Philippines, which is a small contribution to the total anthropogenic CO_2 load. Moreover, this will only be temporary since the construction project will only be in four (4) years. In order to minimize unnecessary CO_2 generation from construction activities, the following measures will be implemented:

- Implement regular inspection and preventive maintenance of heavy equipment, machineries and service vehicles to meet the DENR standards on vehicular emissions; and
- Use electric or fuel-efficient equipment, machineries and vehicles and maximize its operation, if possible.

2.3.3 Ambient Air and Noise Quality

This section presents the methodology and results of baseline ambient air and noise quality sampling conducted in the vicinities of the proposed project, the assessment of the anticipated impacts arising from the project, and the proposed mitigation measures and monitoring program.

2.3.3.1 Methodology

2.3.3.1.1 Sampling and Analysis

Air quality monitoring activities of Camaya coast resort was utilized in this portion. The table below presents the location and coordinates of the air sampling stations including the date and time of the monitoring. **Figure 2-49** shows location of the air sampling stations with reference to the Project site.

TABLE 2-29. LOCATION OF AIR SAMPLING STATIONS AND DATE AND TIME OF MONITORING

Station No.	Location	Date/ Time of Sampling
1	Project Site	April 06, 2016; 1230H-1330H
2	In front of main beach area of Camaya	April 06, 2016; 1340H-1440H

The ambient air quality monitoring was conducted in accordance to the standard methods of the DENR as prescribed in its AO No. 2000-81, the Implementing Rules and Regulations (IRR) of the Philippine Clean Act of 1999 and the Presidential Decree No. 984 (National Pollution Control Decree of 1976), as amended by NPCC MC No. 1980-002. The collected samples were brought to CRL Environmental Corporation, a DENR recognized laboratory. **Table 2-30** presents the air pollutants and the corresponding methods of sampling and analysis.

TABLE 2-30. SAMPLING AND ANALYTICAL PROCEDURES USED ON BASELINE AMBIENT AIR SAMPLING

Pollutant	Method of Sampling and Analysis
Total Suspended Particulates (TSP)	High Volume-Gravimetric Method
Suspended Particulates less than 10 µm (PM_{10})	High Volume-Gravimetric Method

Pollutant	Method of Sampling and Analysis
Sulfur Dioxide (SO_2)	Impinger-Pararosaniline Method
Nitrogen Dioxide (NO_2)	Impinger -Griess Saltzman Reaction

Wind speed and direction, cloud cover, rainfall and other relevant parameters, which describe the weather condition in the area, were also recorded at each station during sampling. The wind direction was reported in cardinal directions while wind speed was described using the Beaufort Wind Scale. The system used to describe the sky condition and rainfall was adopted from the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA).

The results of ambient air quality monitoring for the proposed Project were compared to the National Ambient Air Quality Standards (NAAQS) set forth in the Philippine Clean Air Act of 1999. The NAAQS for TSP, PM_{10}, SO_2, and NO_2 are presented in **Table 2-31**.

TABLE 2-31. NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS) FOR SO_2, NO_2, TSP, AND PM_{10}

Pollutant	Averaging Time (min)	NAAQS(1) (µg/Nm^3)
Sulfur Dioxide (SO_2)	60	340
Nitrogen Dioxide (NO_2)	60	260
Total Suspended Particulates (TSP)	60	300
Particulate Matter less than 10 microns (PM_{10})	60	200

Notes: µg/Nm^3 – microgram per normal cubic meter
Source: (1) National Ambient Air Quality Guideline for Criteria Pollutants of the Philippine Clean Air Act of 1999 (DAO 2000-81)

Station 1: at the Project Site
(14°28'6.14"N and 120°25'25.88"E)

Station 2: Near Camaya Resort
(14°27'18.16"N and 120°25'20.96"E)

FIGURE 2-48. PHOTOS DURING AIR QUALITY SAMPLING

FIGURE 2-49. AIR SAMPLING MAP

2.3.3.1.2 Results

Ambient Air Quality

Below results of analysis are compared to the National Ambient Air Quality Standards (NAAQS) for Source Specific Air Pollutants from Industrial Operations. These standards are specified in the Implementing Rules and Regulations of the Philippine Clean Air Act of 1999.

During sampling on April 06, 2016 the resort was at normal operation and the operation was on-going. The weather was sunny and prevailing light to moderate wind. The ambient Air results at all Sampling Stations indicate that the TSP, SO_2 and NO_2 concentrations were within the applicable DENR standards shown in **Table 2-32**.

TABLE 2-32. RESULTS OF AMBIENT AIR SAMPLING

Stn. No.	Location	Date/ Time of Sampling	TSP µg/Nm^3	SO_2 µg/Nm^3	NO_2 µg/Nm^3
1	Project Site	April 06, 2016 1230H-1330H	33.9	89.0	48.3
2	In front of main beach area of Camaya	April 06, 2016 1340H-1440H	55.7	114.1	51.9
NAAQS		**1 – hour sampling**	**300**	**340**	**260**

TABLE 2-33. METEOROLOGICAL MONITORING RESULTS

Stn. No.	Location	Date / Time Sampling	Ambient Temp. (°C) Result Avg.	Barometric Pressure. (inch Hg) Result Ave.	% Relative Humidity Result Ave.	Wind Speed Avg. (m/s)
1	Project Site	04/06/2016 1230H-1330H	37.3	29.70	36.2	1.2
2	In front of Main Beach Area	04/06/2016 1340H-1440H	37.6	29.68	42.3	1.6

Ambient Noise Quality

The result of the noise level measurement shows that the noise levels at both stations were within the applicable DENR Daytime limit of 65 dBA. Audible noise during the time of measurement normally came from the guests passing by and waves.

TABLE 2-34. RESULTS OF NOISE QUALITY SAMPLING

Stn.	Location	Date/ Daytime (0900H-1800H)	Noise Level dBA	Category of the Area	DENR (dBA)
1	Project site	04/06/2016 1330H-1335H	60.2	Class B	65
2	In front of Main Beach Area	04/06/2016 1440H-1445H	63.5	Class B	65

2.3.3.2 Impact Assessment – Air and Noise Quality

Earth movement and cut and fill activities during the construction phase will generate dust. Re-suspension of dust and particulate matter from the area even during weak to moderate wind events will definitely occur. This will cause some increase in the Total Suspended Particulate (TSP) within the immediate vicinity. This impact is temporary however, and can be mitigated by frequent watering of the soil surface.

It is also expected that gaseous emissions during construction will increase. This is due to vehicle exhaust since transport of materials needed during the construction phase requires trucks and loaders. It is projected however, that the insignificant emission levels from limited number of vehicles will not exceed existing ambient air quality standards. The negative impact on air quality can be easily minimized by intermittent operation of the vehicles and transport facilities.

During operation phase, the use of generator set, diesel operated equipment and ingress/egress of guests' vehicles would most likely contribute to the emission of SOx, NOx and generation of dusts.

To minimize emissions from generator and vehicles, the following shall be undertaken:

- "Turn off Engine while Parked" sign shall be posted at the parking area.
- Regular maintenance of generator set and diesel operated equipment.
- Ensure that appropriate control facilities are installed and being used to reduce emission and help deaden the noise.
- Permit to Operate shall be secured for all Air Pollution Source Equipment.

2.4 People

2.4.1 Methodology

The following methods were used to identify and assess the socio-economic baseline data as well as the potential impacts of the Project, particularly on the Socio-economic aspects:

1. Site Visit/Ocular Inspection/Area Reconnaissance/Preliminary Survey
2. Secondary Data Gathering
3. Public Scoping
4. Key Informant Interviews
5. Random Sample Interviews and Perception Survey
6. Focus Group Discussions

A PERCEPTION SURVEY questionnaire was filled up in behalf of the interviewees by an interviewer and/or served as a guide questionnaire in the KII, Random Sample Interviews and FGDs.

2.4.1.1 Site Visit/Ocular Inspection/ Area Reconnaissance/Preliminary Survey

During the reconnaissance survey, the general condition of the impact areas and communities near the Camaya Golf Course Project Site were observed and noted. In this method, one can generalize the socio-economic and demographic conditions of the covered areas and communities. Brief random interviews of the residents within the area were also conducted to research on the general situation of the area and the communities and help determine the perception of the respondents towards the project.

2.4.1.2 Secondary Data Gathering

Data and information were procured from pertinent documents from respective government institutions such as from the municipal LGU of Mariveles, and Barangay LGU of Barangay Biaan as well as online sources for background information. All sources of such information were exhausted in this report. Other than online sources. Due to limited available document sources, the preparers compensated for the data gaps by presenting in this study the demographics of the respondents of the perception survey held, as well as first hand observations of the researchers.

Other secondary data sources were online articles and websites such as PSA.gov.ph and bataan.gov.ph.

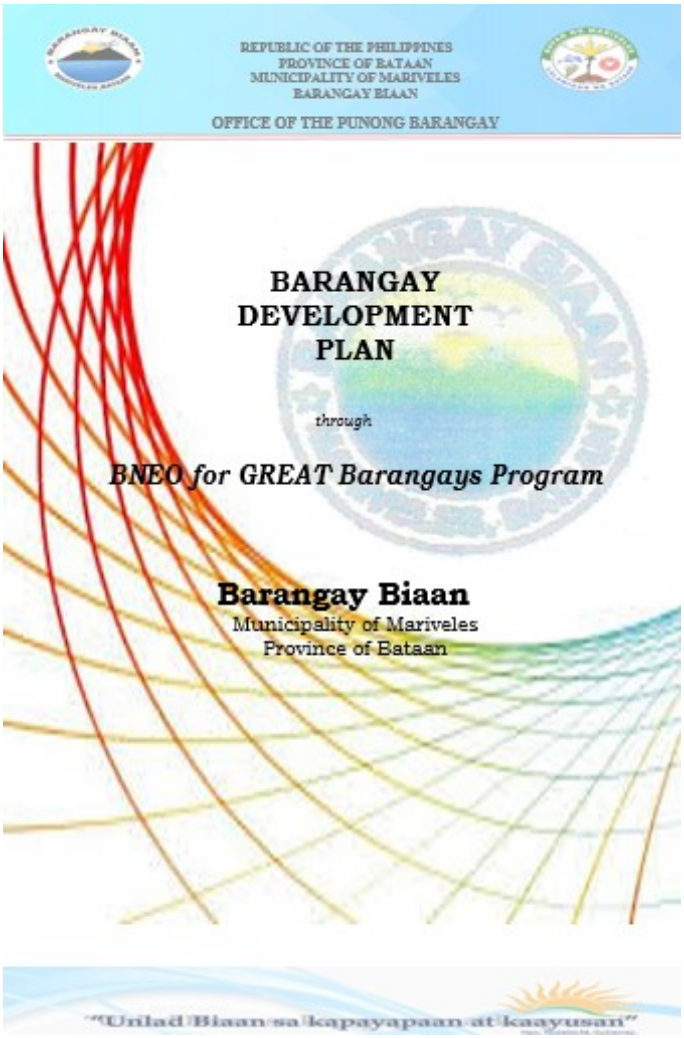


FIGURE 2-50. SAMPLE DOCUMENT COVER OBTAINED FROM LGUS

2.4.1.3 Random Sample Interviews and Perception Survey

Random Interviews and Perception Survey were held in the direct impact barangay of Biaan. A Perception Survey Questionnaire served as a guide during the discussion, and with the contents not only focusing on the issues of the community and with regards to the project, but also the demographic data of the respondents. A total of 100 respondents were interviewed during the survey. Thirty three (33) respondents were workers of Camaya Beach Resort, who are also residents of Barangay Biaan, and Sixty Seven (67) respondents from the coastal community of Barangay Biaan was interviewed using random sample interviews. With the use of a survey questionnaire, the interviewer noted/filled up the answers of each interviewee into the questionnaire to facilitate time and discourse during the interview. There are 100 respondents in total from the impact area – ensuring that different sectors in their communities are well-represented.

Method used for Perception Survey

Method	Date of Survey	Location	No. of Respondents
Key Informant Interviews	19 January 2019	Camaya Coast Dining Hall	3
	23 January 2019	Barangay Biaan Barangay Hall	2

Method	Date of Survey	Location	No. of Respondents
		Municipal Planning and Development Office of Mariveles	1
Random Sample Interviews	20 September 2018	Barangay Biaan Camaya Coast Resort	100
Focus Group Discussion	23 January 2019	Barangay Biaan Barangay Hall Municipal Planning and Development Office	6 3

2.4.1.4 Key Informant Interviews (KII)

Key Informant Interview was also used primarily to provide an in-depth discussion on the condition of the community and to determine the perceptions and interests of several groups in the host barangay. This was administered to the knowledgeable and influential people in the locale. Among those interviewed were Barangay Officials of the Direct Impact Barangay. A questionnaire consisting of both closed and open-ended questions was prepared for the purpose.

2.4.2 Results

2.4.2.1 Secondary Data

2.4.2.1.1 Municipal Profile of Mariveles

2.4.2.1.1.1 Brief Profile of Impact Area

Originally known as the “Village of Kamaya”, it was founded as a pueblo by a Franciscan Friar in 1578 and was made part of the Corregimiento of Mariveles which includes the towns of Bagac and Morong, the Island of Corregidor, and the town of Maragondon in Cavite. When Bataan was declared as another province separate from Pampanga pursuant to Superior Decree on July 1754, Mariveles became a part of the new province. It served as the checking point for ships entering or leaving Manila Bay.

When the Philippines fell to the Americans at the turn of the 19th century, Mariveles was placed under American rule. They established the country’s first quarantine station in the old Spanish Leprosarium Hospital to check all incoming and outgoing shipments from any

communicable and deadly diseases from spreading. Today, this quarantine station is converted to a National Mental Ward.

Legend

There are many theories and myths about the origin of the name “Mariveles”, to wit:

According to the geographical history, the word Mariveles is a collaboration of the Tagalog words “Maraming Dilis” which refers to the abundant anchovies caught on the seas surrounding the town. “Maraming Dilis” was shortened to Mara-dilis and eventually to “Mariveles” through the passage of time.

Another popular myth is about the romantic story of a nun named Maria Veles who had fallen in love with a man and chose her love instead of her vocation to God. She and her lover eloped and hid in the mountain who, according to legend, live happily till she met her death. In her memory, her lover named the mountain where she was buried as Mt. Maria Veles, which later was shortened to Mariveles.

Industrialization

Mariveles was then referred to as a war-torn small fishing village of 5,000 people who subsist from their farm harvest and catch from the sea. Until in the 1960’s, when the Philippine Government made a remarkable step toward investment planning to attract foreign investments into the country. Many factors were considered in deciding the site. When it was suggested that Bataan Province was a likely spot for the Philippine debut in the field, businessmen were really not convinced. Bataan was too far from Manila and harbored only a village backed by mountains and muddy tracks. But it was done. With the declaration of Martial Law in September 1972, former Pres. Ferdinand E. Marcos issued Presidential Decree No. 66, creating the Export Processing Authority, the forerunner of the Philippine Economic Zone Authority or the PEZA today. And the site chosen was Mariveles, Bataan.

Since then, remarkable progress took place at the Bataan Export Processing Zone, the first and premiere economic zone in the country, now called the Bataan Economic Zone. A former 1,200 hectares barren jungle is now transformed into a modern industrial complex with more than 40 multinational companies manufacturing products for the World and providing employment to more than 15,000 Filipinos.

Today, Mariveles has metamorphosed from a small fishing village, to a war-torn community in the 2nd World War into an industrial city of Bataan. As employment opportunities inside the town continue to expand, migration of workers from the other parts of the country continue to grow. The tiny population of 5,000 in the 1970’s now registered at 104,410, the biggest in the entire Province of Bataan per 2006 census.

But the most significant contribution of the industrialization going on in the town is the economic gain it has achieved in terms of revenue collection. Looking back ten years ago, Mariveles was a third class municipality with revenue collection of P49,742,054.38. Because of its improved revenue collections of P71,029,842.77, Mariveles rose to a first class municipality in 1999. In 2007 Mariveles registered the highest revenue collection of P150,701,935.98 in the whole province of Bataan.

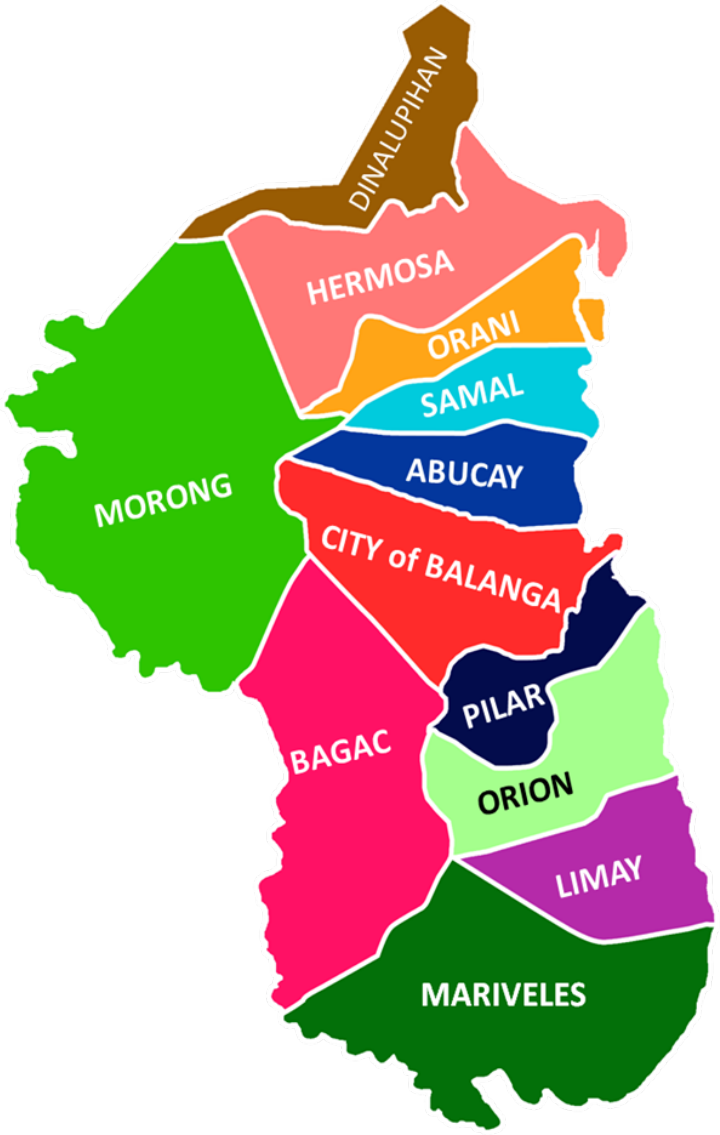


FIGURE 2-51. POLITICAL MAP OF BATAAN

2.4.2.1.1.2 Demographic Data of Impact Area

Population Profile

Based on the 2015 Census of Population, Bataan ranked fifth among the seven provinces comprising Central Luzon in terms of population. The province's 11 municipalities and 1 component city had for the year 2015 a total population of 760,650 representing 7% of the region's population. The 2015 population was higher by 73,168 compared with the population of 687,482 in 2010, and 202,991 compared with the population of 557,659 in 2000.

Among the 11 municipalities and 1 component city of Bataan, the largest in terms of population size was Mariveles with 127,536 persons as of CY 2015. It accounted for 16.77% of the population of the entire province. In the same year, Dinalupihan was second largest

with 106,371 persons or 13.98% share while Balanga City, the capital of the province, registered the third largest population with 96,061 persons or 12.63% share of the population of Bataan. The fourth largest was Limay with 68,071 persons or 8.95% share. Fifth was Orani with 66,909 or 8.80%. Hermosa, with 65,862 persons or 8.666% share was the sixth. The smallest in terms of population was Bagac, with 26,936 persons or 3.54% share.

Hence from 2000-2015, the population of Mariveles with 17% share of the total population of Bataan, remained the largest municipality in terms of population size. Dinalupihan, the second largest, was 14% while Balanga City, the third largest, had 13% of the total population of Bataan. On the other hand, Morong, the smallest municipality accounted for 4% of the province's population ranked second to Bagac, the smallest municipality in terms of population size according to PSA 2015 report.

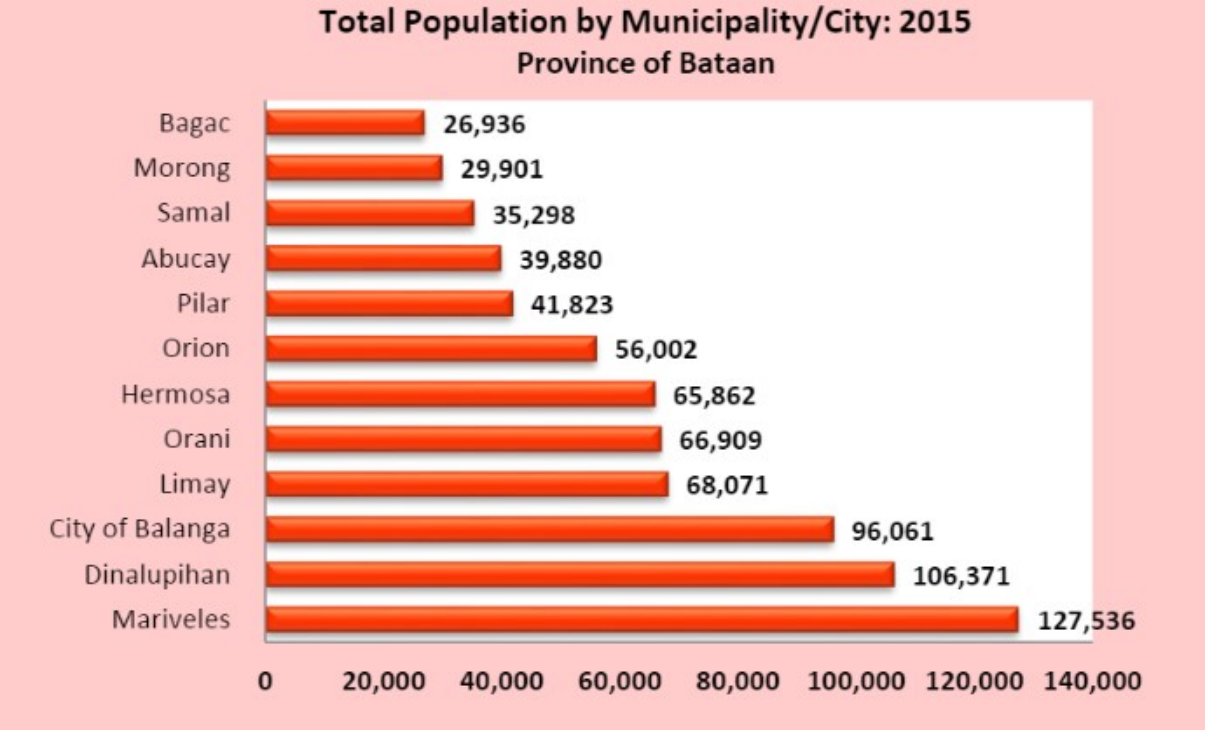


FIGURE 2-52. TOTAL POPULATION BY MUNICIPALITY (BATAAN SOCIO-ECONOMIC PROFILE 2015)

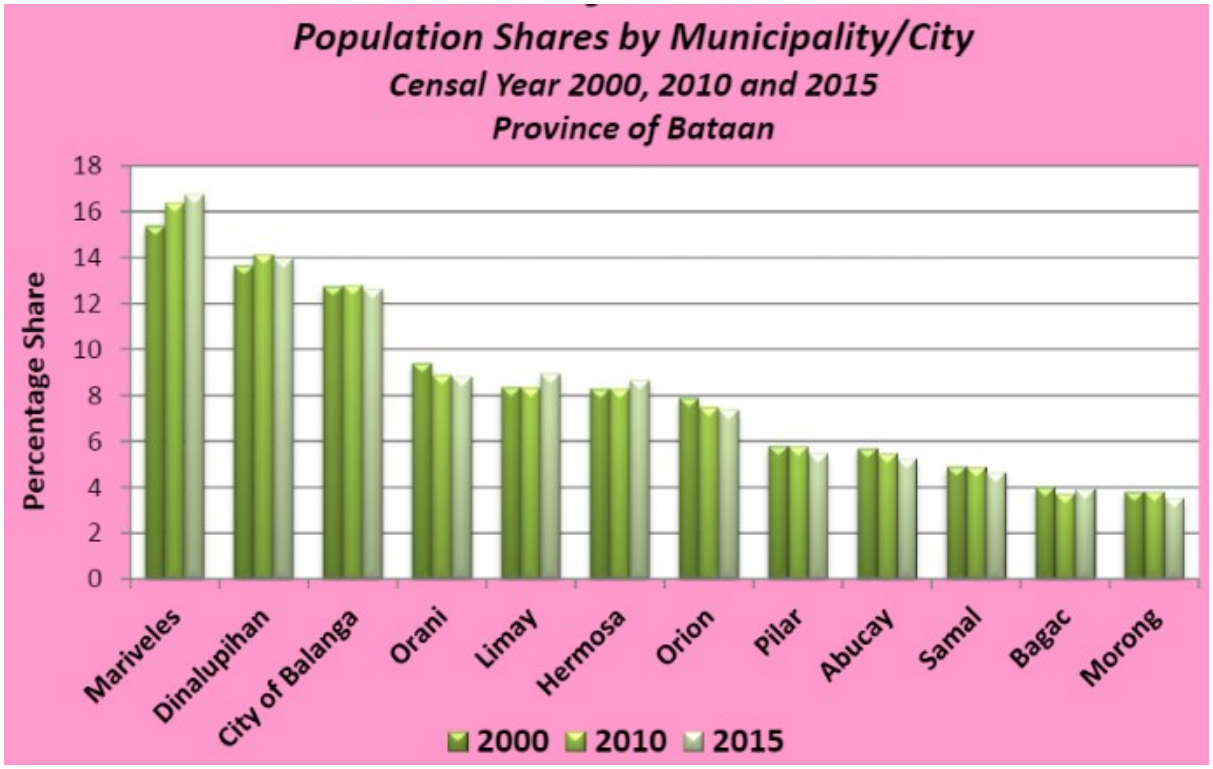


FIGURE 2-53. POPULATION SHARES BY MUNICIPALITY (BATAAN SOCIO-ECONOMIC PROFILE 2015)

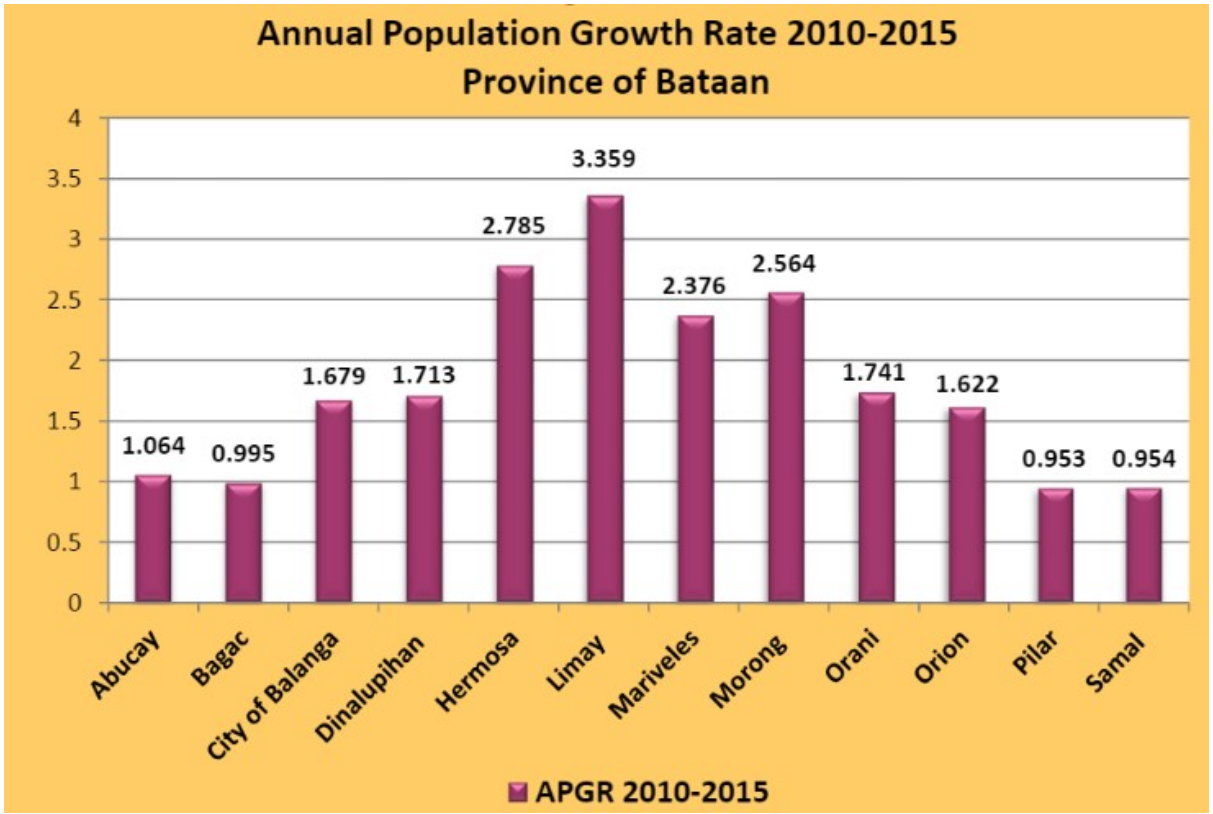


FIGURE 2-54. ANNUAL POPULATION GROWTH RATE (BATAAN SOCIO-ECONOMIC PROFILE 2015)

On August 1, 2015 PSA census, Mariveles still had the highest population among the municipalities in the Province of Bataan. Its population reached 127,536 persons (**Table 2-35**).

In the 2015 census, Mariveles had a population of 127,536. The population density was 830 inhabitants per square kilometer (2,100/sq.mi.). In the 2016 electoral roll, it had 75,890 registered voters. Mariveles is home to an Aeta Community speaking a Sembalic Language called Mariveleno.

TABLE 2-35. POPULATION OF MARIVELES PER BARANGAY IN 2010 AND 2015

Barangay	Population		±% p.a.	
	2010	2015	Increase/Decrease	Percentage (%)
Alas-asin	11,606	15,047	+	5.07%
Alion	3,015	3,264	+	1.52%
Balon-Anito	10,255	12,286	+	3.50%
Baseco Country (Nassco)	3,440	4,581	+	5.61%
Batangas II	5,122	5,951	+	2.90%
Biaan	1,571	1,837	+	3.02%
Cabcaben	6,269	6,427	+	0.48%
Camaya	12,077	14,869	+	4.04%
Ipag	9,430	10,010	+	1.14%
Lucanin	3,570	5,169	+	7.30%
Malaya	5,211	4,910	-	-1.13%
Maligaya	4,416	4,407	-	-0.04%%
Mt. View	8,843	10,461	+	3.25%
Poblacion	8,074	7,938	-	-0.32%
San Carlos	1,592	1,517	-	-.91%
San Isidro	5,816	5,761	-	-0.18%
Sisiman	5,837	6,221	+	1.22%
Townsite	6,563	6,880	+	0.90%
Total	**112,707**	**127,536**	**+**	**2.38%**

On the other hand, the table below shows the educational attainment status of population in Mariveles, Bataan in 2015.

TABLE 2-36. POPULATION BY AGE ANDEDUCATIONAL ATTAINMENT IN MARIVELES, 2015

Highest Grade/ Year Completed Sex and City/ Municipality	Total Population 5 Years Old and Over	Age																		
		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20-24	25-29	30-34	35 and over
Total	115,771	2,321	2,408	2,518	2378	2,352	2,494	2381	2,474	2316	2601	2,686	2,496	2,733	3,043	2377	13,389	11,529	10282	42,613
No Grade Completed	1,982	1,290	138	29	17	9	13	9	6	7	9	36	35	16	17	7	43	37	31	235
Pre-School	2,729	1,026	1,419	202	38	10	7	3	1	3	1	2	-	1	2	-	6	1	4	3
Special Education	47		1	1	1	1	2	2	3	3	7	1	1	4	4	2	4	4	5	1
Elementary	27,142		852	2,286	2,322	2,332	2,472	2,347	1,842	657	320	211	177	148	176	168	801	782	831	8,418
1st - 4th Grade	13,452		852	2,286	2,322	2,332	1,864	482	189	107	78	48	41	39	35	35	177	194	207	2,164
5th - 6th Grade	4,068						608	1,423	405	99	72	41	30	25	34	25	118	107	129	952
Graduate	9,622							442	1,248	451	170	122	106	84	107	108	506	481	495	5,302
High School	56,929								622	1,646	2,162	2,436	1985	1,714	1,537	1,445	7,223	6,655	5,920	23,534
Undergraduate	13,569								622	1,646	2,162	2,128	729	375	257	249	957	832	690	2,922
Graduate	43,360											308	1,256	1,339	1,280	1,196	6,266	5,823	5230	20,662
Post - Secondary	2,524												1	1	3	44	434	425	346	1,270
Undergraduate	103												1	1	3	2	24	23	14	35
Graduate	2,421															42	410	402	332	1,235
College Undergraduate	12,433												290	845	1,299	1,145	2,675	1,269	1,171	3,739
Academe Degree Holder	11,474															62	2,149	2,304	1918	5,041

Source: Socio-Economic Profile of Mariveles (2018)

2.4.2.1.1.3 Culture and Lifestyle

Religion

The majority of various religious groups are subscribed to by the people but Roman Catholicism is the predominant religion, comprising 85% of the Bataan population. Aglipayan, several other Christian faiths, Muslims, Anitists, animists, and atheists are the minority.

Churches in the area are:

- Nuestra Señora del Pilar Church — Morong
- Nuestra Señora del Pilar Church — Pilar
- Nuestra Señora, Virgen Milagrosa del Rosario Church — Orani, declared as a diocesan-shrine by the Diocese of Balanga. It is home to the miraculous image of the Our Lady of Orani which was canonically crowned 18 April 1959.
- San Francisco de Asis Church — Limay
- Diocesan Shrine and Cathedral-Parish of Saint Joseph — Balanga City, was declared as a diocesan-shrine and is the seat of the Diocese of Balanga
- San Juan Bautista Church — Dinalupihan
- San Miguel Arcangel Church — Orion
- San Nicolas de Tolentino Church — Mariveles

Indigenous People

The Aeta Magbukún can be found living near the fringe of the Manila Bay/South China Sea and the forest cover of Mount Mariveles in the Philippines (Balilla et al., 2013). They constitute one of the 5 main groups of Aeta tribes in Central Luzon and is the least known of all Aeta groups. They have descended from the Negrito ethnolinguistic group, and this is manifested in their physical traits, language and culture.

The recent official use of the term ‘Aeta Magbukún’ refers to both the Indigenous language and people of Bataan peninsula, specifically that of the Aeta groups from Morong, Mariveles and Limay (McHenry et al., 2015). The Chieftain of the Aeta Magbukún explained the term Magbukún originated from the word buk ud/magbukud, which literally means “to separate from” in the Aeta Magbukún language (Balilla et al., 2013). The Aeta Magbuk´un, and women in particular, are known for their reclusive shyness in social situations, particularly outside of their own bayanbayanan (village/hamlet) located in Barangay Biaan, Mariveles. Despite this shyness, in some situations Aetas are known to passionately defend their distinctiveness as Aeta Magbuk´un as opposed to other Aeta groups and non-Aeta alike. The Aeta Magbuk´un present themselves as a distinguished Aeta group that has lived relatively independently since pre-European colonization.

Figure 2-55 shows the location of the nearest Aeta Community to the Project Site. While Figure 2-56 shows the locations of registered and approved areas with Certificate of Ancestral Domain Titles within Region III.

FIGURE 2-55. BARANGAY BIAAN SETTLEMENT MAP INCLUDING AETA COMMUNITY

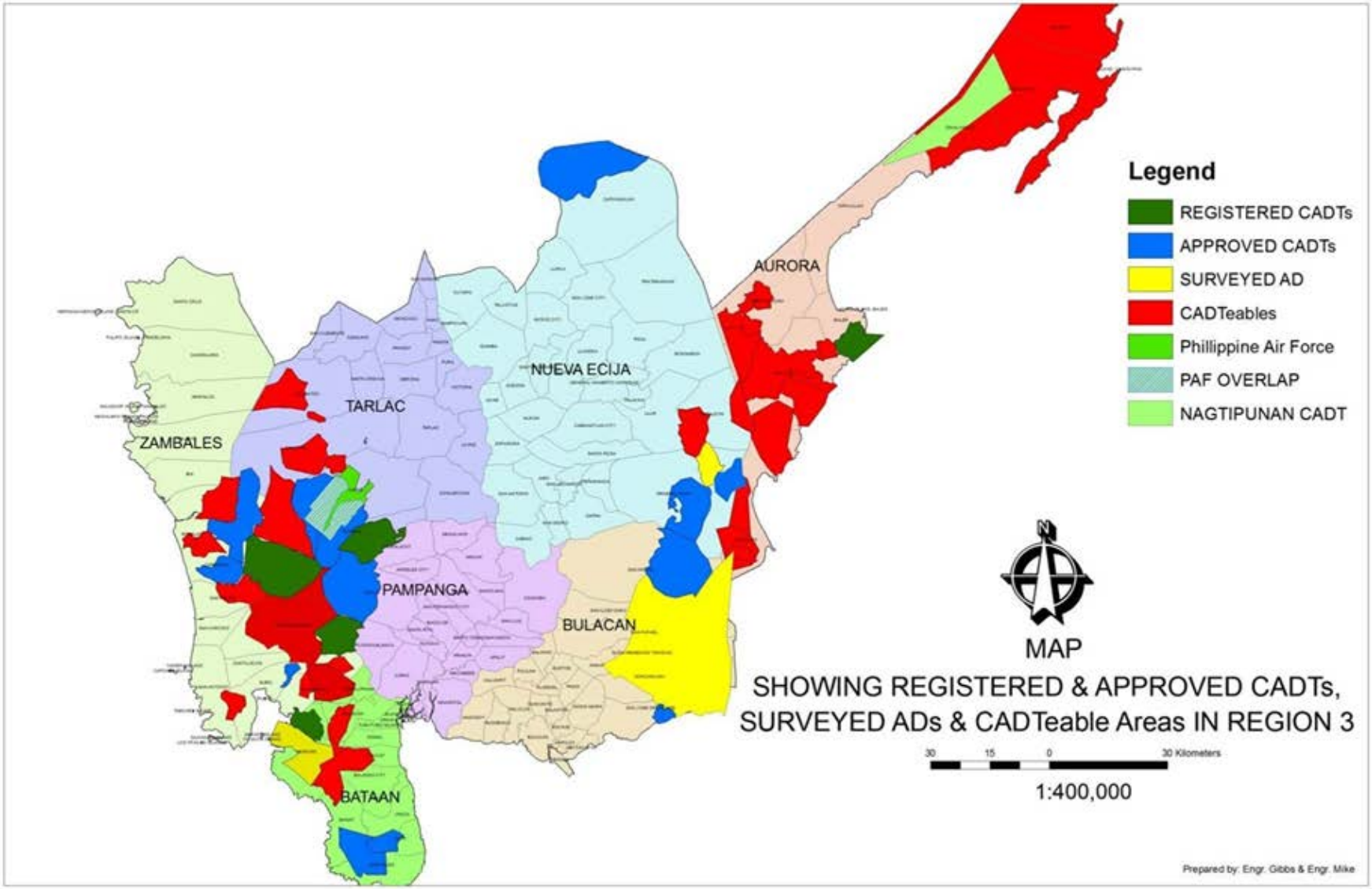


FIGURE 2-56. ANCESTRAL DOMAIN MAP OF REGION III
(Source: NCIP Region II)

- **Demography**

In 2008, the total population of the Aeta Magbukún's bayan-bayanan was 107, with a total of 21 nuclear families (Balilla et al., 2013). Population sex ratios included 63 (59 percent) males and 44 (41 percent) females, with 72 (67 percent) of the total population aged between zero and thirty. The average size of an Aeta Magbukún nuclear family is five family members, including the mother and father. In the period from 1990 to 2008, there was an average of three live births per annum. Only ten (9%) of the community are non-Aetas, and all of them are spouses of Aetas. Thus, ten out of twenty-one (47 percent) married couples in the bayan-bayanan are of mixed marriage (Balilla et al., 2013).

- **Livelihood Practices**

The livelihood practices of Aeta Magbuk´un includes pangangalakal, pamamatibat or pagdadanso (women oraging for wild tubers and freshwater shelfish), pamumuay (harvesting honey), pangangati (trapping Red Jungle Fowl or labuyo), pangangaso (hunting wild boars and monkeys, and very rarely, deer), paninilo (setting traps for wild boars and wild cats), pag-uuling (charcoal production), wage-working for the cattle ranchers near their community, elementary agriculture, planting in their gasak (swidden field) sweet potatoes, cassava, bananas and etc. (Peninsula Ecosystems & Health Foundation Inc., 2016). Out of these, two are considered as Aeta's main source of livelihood: Pamumuay or honey gathering and Pag-uuling or charcoal production.

2.4.2.1.1.4 Physical Cultural Resources

Tourism

- Nuestra Señora del Pilar Church — Morong
- Nuestra Señora del Pilar Church — Pilar
- Nuestra Señora, Virgen Milagrosa del Rosario Church — Orani, declared as a diocesan-shrine by the Diocese of Balanga. It is home to the miraculous image of the Our Lady of Orani which was canonically crowned 18 April 1959.
- San Francisco de Asis Church — Limay
- Diocesan Shrine and Cathedral-Parish of Saint Joseph — Balanga City, was declared as a diocesan-shrine and is the seat of the Diocese of Balanga
- San Juan Bautista Church — Dinalupihan
- San Miguel Arcangel Church — Orion
- San Nicolas de Tolentino Church — Mariveles
- San Pedro Martir de Verona Church — Hermosa
- Santa Catalina de Alexandria Church — Bagac
- Santa Catalina de Siena Church — Samal
- Santo Domingo de Guzman Church — Abucay, the oldest church in Bataan

Other Places of Interest

- Bataan Tourism Center — Balanga
- Las Casas Filipinas de Acuzar — Bagac
- Philippine Refugee Processing Center — Morong
- Ocean Adventure — Mabayo, Morong (SBFZ)

- Zoobic Safari — Mabayo, Morong (SBFZ)
- Major General Edward P. King (Grave) — Lamao
- Sinagtala Farm Resort & Adventure Park — Orani
- Vista Tala Resort & Recreational Park — Orani
- Camaya Coast (Camaya Sands Resorts and Leisure) — Mariveles
- Montemar Beach Club — Bagac
- Duhat Bike Trail — Orion

Natural Places of Interest

- Ambon-ambon(Lumutan) Falls (Binukawan, Bagac)
- Anvaya Cove (Morong)
- Balong Anito (Mariveles)
- Bataan National Park
- Camaya Coast (Mariveles)
- Claubel Beach Resort (Mariveles)
- Dunsulan Falls - Pilar
- Emerald Resort (Mariveles)
- Laki (Laque) Beach (Mariveles)
- Mariveles Five Fingers (Mariveles)
- Mount Mariveles
- Mount Natib (Orani)
- Nagbintana Arc (Mariveles)
- Panoypoy Cove (Mariveles)
- Pasukulan Falls (Abucay)
- Playa La Caleta (Morong)
- Roosevelt Protected Landscape
- San Miguel Mountain Peak (Mariveles)
- Sibul Spring (Abucay)
- Sinagtala & Vista Tala (Orani)
- Talain Cove (Mariveles)
- Tarak Ridge (Mariveles)
- Tortugas Bay Park (Balanga)

Figure 2-57 shows the location of the Bataan National Park vis-a-vis the location of the project where it shows that there is an approximate aerial distance of 20 kilometers between the two.

FIGURE 2-57. LOCATION OF BATAAN NATIONAL PARK RELATIVE TO THE LOCATION OF THE PROJECT

2.4.2.1.1.5 Public Services

Water Supply

Mariveles Water District and the Bataan Economic Zone Water System (BEZWS) are the water supply system providers in Mariveles. The Mariveles Water District serves the town proper, while the BEZWS serves the Bataan Export Processing Zone (BEPZ) area (now FAB). Common sources of water in areas without existing water systems are shallow and deep wells and springs.

Power Supply

The electricity in Mariveles is provided by PENELCO, National Power Corporation (NAPOCOR) and FAB. PENELCO supplies electricity to fifteen (15) barangays, while NAPOCOR provides electricity to two (2) barangays. The FAB is powered by a 59 MW power plant.

Communication

The municipality has one (1) Postal Office located at the municipal hall and a substation at the AFAB. It has also a telegraph facility. Telephone and mobile communication services are provided by PLDT, Globe and Smart Telecommunications and Oceanic Wireless Network Inc.

In addition, telegraphic and courier services in the municipality are provided by PT&T, RCPI, Telefast, DHL, JRS, Fax and Parcel, and Del Bros-UPS.

Education Facilities

In 2009, Mariveles has forty (40) day care centers; eighteen (18) public and five (5) private elementary schools; four (4) public and five (5) private high schools; one (1) public and two (2) private college institutions; and one (1) technical schools.

Health Facilities

The municipality of Mariveles has one private secondary hospital, a maternity clinic and ten (10) private clinics. The government has provided one mental hospital, three rural health units (RHU), 18 barangay health stations (BHS), 13 satellites of barangay, one rehabilitation unit and two emergency units where residents can consult their health problems

2.4.2.1.1.6 Public Health and Safety

Peace and Order/Crime

In 2009, the Municipality of Mariveles had one (1) police station, five (5) police clusters, one (1) fire truck and one (1) police patrol car. The police-population ratio was 3%, the total crime volume was 46 and the crime rate was 25.

Morbidity

Acute upper respiratory infection is the most common disease in Mariveles followed by wounds, dengue fever then diarrhea. The other causes of diseases are coronary artery disease, hypertensive vascular disorder (CAD/HCVD/HPN), urinary tract infection (UTI), skin disorder and systemic viral infection.

TABLE 2-37. LEADING CAUSES OF MORBIDITY FOR THE LAST SIX YEARS

Causes	Number of Cases					
	2011	2012	2013	2014	2015	2016
AURI	2,405	3,013	6,244	2,194	909	9,973
Wound	1,577	1,,856	1,619	933	750	2,901
CAD/HCVD/HPN	931	518	1,228	-	77	469
UTI	730	891	898	638	77	5,999
Diarrhea	670	564	624	686	116	783
Skin Disorder	388	329	862	315	75	160
Pneumonia	346	-	-	-	-	-
Dengue	300	239	145	104	230	-
Vehicular accidents	-	479	721	320	-	-
Systemic viral infection	294	619	552	412	31	-
Gastritis/PUD	-	-	309	255	-	162
PTB	-	-	378	570	-	-
Total	7,641	8,508	13,580	6,427	2,265	20,477

Source: Mariveles Health Profile, 2016

Mortality

The leading causes of deaths in Mariveles, Bataan in 2015 include cancer of all kinds (31), myocardial infarction, cardiovascular (heart) diseases, pneumonia, multiple organ failure, tuberculosis, sepsis, cerebrovascular accident (CVA) or stroke, and traumatic head injury.

TABLE 2-38. LEADING CAUSES OF MORTALITY

Causes	Number of Cases, 2014			Number of Cases, 2015		
	Male	Female	Total	Male	Female	Total
Diseases of the heart	49	15	64	13	8	13
Cancer, all kinds	14	8	22	31	20	31
CVD/CVA	13	7	20	4	2	4
Pneumonia	13	6	19	5	8	5
Myocardial Infarction	-	-	0	30	16	30
Tuberculosis, all kinds	13	5	18	7	1	7
Sepsis	-	-	0	1	5	1
Multiple organ failure	3	6	9	10	9	10
Traumatic Head Injury	-	-	0	4	1	4
COPD	12	4	16	-	-	0
Renal Failure	13	6	19	-	-	0
Asphyxia	6	1	7	-	-	0
Total	136	58	194	105	70	175

Source: Mariveles Health Profile, 2015

Environmental Health and Sanitation

One hundred percent of the households (21,008) have access to safe water. Most of the households are supplied with safe water directly to their homes through a pipe system (81.6%). Fourteen percent (14%) of them still get water from direct sources (level 1) like streams and springs.

Many of the households keep a sanitary type of toilet (96%), while only 85% of the households have a satisfactory way of disposing their solid waste. About 96% of the households possess the basic sanitation facilities required.

Sixty-three percent (1,369) of food establishments have sanitary permit, while 95.6% of food handlers have health certificates.

TABLE 2-39. ENVIRONMENTAL SANITATION IN MARIVELES (2014-2015)

Parameter/Indicator	2014		2015	
	Number	%	Number	%
No. of Households (HH)	21,008	-	21,576	-
No. of HH with access to safe water	21,008	100	21,576	100
HH with access to Level 1 water supply	3,006	14	3,014	14
HH with access to Level 2 water supply	855	4	855	4
HH with access to Level 3 water supply	17,146	81.6	17,707	82
HH with Sanitary Toilet Facilities	20,231	96	20,824	97
HH with satisfactory disposal of solid waste	2,189	85	20,138	93
HH with complete basic sanitation facilities	1,369	96	20,006	93
No. of Food Establishments	2,189	-	2,181	-
No. of Food Establishments with Sanitary Permit	1,369	62.5	1,243	57
No. of food Handlers	2,378	-	2,513	-
No. of food Handlers with Health Certificate	2,274	95.6	-	-

Source: Mariveles Coal Power Plant Project EIS Report (2018)

2.4.2.1.1.7 Socio-Economic Profile

The Municipality of Mariveles has the second highest IRA within the Province of Bataan from 2011-2015.

Agriculture

Bataan province produced an average of 5.02 metric tons of palay per hectare planted in an effective area of 28,529.75 hectares in year 2015. Effective area here refers to the totality of the area devoted for planting of main crops, double crops and intercrops during one calendar year. It is another measure for farm size indicating the area planted for different crops in a fixed period of time.

Palay production in 2011 was 128,705 metric tons or 2,787,470 cavans harvested from an effective area of 31,687 has. In 2012, rice production increased by 18,097 metric tons or 14% total increase amidst the decrease by 1,045.75 hectares area planted for palay. However, the following year brought a minimal decrease of 4% in production, which

accounted to 4.49 metric tons harvested from 30,539 has. effective area, thus increased the average yield to 4.88 MT/ha.

From 2011- 2015, there was an increase of 7% with regards to irrigation coverage of the province; however this was not translated to an increase in palay production. Such incident can be attributed to biological stressors like weeds and insects/pests as well as to the El Nino phenomenon being experienced not only in the province but also in the whole country.

Industry

Mariveles has an industrial area of approximately 3,834.05 ha or 24% of the total municipal area. Largely due to the establishment of the first Export Processing Zone Authority, Mariveles became industrial municipality and host to different heavy and light industries ranging from ship repair yards and oil companies to garment industries according to its Municipal Profile (2018).

It was on the 70's when the first export processing zone was established in Mariveles. Its objective is to lure investors to establish companies in zone wherein all their imported raw materials are free from tariffs and other taxes.

Presently, the Authority of the Freeport Area of Bataan (AFAB), formerly EPZA, has a land area of almost 1,700 hectares, catering to various industries, hotels and commercial establishments. Also it covers Brgys. Malaya and Maligaya.

Employment Profile

Mariveles has 56,262 gainful workers where in most of workers (29.8%) are involved in crafts and related trades in 2015.

TABLE 2-40. TOP FIVE OCCUPATION OF WORKERS IN MARIVELES, 2015

Occupation	Number of Individuals	Percentage
Craft and Related Trades Workers	16,773	29.8%
Plant and Machine Operators and Assemblers	7,337	13.0%
Service and Sales Workers	6,506	11.6%
Technicians and Associate Professionals	6,352	11.3%
Elementary Occupations	6,231	11.1%

Source: NSO, 2015 Census of Population and Housing

2.4.2.1.1.8 Traffic

Mariveles has a total road network of 246.096 kilometers. These are classified into National, Provincial, Municipal and Barangay roads. The total length of national road within the municipality is 74.167 km. This serves as main access of Mariveles to the adjacent municipalities. The provincial road, which is 62.326 km connects the different barangays to the national road while the municipal road, which is 5.938 km in length, are found within the urban area. The barangay road is about 103.665 km.

TABLE 2-41. ROAD NETWORK IN MARIVELES, 2002

Type of Road	Total	Concrete	Asphalt	Gravel
National	74.167	13.066	39.246	21.855
Provincial	62.326	20.206	21.114	21.006
Municipal	5.938	3.802	1.695	0.441
Barangay	103.665	41.125	50.805	11.735
Total	246.096	78.199	112.860	55.037

Source: 2002 CLUP of Mariveles

Numerous transport vehicles are operating in the municipality, namely: inter-provincial bus companies, provincial and mini buses, jeepneys, tricycles, ferry boats, fishing boats and cargo vessels, and private air crafts. Existing transportation facilities are bus terminals, BASECO and BEZ wharfs, Mariveles Port, Bataan Storage Corp. Pier and helipads are facilities within the economic zone.

Transport services within, to and from Mariveles are provided by a network of public utility buses and jeepneys and tricycle franchises. There are two (2) bus companies operating in Mariveles. These are Genesis Transport Service and Bataan Transit. Both have bus terminals are located in Lakandula St., Poblacion/San Isidro, Mariveles. There are also mini-buses that ply the Balanga-Mariveles route. The vicinity of the market serves as the terminal of both jeepneys and tricycles. The jeepneys ply the longer route while tricycles serve as means of transport within the inner arteries of the municipality.

Most shipping activities occur in the Mariveles harbor, a seaport owned by the national government. Foreign cargo vessels are located in this seaport with exportable items from the Freeport Area of Bataan. Jet ferries take the Mariveles to Manila and back via the Manila Bay.

The host Barangay Biaan can be reached thru different modes of transportation such as public utility jeepneys (PUJ), private vehicles and tricycles, which roam within the barangay via provincial road (Mariveles-Bagac Road) from Mariveles proper (Barangay Poblacion). The sitios of the barangay can be reached thru the Mariveles-Bagac road. The sitio Talain and Lusong can also be reached from Barangay proper (Lower Biaan) via 15-20 minutes boat ride.[3]

2.4.2.1.2 Barangay Profile of Biaan

Barangay Biaan is located in the farthest part of the municipality of Mariveles, in the province of Bataan. It is surrounded by crystalline ocean waters and coastal seas, which have mountains that cradle the simple life of the Barangay.

It is also noteworthy that Barangay Biaan has the largest area of land among the eighteen Barangay of Mariveles, although it has the smallest population. It also has natural boundaries which give reason to know the terrestrial land of Barangay. Sitio Porto Aplaya, Barangay Balon Anito is the main boundary of Barangay Biaan in the East and in the West is

[3] *Environmental Impact Statement for the proposed Mariveles Coal Power Plant Project (2018)*

Barangay Quinawan, Bagac, Bataan. It can also be said that the total size of Barangay Biaan when it comes to the land is about 17,000 hectares.

In addition, 45% of the mountain covering the entire Mariveles area is under Barangay Biaan. Barangay Biaan is very proud of its natural resources because it has a lush forests where various types of animals are found and trees that allow people to live well. It is also the pride of the Barangay in its natural beauty when it comes to Water Resources just like the charming and glamorous beauty of the oceans or coastal waters, which will be the investment to further increase the Eco-Tourism of Barangay.

One of the main sources of livelihood of Barangay is fishing and farming, where it is bountiful in the Barangay. It is undeniable that people live a simple life, but in spite of this, every citizen has unity and cooperation in all things, especially in observing or following important statutory laws.

Barangay Biaan is also very far from the town which is under Barangay Poblacion, about 6 km away. That is where the neighboring barangays of Balon Anito and San Isidro go west, and the Barangay of San Carlos to the north.

2.4.2.1.2.1 History of the Barangay

From stories and opinions that have come from the ancestors of ancient settlements which have been translated into the mouths of various people who came and lived in this area. The place of Barangay Biaan comes from a legendary story that people believe and shared. It is a place where there are attractive and splendid views, with a simple lifestyle of citizens. It is also very far from civilization and the main source of livelihood is the ocean and the river that offers its blessings. Because of this area, it is undeniable that a large number of people have been enriched caused by the blessings provided by the ocean and its natural resources. On the other hand, darkness and light do not overlook the eternal gratitude and praises to God, despite the blessings they enjoy.

One day while community groups crowded into the ocean there was an attraction that passed through their eyes and this was the crystalline cluster of fish which they had witnessed in the ocean's “belly”. This is why they went to catch fish with their native tools. Everyone was surprised by the amount of fish caught and besides, this was the first time they witnessed this type of fish, very small but delicate and all-encompassing in its crystalline scales, such as the ocean, full of grace, and since catching this kind of fish is filled with joy and joy among the peoples of the community, and continually they thanked and praised God and as a thanksgiving offer, everyone agreed that this type of fish be given a name and they chose the name "Biya" which is abbreviated from the word "grace".

The place soon became famous for this kind and extraordinary fish. Many people came to see and taste the fish called “biya”, which is undeniably abundant in the area. Since then, it has been translated by the words of the people’s mouth and changed over time from “Biya” to “Biaan”. But it cannot be prevented as time passes that the conquerors had interest in the Biaan area because it is a hidden place but has a wonderful view and is blessed with natural resources. It also provides a reason to serve as a tourist destination to citizens who want to have a good disposition in life. As a result many people were interested in

invading/conquering the area of Biaan because of its natural resources and beauty. In fact during the 1900s this place was under Barangay San Isidro where governance was headed by the Barangay. On the other hand it did not last, because the Biaan area was able to independently and lead the citizens of the rulers, and later this place became an Independent Barangay on 1960.

2.4.2.1.2.2 Demographic Profile of the Barangay

Barangay Biaan has a total population of 1,911 based on the 2018 census. There are 990 males and 921 females. The barangay has always had an increasing annual growth population.

TABLE 2-42. TOTAL POPULATION BY SITIOS VS GENDER (BDP, 2018)

Sitio/Streets	Population		
	Male	Female	Total
Lower Biaan	398	284	682
Sitio 31	214	210	424
Sitio Talain	181	220	401
Sitio Wain	**51**	**25**	**76**
Sitio Laki	13	19	32
Sitio Nagtalinga	12	15	27
Sitio Basay	15	18	33
Sitio Quiapo	20	27	47
Sitio Aglaloma	34	41	75
Barrio Site	35	40	75
Signal Hills	17	22	39
Total	**990**	**921**	**1,911**

Number of Households

The total number of households living in Barangay Biaan is 550. The said numbers of households are living in the 11 sitios of the Barangay.

TABLE 2-43. TOTAL NO. OF HOUSEHOLDS BY NO. OF FAMILIES (BDP, 2018)

Sitios	Total No. of Households	Total No. of Families
Lower Biaan	187	198
Sitio 31	98	105
Sitio Talain	89	98
Sitio Wain	36	48
Sitio Laki	13	16
Sitio Nagtalinga	11	24
Sitio Basay	15	26
Sitio Quiapo	12	21
Sitio Aglaloma	37	42
Barrio Site	29	33
Signal Hills	23	27
TOTAL	**550**	**638**

Housing Materials

Based on the total number of households in Barangay Biaan, the breakdown of their household materials are as follows: 40% made from semi-concrete, 35% from concrete, and 25% from light materials.

2.4.2.1.2.3 Public Services

Education Facilities

Barangay Biaan has no college level school in the area. It has 2 Day Care Centers and 2 elementary schools located in Lower Biaan and Upper Biaan. There is only one high school and is locate in Upper Biaan which is 6 kilometers away from Biaan proper.

Health Facilities and Services

Barangay Biaan has its own Health Center located near the Barangay Hall. It is led by 5 hardworking Barangay Health Workers who service the barangay with their programs such as: Operation Timbang, Deworming, Vitamins Distribution, DOTS, Birth Control Program, Supplemental Feeding, and Assistance for Disabled Persons.

2.4.2.1.2.4 Public Health and Safety

Morbidity

The common causes of sickness in Barangay Biaan are the following:

1. Fever
2. Common Colds
3. Cough
4. Diarrhea
5. Rheumatism
6. High Blood Pressure
7. Cases of Malnutrition

Based on the records of the Barangay Health Center, Rheumatism usually occurs on the month of December until February because of the cold weather. Diarrhea, on the other hand, is high for the months of May until October because of the wet season where the water from the river is dirty. Common colds on the months of June to August and December to January. These months are either the wet or cold season. The table below shows the type of diseases and when they are usually present.

TABLE 2-44. TYPES OF DISEASES (BDP, 2018)

Diseases	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
1. Fever	✓					✓	✓	✓				✓
2. Colds	✓					✓	✓	✓				✓
3. Cough	✓					✓	✓	✓				✓
4. Diarrhea					✓	✓	✓	✓	✓	✓		
5. Rheumatism	✓	✓										✓
6. High Blood Pressure	✓			✓	✓	✓						✓

2.4.2.1.2.5 Socio-Economic Profile

Source of Income

In Barangay Biaan, there is an enforced Barangay Solid Waste Management Committee which is headed by the Punong Barangay, which is responsible for responding to the availability of proper and costly disposal of garbage as well as the development of the cleanliness of the Barangay.

Barangay Biaan has no Materials Recovery Facility (MRF). Non-decayed trashes are sold by citizens to the buyer of "Bote, Dyaryo, Bakal, Plastic". On the other hand, there are still a few residents of Barangay burning waste which is a problem by the Barangay because it causes a negative impact on the health and hygiene of the community. Also, other residents dig a pit on their yard to dispose of their garbage.

Farming

Everyone knows that Barangay Biaan is an agricultural area because 70% is occupied by a large area of land. Therefore, most farmers are able to plant a variety of different types of plants, fruit trees and forest trees that also provide income to the people, as well as the growth of Barangay in the agricultural branch. The major crops of Barangay Biaan are different types of root crops, copra, rice, fruits, vegetables, and bananas.

Because of the presence of a large river, there are enough rice fields in Barangay. It is undeniable that the main harvest in this area is rice with an exact number of 35% being collected for a total of one year. This is followed by 20% harvesting of various types of vegetables that are also found in Barangay as a result of abundant forests and vast terrain. 17% for good production of various types of fruits, usually manga, cashew and santol. In this area, the production of a variety of Roots Crops is 15%, which is usually harvested in the high sitios of Barangay. In addition, there is also an 8% for banana production. It can be said that the smallest harvest production comes from coconut or Copra (5%), because it is not much in Barangay and is not over-emphasized, because it demands high absorption of groundwater to be harvested properly and easily.

Livestock

The figure below shows the breakdown of type of livestock in Barangay Biaan. Hog raising is the highest type of livestock with 35%, followed by chicken with 25%. A small percentage (5%) is raising horses mostly in sitios located in the mountains.

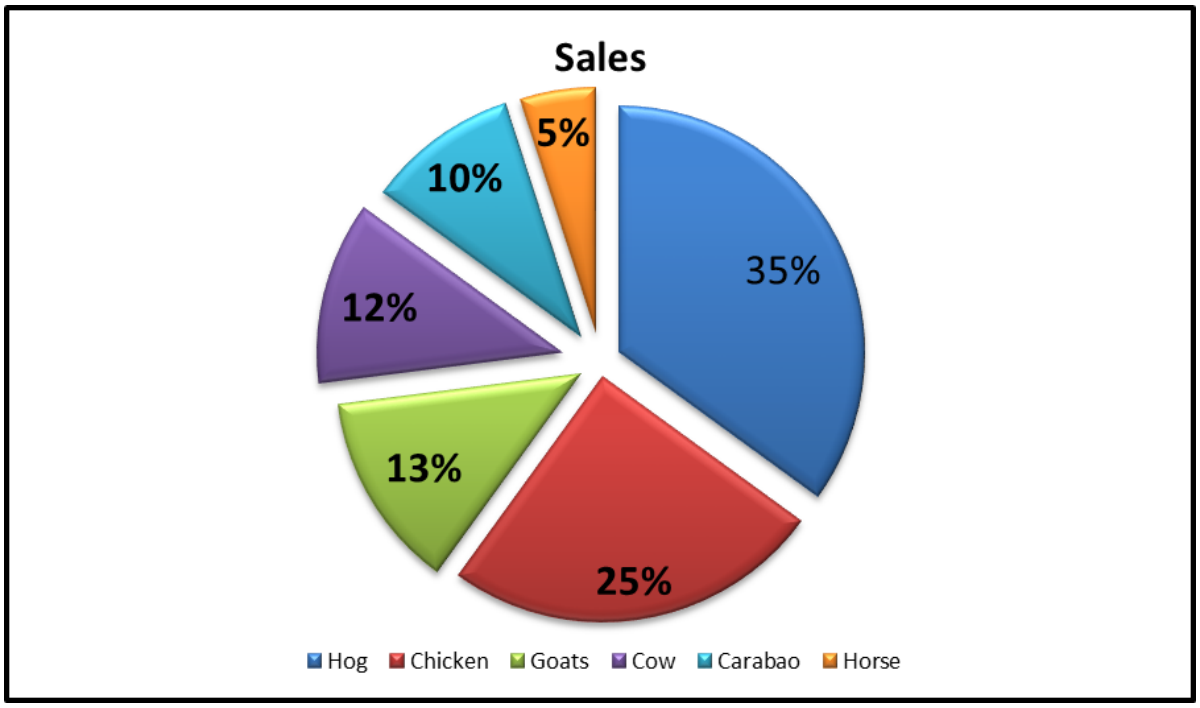


FIGURE 2-58. PERCENTAGE OF LIVESTOCK PRODUCTION IN BARANGAY BIAAN (BDP, 2018)

Fishing

Barangay Biaan is mostly a coastal community with 55% of livelihood coming from fishing. There are 5 types of fishing employed by the fishermen in the area. The table below shows the way of catching fish in Barangay Biaan.

TABLE 2-45. TYPES OF FISHING METHOD (BDP, 2018)

Way of Fishing	Percentage of individual
1. Pagkikitang	45 %
2. Pagkakaskas	15 %
3. Pangangawil	5 %
4. Paglalapas	10 %
5. Pagbubobo	15 %

- Pagkikitang - which utilizes nylon and “taga” from a long distance. These are thrown in the water from large containers at a depth of more than 15 feet.
- Pagkakaskas – is almost the same method as pagkikitang but using a shorter nylon tied to a medium sized wood plank.
- Pangangawil – Used with bamboo. Also with nylon and hook usually done in seashores.
- Paglalapas – Divers collect lapas or abalone
- Pagbubobo – A method to fish for squid using bamboo as temporary shelter. It is usually done in depths more than 6 feet and is left for a month before harvesting.

2.4.2.1.2.6 Traffic

Barangay Biaan is about 6 kilometers from the town, where it has a well-maintained road for all Barangay residents. In fact, the road from Barangay Biaan to Bayan can be used by vehicles such as motorcycles, tricycles, cars, and jeeps, where these are the main motorcars, and other large-scale vehicles. For the constituents to run smoothly on the road, the barangay currently plans to continue and implement the "Farm to Market Roads".

2.4.2.2 Perception Survey

A total of 100 respondents were interviewed during the survey on January 19, 2019. Thirty-three (33) respondents were workers of Camaya Beach Resort, who are also residents of Barangay Biaan, and 67 respondents from the community of Barangay Biaan.

Table 2-46 shows the number of and households and household size of the respondents.

TABLE 2-46. NUMBER OF HOUSEHOLD AND HOUSEHOLD SIZE

Household Size	Number of Households	Respondents
10	1	5
9	2	10
8	3	10
7	1	2
6	5	13
5	4	7
4	3	5
3	2	2
Did not answer	46	46
Total	67	100

2.4.2.2.1 Age

The table below shows the age distribution of the respondents. Most (52%) of the respondents are from the 31-50 age bracket while the least (5%) age bracket is from the Below 20s.

TABLE 2-47. AGE DISTRIBUTION OF RESPONDENTS

Age	Barangay Biaan	Camaya Resort	Total
Below 20	3	2	5
21-30	6	23	29
31-50	44	8	52
51-60	14	-	14
Total	67	33	100

2.4.2.2.2 Gender

The table below shows the gender distribution of respondents with 62% men and 38% women.

TABLE 2-48. GENDER DISTRIBUTION OF RESPONDENTS

Gender	Barangay Biaan	Camaya Resort	Total
Male	41	21	62

Gender	Barangay Biaan	Camaya Resort	Total
Female	26	12	38
Total	67	33	100

2.4.2.2.3 Civil Status

Majority of the respondents corresponding to 64% are married while 31% are single. 1% of the total respondents is separated and another 1% did not answer. The table below shows the distribution for Civil Status.

TABLE 2-49. CIVIL STATUS DISTRIBUTION OF RESPONDENTS

Civil Status	Barangay Biaan	Camaya Resort	Total
Married	51	13	64
Single	14	20	34
Separated	1		1
Did not Answer	1		1
TOTAL	67	1	100

2.4.2.2.4 Educational Attainment

Out of the total respondents, 53% did not graduate from High School. Only 30% were able to finish High School while 16% were able to reach college level. The table below shows the distribution for educational attainment.

TABLE 2-50. DISTRIBUTION OF EDUCATIONAL ATTAINMENT OF RESPONDENTS

Education	Barangay Biaan	Camaya Resort	Total
H.S. Undergraduate	48	5	53
H.S. Graduate	18	12	30
College Level	1	15	16
Business Mgt.		1	1
Total	67	33	100

2.4.2.2.5 Peace and Order

Almost all of the respondents (95%) said that they currently have a peaceful and orderly situation in the area and that they experience no significant disturbances except from the occasional drunken squabbles and misunderstandings.

2.4.2.2.6 Valued Tradition and Historical Place

The valued tradition in the community cited by the respondents is the Barangay Fiesta. A 12% response also observed “pasyon” as their tradition. All of the respondents have no recollection of any historical place or event that happened in their barangay or nearby area and said the Mt. Samat is the nearest historical place they have.

2.4.2.2.7 Livelihood

Half (50%) of the respondents rely on employment as their main source of income. While almost all of the respondents know how to fish, only 16% of the respondents are full-time fishermen.

TABLE 2-51. MAIN SOURCES OF LIVELIHOOD

Source	Barangay Biaan	Camaya Resort	Total
Employment	17	33	50
LGU	18		18
Fisherman	16		16
Small Businesses	4		4
Housewife	5		5
Tricycle Driver	2		2
Did not Answer	5		5
Total	**67**	**33**	**100**

2.4.2.2.8 Average monthly Income

Most of the respondents (53%) have a monthly income range of Php 1,000.00 – 5,000.00. Next is the income range of Php 5,000.00 – 10,000.00 with 35%. A small number (5%) receive no income per month.

TABLE 2-52. AVERAGE MONTHLY INCOME OF RESPONDENTS

Income	Barangay Biaan	Camaya Resort	Total
0-1,000	1		**1**
1,001-5,000	48	5	**53**
5,001-10,000	12	23	**35**
10,001-15,000		3	**3**
15,001-20,000		2	**2**
None	5		**5**
Total	**67**	**33**	**100**

2.4.2.2.9 Common Illnesses for the Past Five Years

For this sub-section, the report is made on the illness by the respondents including themselves, the common sickness encountered by the barangay, and the medical practitioner or institutions that they had sought for medical assistance.

A majority of the respondents (95%) use the existing Barangay Health Center while the remaining 5% seek treatment from the local albularyo or quack doctor.

Based on the survey, 36% had fever for the past 5 years while 27% could not remember getting sick. Tetanus and High Blood was the least illness with 1% each.

TABLE 2-53. COMMON ILLNESSES IN THE PAST 5 YEARS

Illness	Barangay Biaan	Camaya Resort	Total
Cough/Colds	20	10	32
High Blood	1		1
Fever	33	3	36
Tetanus	1		1
Diarrhea	5		5
None	7	20	27
Total	67	33	100

2.4.2.2.10 Cause of Death for the Past Five Years

The survey results showed that 94% could not remember a death in their family for the past 5 years. Drowning had a 4% response while 1% answered motorcycle accident as cause of death.

TABLE 2-54. CAUSE OF DEATH FOR THE PAST FIVE YEARS

Cause of Death	Barangay Biaan	Camaya Resort	Total
Motorcycle Accident	1		1
Drowning	3	1	4
None	62	32	94
Total	67	33	100

2.4.2.2.11 Project Awareness

Most of the respondents (56%) was aware of the proposed golf course while 32% said that they did not know about the project. A small number (12%) of respondents did not answer. The most common source of information on the project is from the Barangay Officials and Project Coordinators of the Proponent.

TABLE 2-55. PROJECT AWARENESS

Awareness	Barangay Biaan	Camaya Resort	Total
YES	46	10	5
NO	9	23	32
Did not Answer	12		12
Total	67	33	100

2.4.2.2.12 Impact of the Project

The majority (88%) of the respondents say that the project will be favorable to the Barangay. It will be an additional source of income since the priority for hiring is the impact barangay. A small percent (12%) from the barangay did not answer because they do not understand how the golf course project, 16 kilometers away, will affect them.

TABLE 2-56. PERCEIVED IMPACTS OF RESPONDENTS

Awareness	Total
Favorable	88
Did not answer	12
Total	**100**

2.4.2.2.13 Disaster Response

A total of 100% of the respondents experienced typhoon/storms (July 2018). One of the most recent typhoons the community encountered is the typhoon Josie in July 2018 where properties and the surrounding of the respondents were severely affected.

About 63% of the respondents stated that the level of response for disasters is adequate. Thirty three percent (33%) stated that level of community participation for disasters is also adequate, while 67% says that the infrastructures and materials are inadequate.

2.4.2.2.14 Respondents' Perceived Present Problems of their Community

The table below presents the respondents' perceived issues and concerns on different social aspects of their community.

TABLE 2-57. ISSUES AND CONCERNS OF RESPONDENTS ABOUT THE PROJECT

Social Aspect	Issues/Concern
Livelihood	• Insufficient livelihood programs for the marginal community
Environment	• Siltation from the project site
	• Dust from the dump trucks
	• Damage to marine waters and fishing opportunities
Health	• Dust may affect the children's health during the dump truck's delivery
	• Insufficient medical facilities and equipment
Basic Services	• Inadequate water supply
	• There are still households that do not have access to working toilets
Disaster preparedness	• Lack of disaster preparedness facilities (larger evacuation center)
	• Lack of disaster preparedness equipment (ambulance and firetruck)
	• Lack of assistance during disasters and emergencies

Results of KII Perceived Impacts

TABLE 2-58. RESULTS OF KII PERCEIVED IMPACTS

Sector	Perceived Impacts
LGU	• Employment Opportunities for locals • Additional taxes • Increase in tourists in the locale, increasing business opportunities • Siltation from the project site • Dust from the dump trucks
Seniors	• Employment Opportunities for locals • Increase in tourists in the locale, increasing business opportunities • Dust from the dump trucks
Youth	• Employment Opportunities for locals
Women	• Employment Opportunities for locals • Application of Gender
Residents	• Employment Opportunities for locals • Dust from the dump trucks

Perceived Positive Impacts of the Project

1. Improvement of roads
2. Possible employment opportunities
3. Increase in land tax
4. Improvement of government services (through community projects)

Perceived Negative Impacts of the Project

1. Might give illness/diseases
2. Landslide / soil erosion
3. Disaster

2.4.3 Summary: Social Issues and Concerns about the Project

Based on the output of the research and the methodologies used, the following is the enumeration of the documented community's issues and concerns with regards to the project:

1. Loss or depletion of water supply
2. Damage/destruction of fishing/marine waters due to siltation or pesticide use
3. Safety of employees during landslide
4. Threat to health due to generation/dispersion of dust
5. IEC and consultation on community

2.4.4 Impact Assessment and Mitigation Measures (People)

The matrix below presents the key impacts and the corresponding mitigation/enhancement measures from the proposed expansion project on the socio-demo-cultural aspect:

List of Key Impacts	Phase Occurrence				Discussion/Options for Prevention, Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Negative perception about the Project (Social Acceptability)	✓				IEC and community level consultations on the Project to properly inform the stakeholders
Loss of livelihood from fishing and farming Limited Employment opportunities	✓	✓	✓		Provision and development of alternative livelihood projects/programs especially for youth, women, and senior citizens Provide alternative routes to livelihood sources
Fear of landslides/ siltation and other hazards		✓	✓		Disaster Risk Management Plan IEC on Disaster Risk Management Seminars/training for communities on Disaster Risk Preparedness and Mitigation Provision of equipment and aid in response and recovery of affected communities Provision of larger evacuation center

List of Key Impacts	Phase Occurrence				Discussion/Options for Prevention, Mitigation or Enhancement
	Pre-Construction	Construction	Operation	Abandonment	
Threat to health due to generation/ dispersion of dust	✓	✓	✓		Develop and implement health programs/services for the host communities Setting-up of community health program at project affected areas; regular monitoring and consultation on medical services
Information regarding the project	✓	✓	✓		Provision of documents and updates to the municipal office regarding the status of the project
Utilization of existing MMT to monitor the project			✓		
Non-compliance to Required, Lawful, Agreed Upon and Programmed environmental protection, risk and damage mitigation and compensation Delay of necessary and requisite enhancement, preventive, mitigating, and compensatory measures, as well as compensatory payments and penalty payments Lack and delay of access of the communities to the programmed social development projects	✓	✓	✓		IEC on process of monitoring plans; procedures and regulations/processes Establishment/Development of community-driven programs/measures and actions/activities to enforce compliance (petitions, revocation of endorsement, citizen's arrest, etc.) Communicate with LGUs, POs, and NGOs to aid in more regular and continuous monitoring Implementation of SDP in coordination with the LGUs

3 ENVIRONMENTAL MANAGEMENT PLAN

This section provides the Project's Impact Management Plan (IMP), which serves as the action plan for implementing the mitigating and enhancement principles, practices and measures aimed at minimizing and/or eliminating the potential impacts of the proposed Project to the surrounding environment.

The identified environmental impacts and corresponding proposed preventive, mitigation and/or enhancement measures for each environmental component during the Project's pre-construction, construction, operation and abandonment phases are detailed in the following table.

The objectives of an Environmental Management Plan (EMP) are to formulate measures which will:

- Mitigate adverse impacts on various environmental components, which have been identified during the Environmental Impact Assessment study.
- Protect environmental resources wherever possible.
- Enhance the value of environmental components wherever possible.
- Formulate a plan to monitor the success or failure of environmental management measures, so as to carry out reorientation/modification of the management, if found necessary. A number of environment protection and enhancement measures can be implemented by adopting suitable planning and design criteria during the construction of the project. Further, it is necessary that the resources required for mitigation/protection, enhancement measures and monitoring are provided for in the cost estimates of the project, to ensure proper implementation.

Mitigation measures are suggested for activities which are categorized into environmental components during the construction, operation, and abandonment phases.

TABLE 3-1. IMPACT MANAGEMENT PLAN

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
CONSTRUCTION PHASE						
Transportation/ Mobilization of heavy equipment	Air People	(-) Dust generation as a result of increased movement of heavy equipment on site and delivery of materials (-) Health effects due to inhalation of dust by residents near road networks	• Implement dust suppression techniques. • Cover trucks loaded with spoils/ filling materials when in transit, especially in areas where communities are situated. • Regular water spraying of road surface, particularly in community areas, to minimize dust. • Provision of speed limits in major roads and in built-up areas. • Regular coordination with relevant government agencies (such as DPWH) and LGUs as to the activity.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
Civil works	Land	(-) Possible encroachment in the ECA	• Implementation of no hunting of wildlife in the project areas • Design of project components shall consider the natural calamities	Proponent		Approved Site Development Plan No Hunting Policy
	Land Water	(-) Generation of solid wastes	• Implementation of Solid Waste Management Plan • Segregation at source • Management of solid waste at the materials recovery facility • Segregation of solid waste according to recyclable and non-recyclables • Hauling of discarded/recyclable items by DENR-Registered transporters	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
		(-) Generation of hazardous wastes	• Segregation of hazardous wastes from regular wastes	Proponent's Environmental	Part of Construction	Proponent and Contractor's

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			• Storage of hazardous items on sealed, sturdy, and properly-marked containers • Hauling of hazardous items by DENR-Registered transporters	Unit / Contractor	Costs	MOA
		(-) Soil Erosion/Loss of Topsoil	• Conduct of earthworks during dry season, if practicable, to minimize possible soil erosion. • Implement progressive clearing and earthworks moving to the remaining undeveloped area to minimize erosion • Conduct immediate revegetation of appropriate erosion control grasses, especially native grasses such as carabao grass and *talahib*, to reduce rainfall impact to soil that can cause soil erosion during wet season.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
Civil works (*cont'n*)	Land	(-) Contamination of soil due to increased rate of erosion as a result of earthmoving, excavation, tunneling, and generation and presence of topsoil	• Proper road construction technique such as adhering to engineering best practices (i.e. proper gradient, proper slope stabilization) • Provision of proper and adequate drainage system. • Progressive ground preparation and clearing will be conducted to minimize total area of land that will be disturbed at any one time, where practical. Construction plan will be programmed consistent with this principle.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
	Water	(-) Contamination of water quality due to sedimentation/ siltation	• Implementation of proper engineering control designs and measures for potential erosion and siltation.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
	Land	(-) Vegetation removal and loss of habitat	• Trees that can be affected during grading and shaping can be minimized by incorporating the existing trees with the landscape design of the project. • All necessary permits (e.g. tree cutting permit) from DENR and other concern government agencies should be secured prior to tree cutting. Conditions of the said permit shall be complied by the proponent.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Tree Cutting Permit
	Air People	(-) Dust generation as a result of increased movement of heavy equipment on site and delivery of materials (-) Health effects due to inhalation of dust by residents near road networks	• Implement dust suppression techniques. Cover trucks loaded with spoils/ filling materials when in transit, especially in areas where communities are situated. Pre-wetting of road surface, particularly in community areas, to minimize dust. Provision of speed limits in major roads and in built-up areas. • Avoid long exposure of excavated soil to rain and strong winds • Establishment of construction buffer zones and containment barriers • Coordinate with relevant government agencies (such as DPWH) and LGUs as to the activity.	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
Civil works (*cont'n*)	Air People	(-) Increase in air emission levels	• Proper and regular maintenance of heavy equipment	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA
		(-) Increase in noise levels	• Installation of mufflers • If practicable, perform noise generating activities during daytime	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
	People	(+) Increased risks to occupational safety	• All personnel shall be required to wear proper PPE • All civil and electro-mechanical works shall be supervised by trained engineers • First-aid stations, safety equipment and signage shall be made available on working areas	Proponent's Environmental Unit / Contractor	Part of Construction Costs	Proponent and Contractor's MOA, Labor Code
	People	(+) Generation of Employment (-) influx of construction personnel (+) Creation of additional sources of income and livelihood	• Prioritize hiring of qualified residents of the host communities • Conduct specialized training program for the host communities • Prioritize purchasing of local items, if applicable, within the host communities	HR Department	Variable	Proponent's Public Relations Guidelines
OPERATION PHASE						
Maintenance of Golf Course (i.e., fertilizer application, pest management, landscape maintenance)	Land Water	(-) Solid waste generation	• Implementation of the Solid Waste Management Plan • Segregation at source • Segregation of solid waste according to recyclable and non-recyclables • Management and operation of materials recovery facility • Collection and disposal of segregated solid waste	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
		(-) Change in soil quality/fertility	• The fertilizers to be used should only be specific substances approved by the Fertilizer and Pesticide Authority (FPA) of the Department of Agriculture.	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			• Use of controlled-release fertilizer to minimize the possible contamination of groundwater by nitrate			
		(-) Contamination soil and groundwater due to excess fertilizers and pesticides	• Fertilizers to be used should only be specific substances approved by the Fertilizer and Pesticide Authority (FPA). • Use of controlled-release fertilizer to minimize the possible contamination of groundwater by nitrate. • If practicable, weeding control shall be done manually. • Ensure proper handling, management and storage of fertilizers and pesticides to avoid spills.	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
Maintenance of Golf Course (i.e., fertilizer application, pest management, landscape maintenance) (*cont'n*)	Land	(-) Vegetation removal/ Loss of habitat	• Prioritize native trees and grasses to be planted in identified buffer zones and/or as erosion control purposes. • Proper and regular maintenance of landscape/ greenery. • If practicable, retain existing trees and/or grasses as part of the golf course's landscape.	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
		(-) Threat to existence and/ or loss of important local species	• Secure tree-cutting permit from DENR before any cutting of trees will be carried-out. • Replacement of cut trees (e.g. 1:100 replacement ratio) shall be carried out. • any form of hunting will be prohibited	Proponent's Environmental Unit	Part of operation costs	Tree cutting permit
		(-) Threat to abundance, frequency and				

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
		distribution of important species	to all personnel working on site and shall allow all wildlife to flee to suitable habitats in case these are spotted. • As much as possible, any injured and/or less mobile wildlife seen on site should be rescued and relocated in suitable habitats			
	Water	(-) Change in drainage pattern/Inducement of flooding	• Regular monitoring of the rivers to ensure continuous flow of water. • Monitor efficiency of the artificial lakes that, aside for aesthetic purposes, also function as water retention basin for flood protection. • Drainage lines and canals shall be regularly checked for optimum efficiency.	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
		(-) Depletion of water sources/ Competition in water use	• Regularly check the drainage lines to ensure that the runoffs from the golf course are impounded back to the lake or diverted to constructed irrigation canals. • Ensure that company personnel operating the water supply equipment and devices are well trained and equipped with knowledge about the assigned tasks to ensure job efficiency. • Personnel in charge with the irrigation system, should regularly document the working condition of the facility to	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			monitor its efficiency. In case one of the components failed, it should be reported immediately so proper corrective measures can be applied. • Ensure that all water spraying equipment and/or system are properly calibrated. • Checking and maintenance of sprinklers shall be done regularly to ensure that clogging is avoided and optimum efficiency is maintained. • Ensure compliance with pertinent permits, such as the Water Permit from the National Water Regulatory Board (NWRB).			
Maintenance of Golf Course (i.e., fertilizer application, pest management, landscape maintenance) (*cont'n*)	Water	(-) Degradation of ground and surface water quality due to chemical/ hazardous waste's spillage	• Proper handling, management, transport and disposal of all identified fertilizers and pesticides and related hazardous materials and wastes. • Hauling and disposal of hazardous wastes by DENR-Registered transporters and treaters	Proponent's Environmental Unit Fertilizer/Pest Control Suppliers DENR Accredited hauler	Part of operation costs	Monitoring to be included in the CMR/SMR Regular submission of CMR/SMR
			• Hazardous wastes shall be collected and stored separately from regular wastes • Stored HW shall be adequately covered and properly marked based on specifications for easy identification during monitoring and hauling • HW storage area shall be inspected	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
			and checked regularly for possible spillage. It shall be kept clean at all times			
Daily operations	Land	(-) Solid waste generation	• Implementation of the Solid Waste Management Plan • Segregation of solid waste according to recyclable and non-recyclables • Provided trash bins within the golf course and clubhouse shall regularly be collected • Collected wastes shall be segregated and stored in garbage area prior to collection. • Ensure regular collection of wastes (wastes are hauled by municipal collection system)	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
	Water	(-) Wastewater generation	• Provision of appropriate sewage treatment plant	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
	Air People	(-) Emission from genset, vehicles and other diesel generating equipment	• "Turn Off Engine while Parked" sign shall be posted at the parking area. • Regular maintenance of generator set and diesel operated equipment. • Ensure that appropriate control facilities are installed and being used to reduce emission and help reduce the noise.	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
	People	(-) In-migration due to project operation	• Priority in giving employment shall be given to the qualified residents of the host barangays.	HR Department	Part of operation costs	Barangay Clearance
	People	Perception about the Project	• Disaster Risk Management Plan • IEC on Disaster Risk Management	Proponent's Environmental	Part of operation	Proponent EMP, ECC

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
		(-) Fear of landslides/siltation and other hazards	• Seminars/training for communities on Disaster Risk Preparedness and Mitigation • Provision of equipment and aid in response and Recovery of affected communities	Unit	costs	
Daily operations (*Cont'n*)	People	(-) Traffic congestion due to additional load due to influx of tourists/ visitors	• Posting of signage at strategic areas to direct the tourists/visitors to use the alternate • Ensure that the parking area is sufficient especially during scheduled golf league/tournament	Proponent's Environmental Unit	Part of operation costs	Proponent EMP, ECC
	People	(-) Increase in demand for health services in the area (-) Threat to health due to generation/ dispersion of dust	• The project is provided with clinic to immediately respond to minor health care needs of the tourists/visitors/employees. • Hiring of health personnel to attend to those who need medical assistance • In cases of untoward incidents and severe situations, the person who needs hospital care shall be brought immediately at the nearest hospital.	Proponent's Community Relations	Part of operation costs	Proponent EMP, ECC
	People	(-) Non-compliance to Required, Lawful, Agreed Upon and Programmed environmental protection, risk and damage mitigation and compensation	• IEC on process of monitoring plans; procedures and regulations/ processes • Establishment/ Development of community-driven programs/ measures and actions/activities to enforce compliance (petitions, revocation of endorsement, citizen's arrest, etc.) • Communicate with LGUs, POs, and NGOs to aid in more regular and	Proponent's Community Relations	Part of operation costs	Proponent EMP, ECC, IEC Plan

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
		(-) Delay of necessary and requisite enhancement, preventive, mitigating, and compensatory measures, as well as compensatory payments and penalty payments (-) Lack and delay of access of the communities to the programmed social development projects	continuous monitoring • Implementation of SDP in coordination with the LGUs			
Daily operations (*Cont'n*)	People	(-) Influx of migrant workers might increase incidences of crime	• Prioritize locally available qualified manpower in hiring to avoid influx of workers • Provision of security officer • Proper coordination with the local police. • Emergency numbers shall be posted at strategic places so assistance can easily be summoned in cases of unlikely situations. • Conduct trainings shall be done to orient employees on proper things to do in case someone would attempt to do untoward things.	Project Manager HR Manager Facility Administrator Security Officer	Part of operation costs	Proponent EMP, ECC, Barangay Clearance
ABANDONMENT PHASE						
Cease of	Land	(-) Possible	• A abandonment management plan	Proponent and	To be	Abandonment

Project Phase/ Environmental Aspect	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation or Enhancement	Responsible Entity	Cost	Guarantee/ Financial Arrangements
operation	Water	contamination of soil and water	will be prepared and carried out that will ensure proper handling, management, storage, transport, and disposal of hazardous materials and/or wastes. • Ensure that all hazardous materials are transported and disposed DENR accredited transporter and treater. • If necessary and required by pertinent laws, conduct of Environmental Site Assessment shall be done. • Properly inform the DENR, as required under pertinent laws, prior to abandonment activities.	Hired Contractor	determined	Plan, Proponent and Contractor's MOA
	Air	Generation of dust	• Watering of exposed ground shall be done to minimize dust dispersion	Proponent and Hired contractor	To be determined	Abandonment Plan, Proponent and Contractor's MOA
	People	Termination of workers	• Advance notice shall be given to workers • Proper compensation shall be provided	Proponent HR Manager	To be determined	

4 ENVIRONMENTAL RISK ASSESSMENT AND EMERGENCY RESPONSE POLICY AND GUIDELINES

4.1 Environmental Risk Assessment

This section discusses the Environmental Risk Assessment (ERA) of the proposed Project. An ERA is an evaluation tool for a project or an activity that determines the level of hazard that it may pose to humans, properties, and to the environment.

This section will discuss whether the proposed Project poses a significant risk to its surrounding environment. Also, this section will determine whether the surrounding environment poses significant risks to the proposed Project.

Ecological risk assessment is a process that evaluates the likelihood that adverse ecological effects may occur as a result of exposure to one or more stressors (U.S. EPA). The process is used to systematically evaluate and organize data, information, assumptions and uncertainties in order to help understand and predict relationships between stressors and ecological effects in a way that is useful for environmental decision making.

Keeping the golf course green entails the application of large amount of water, fertilizers and pesticides. If not controlled, a golf course project may pose significant risk to the environment.

4.1.1 Methodology

The general guidelines and outline for an Environmental Risk Assessment (ERA) preparation are prescribed in Annex 2-7e of DAO 2003-30. However, the guidelines focused more on the risks and hazards posed by activities and/or manufacturing methods that involve chemical storage, processing, and use. Although this is applicable for the proposed Project, this shall only form part of the overall ERA. Major environmental risks identified were the geological hazards posed on the proposed Project.

4.1.2 Risk Screening Level

A risk screening level exercise refers to specific facilities or the use of certain processes that has the potential to pose significant risks to people and its surrounding environment. The Project is covered by the risk screening level exercise, as indicated in **Table 4-1**.

The proposed Project entails risks that are natural, man-made, or a combination of both. Natural risks are hazards caused by phenomena such as earthquakes, geological instability and typhoons. Meanwhile, man-made risks are caused by accidents such as fires, structural/equipment failure, chemical spillages, and human error. Man-made risks could also be aggravated as a direct consequence of natural risks.

TABLE 4-1. RISK SCREENING MATRIX

Activities Requiring Risk Screening Exercise[1]	ERA Applicability to the Project
1) Facilities for the production or processing of organic/inorganic chemicals using: Alkylation, Amination, Carbonylation, Condenstation, Dehydrogenation, Esterification, Halogenation, Hydrogenation, Hydrolysis, Oxidation, Polymerization, Sulphonation, Desulphurization, Nitration, Phosphorus prod., Distillation, Extraction, Solvation, Pesticides & pharmaceutical prod.	Not Applicable
2) Installations for distillation, refining, and other processing of petroleum products	Not Applicable
3) Installations for total or partial disposal of solid or liquid substances by incineration or chemical decomposition	Not Applicable
4) Installations for the production or processing of energy gases (e.g., LPG, LNG, SNG.)	Not Applicable
5) Installations for the dry distillation of coal or lignite	Not Applicable
6) Installations for the production of metals and non-metals by wet process or electrical energy	Not Applicable
7) Installations for the loading and unloading of hazardous materials as defined by RA 6969 (or DAO 29)	Not Applicable
CONCLUSION	Risk screening level exercise is not applicable

Based on **Table 4-1** the Risk Screening Matrix provided under Annex 7-2e of DAO 2003-30 or the Revised Procedural Manual, the proposed golf course project does not fall within all identified activities requiring risk screening exercise, and thus, does not require to prepare an Environmental Risk Assessment.

4.2 Risk Assessment Framework

The ERA conducted for the project applies the generic framework of Australia and New Zealand (AS/NZS 4360:2004) for establishing the context, identifying, analyzing, evaluating, treating, monitoring and communicating risk. AS/NZS 4360:2004 Standard provides a generic guide for managing risk that may be applied to a very wide range of activities, decisions or operations. The Standard was used as a guide to design and implement a system of risk management based on the needs of the company and the processes and specific practices employed.

Specifically, this ERA makes use of the Qualitative Method, a quick and relatively easy to use method. Broad consequences and likelihoods can be identified. The qualitative risk assessment can provide a general understanding of comparative risk between risk events, and the risk matrix can be used to separate risk events into risk classes (ratings). Qualitative methods use descriptive terms to identify and record consequences and likelihoods of events and resultant risk.

Consequence Rating

TABLE 4-2. QUALITATIVE MEASURES OF "CONSEQUENCE" OR IMPACT (BASED ON AS/NZS 4360:1999)

Level	Descriptor	Example Description
1	Insignificant	Minimal, if any impact for some communities. Potentially some impact for a small number of (<10) individuals. Denoting an insignificant or trivial effect as a result of an event occurring
2	Minor	Low level impact for some communities, or high impact for a small number (<10) of individuals. Denoting small effects following the occurrence of an event or series of events
3	Moderate	High level impact for some communities, or moderate impact for communities (Barangay level). Defined as noticeable event or a series of events that can be rectified in the long term
4	Major	High level of impact for communities (Barangay level) Describing key events leading to fatalities, breakdown of social order, loss of abundance and/or loss of species, and widespread contamination resulting to reduction of air and water qualities
5	Catastrophic	High level of impact (Municipal level) Describing disastrous events that would lead to multiple fatalities, complete breakdown of social order, local extinction of population and widespread contamination that cannot be immediately remediated

Likelihood Rating

Level	Descriptor	Description
A	Almost certain	Is expected to occur in most circumstances (80 - < 100%)
B	Likely	Will probably occur in most circumstances (60 - < 80%)
C	Possible	Might occur at some time (40 - < 60%)
D	Unlikely	Could occur at some time (20 - < 40%)
E	Rare	May occur only in exceptional circumstances (< 20%)

		Consequence level				
		1	2	3	A	5
Likelihood level	Descriptor	Insignificant	Minor	Moderate	Major	Catastrophic
A	Almost certain	A1	A2	A3	A4	A5
B	Likely	B1	B2	B3	B4	B5
C	Possible	Cl	C2	C3	C4	C5
D	Unlikely	D1	D2	D3	D4	D5
E	Rare	El	E2	E3	E4	E5

Source: Bowden, Lane and Martin (2001)

Risk rating
Extreme
High Moderate
Moderate Risk
Low

Extreme Risk	Immediate action required.
High Risk	Management measures must be employed.
Moderate Risk	Management measures must be identified.
Low Risk	Manage by routine procedures.

4.2.1 Results

General biological populations within and immediate vicinity of the project area are at risk from chemicals (cumulative risk) from fertilizer and pesticide application. According Kenna (1995), there are six processes that influence the cycle of life of the chemicals sprayed on golf courses: runoff, volatilization, photolysis, adsorption, absorption, dilution/leaching and microbial degradation. Hence, entry of fertilizers and other pollutants to surface bodies via runoff or groundwater infiltration pose risks to water resources within and near the project site. Other pathways of hazards also include the soil and air. Consequently, the hazards from excessive concentration of chemicals could induce risks that are detrimental for plants, wildlife and human health.

Table 4-3 presents the sources of risks and their corresponding management measures.

TABLE 4-3. SOURCES AND MANAGEMENT RISKS

Hazard	Cause	Impact	Proposed controls	Consequence Rating	Without controls		With controls	
					Likelihood rating	Risk Level	Likelihood rating	Risk Level
Safety and Health								
Exposure to toxic levels of pesticides	Excessive application of pesticides Improper pesticide application Poor golf course management (lack of warnings, etc.) Lack of/insufficient/ unsuitable personal protective equipment (PPE)	Chronic or acute health problems affecting golf course personnel, players, and/or the surrounding community	• Development and implementation of an Integrated Pest Management Program; • Well-trained personnel with sufficient knowledge on legislations on pesticide handling, storage and use are hired; • Following the procedures in handling the chemicals, from delivery, application and disposal; • Apply only when prevailing weather conditions are conducive to safe application, preventing pollution from drift and runoff; • Chemical application is done mostly on Mondays or during days when golfers are less expected. Golf course is closed for during Mondays for maintenance activities. • Provide proper orientation for	2	B	B2 (High)	D	D2 (Low)

Hazard	Cause	Impact	Proposed controls	Consequence Rating	Without controls		With controls	
					Likelihood rating	Risk Level	Likelihood rating	Risk Level
			the golfers and communities near the golf course regarding the risks associated with pesticide exposure;					
Nitrate leaching	Excessive application of fertilizers	Increase in nitrate concentration on groundwater beyond drinking water standards	• Use of slow-release fertilizers for a more controlled release of nitrogen resulting in longer residuals; • Proper timing of fertilizer application; • Consider grass species, growth stage, etc. in determining the right amount of fertilizer; • Well-trained personnel with knowledge on fertilizer requirements of the turf and on the right amount of irrigation to be applied for a more effective nutrient uptake; • Perforated pipes installed for proper management and monitoring of runoffs; • Installation liners to artificial lakes;	2	B	B2 (High)	D	D2 (Low)
Environment								

Hazard	Cause	Impact	Proposed controls	Consequence Rating	Without controls		With controls	
					Likelihood rating	Risk Level	Likelihood rating	Risk Level
Eutrophication of surface water	Improper or excessive application of fertilizers especially phosphorus containing fertilizers;	Rapid growth of aquatic plant species, algae and weeds reducing the dissolved oxygen needed by aquatic organisms	• Use of slow-release fertilizers for a more controlled release of nutrients resulting in longer residuals; • Proper timing of fertilizer application; • Ponding of drainage water from the golf course to allow soil particles to settle at the bottom before discharging water especially during wet season. Monitor nitrate content of water quality in artificial lakes.	1	B	B1 (Moderate)	D	D1 (Low)
Excessive concentrations of pesticides on soil and water (surface and ground water)	Management factors such as: incomplete planning, misapplication, poor timing, choice of pesticides and over-irrigation	Bioaccumulation of plants and aquatic animals which could induce greater risk of chronic poisoning	• Adopt and implement an Integrated Pest Management Program • Read and follow label directions starting from planning and preparation to storage and disposal • Select a pesticide that poses the least threat of rapid leaching and runoff and is relatively non-persistent (short half-life).	3	B	B3 (High Moderate)		D2 (Low)

Hazard	Cause	Impact	Proposed controls	Consequence Rating	Without controls		With controls	
					Likelihood rating	Risk Level	Likelihood rating	Risk Level
Spillage of Pesticides / Chemicals / Fuel / Hazardous materials or wastes	Improper transport, handling and/or storage	Contamination of soil, surface water and groundwater; Health hazards	• Engage only DENR-accredited hazardous waste transport, storage and treatment service providers; • Provide proper training to employees handling hazardous materials and wastes; • Regular maintenance of vehicles and equipment; • Area for chemicals/handling facility provided.	4	C	C3 (High)	D	D3 (Moderate)
Groundwater depletion	Over-extraction of groundwater	Decrease in well yield or drying up of wells, land subsidence	• Monitoring of well yields of shallow wells near the project site; • Monitoring of groundwater use; • Implement water conservation measures such as water reuse, maximizing rainwater for irrigation and regular maintenance of irrigation facilities to maximize efficiency.	4	C	C3 (High)	E	D3 (Moderate)

4.3 Emergency Response Policy and Guidelines

4.3.1 Objectives

The primary objective is to ensure the protection and preservation of life, property and environment in the event of disasters such as typhoons, earthquakes, volcanic eruptions, flashflood and man-made disasters such as land, air and sea disasters through the effective and efficient execution of the Emergency Response Plan (ERP.

The mandate of an ERP is to make use of the combined resources created or available at the site and/or off-site services to achieve the following:

- To minimize the detrimental effects of a disaster on people and property;
- Provide rescue services and medical treatment to affected people within and outside the periphery of the resort.
- Inform and collaborate with local/state emergency relief authorities;
- Initially contain and ultimately bring the disaster under control;
- Preserve relevant records and equipment for subsequent enquiry into the causes and circumstances leading to the disastrous happenings;
- Investigate and take steps to prevent recurrence of similar incidents.

The ERP therefore needs to be related to the identification of sources from which hazards can arise and the maximum loss scenario that can take place in the concerned area.

4.3.2 Emergency Response Policy

The Project is committed to ensuring the health, safety and security of its personnel, assets and surrounding environment through the prevention of accidents by eliminating potential threats/hazards and anticipating other probable causes. Hence, the Project shall adhere to the primary approach to emergency response–that is the prevention of circumstances that can create emergency conditions.

The Project shall designate a safety officer, who will regularly conduct safety briefings and periodically conduct emergency response drills. The safety officer will supervise the daily safety performance of operations and maintenance procedures. The safety officer will inspect the work and crew situation to ensure maintenance of and compliance to safety guidelines.

Aside from the occupational safety accidents, the project area is also exposed to various geologic hazards such as ground shaking, surface rupturing, and typhoon.

The potential incidents and emergency situations that may be encountered in the future operation of the proposed Project are presented in **Table 4-4**.

TABLE 4-4. EMERGENCY SCENARIOS FOR THE PROJECT

Type of emergency situation	Possible causes	Potential effects
Occupational safety accidents	• Improper training and supervision of personnel • Equipment or facility failure • Lack of full understanding regarding the surrounding environment	• Injuries and fatalities to personnel • Partial or total loss of equipment
Earthquakes	• Movement/rupture of nearby fault lines • Volcanic eruption	• Failure of structures • Injuries or fatalities to personnel and communities
Tsunami	• Movement/rupture of nearby fault lines • Volcanic eruption • Intense earth movement	• Failure of structures • Injuries and fatalities to personnel and communities
Flooding	• Complex weather condition	• Collapse of structures • Destruction of project facilities • Injuries and fatalities to personnel and communities
Storm surge	• Typhoon-prone area • Complex weather systems • Intense rainfall, wind and high tides	• Injuries and fatalities to personnel and communities

In order to reduce, if not eliminate, extreme emergency situations leading to loss of life and property, hereunder are the Project's initial safety guidelines which will be refined during construction.

4.3.3 Emergency Plan

The company will adopt an Emergency Management Plan based on the recommended structure by the Philippine National Disaster Risk Reduction Management (NDRRMC) and Office of Civil Defense (OCD). The management of emergencies can be outlined into four elements – Prevention, Preparedness, Response, Recovery.

Figure 4-1 illustrates the four elements.

FIGURE 4-1. ELEMENTS OF EMERGENCY MANAGEMENT

4.3.4 Generic guidelines for the prevention, alleviation or response to emergency situations

4.3.4.1 Safety

1. All construction personnel, staff, and crew will undergo proper and complete training and regular toolbox and safety meetings to understand and internalize the job/tasks assigned and the corresponding risks and hazards involved and the necessary safety procedures.
2. All working personnel shall be required to wear appropriate personnel protective equipment.
3. No work will be allowed under typhoon or extreme weather conditions.
4. The Safety officer and its supervisors for each phase/work sector shall regularly check and monitor other personnel compliances with safety guidelines and plan.
5. Applicable safety guidelines and procedures promulgated by relevant agencies such as the OHSC-DOLE shall be complied with accordingly.

4.3.4.2 Emergency procedure

In the event of an emergency, the company General Manager and/or Construction Manager (or the highest ranking official on-site available), together with the Safety Officer and the rest of the Emergency Response Team (ERT), shall implement the Emergency Management Plan. The highest ranking official available on-site shall assume the role of the General Manager as an Incident Commander (IC). The IC will activate the ERT depending on the level and nature of emergency.

TABLE 4-5. KEY PERSONNEL IN EMERGENCY RESPONSE OPERATIONS

Emergency response personnel	Roles and responsibilities
Incident Commander	• Overall in-charge of operations during an emergency event • Provides direction and orders to the response team in managing the emergency • Informs supervisor/project manager about the incident
Supervisor/	• Assists at site when necessary • Know the condition of people involved in the emergency, assess the situation, give instructions to First Aid Team in case necessary • Inform family/ies concerned, providing information of hospital location and other necessary details
Safety supervisors	• Supervises daily safety performance of operations and maintenance procedures, including emergency response procedures
Liaison officer	• Secures the necessary permits and training certification for the personnel
First aid team	• Performs the actual response, rescue and retrieval of personnel and equipment during an emergency event • Calls for ambulance or needed specialists to immediately assist case when necessary, or arrange for case forwarding to better equipped hospital, if needed equipment is not available in nearby hospital
Logistics team	• Provides the necessary supplies and equipment for the First aid team • Provides additional support/assistance to the First aid team

5 SOCIAL DEVELOPMENT PLAN AND IEC FRAMEWORK

5.1 Social Development Plan

Indicative social development planning is necessary in formulating programs and strategies that would mitigate the major impacts of the project. This would guide the proponent in preventing/mitigating and/or enhancing a project's adverse and positive impacts on people's livelihood, health and environment.

Social Development Plan (SDP) aims to assess and identify the basic needs of the communities which will be affected by the project. SDP should be patterned in the Municipal and Barangay Development Plans of the host communities and in accordance with the mandated Corporate Social Responsibility. It aims to establish a strong relationship between the Project Proponent, community institutions, and stakeholders towards the goal of achieving an improved quality of life of the residents of the host localities.

The issues garnered from the perception survey were considered and addressed in the formulation of the SDP. These are the following:

Livelihood

1. Insufficient livelihood programs for the marginal community

Environment

2. Damage/destruction to marine waters/fishing areas
3. Dust from the project site
4. Dust from the dump trucks

Social

5. Provision of documents and updates to the municipal office regarding the status of the project
6. IEC and consultation on the community

Health

7. Dust may affect the children's health during the dump truck's delivery
8. Threat to health due to generation/dispersion of dust
9. Insufficient medical facilities and equipment

Basic Services

10. Loss or depletion of water supply
11. Inadequate water supply
12. There are still households that do not have access to working toilets

Disaster Preparedness

13. Lack of disaster preparedness facilities (larger evacuation center)
14. Lack of disaster preparedness equipment (ambulance and fire truck)

15. Lack of assistance during disasters and emergencies
16. Safety of employees during landslide

The Social Development Plan (SDP) presenting the major programs and activities is presented in **Table 5-3**.

The SDP is impact-based as a result of the EIA. This SDP therefore is rationalized within the purview of the PEISS addressing all the possible socio-economic impacts that may arise during and after the operation of the project as a result of significantly technical impacts. The company through its experienced Community Development or Social Work Officer will implement the SDP in coordination with all stakeholders. A periodic monitoring and evaluation of SDP projects and activities will be carried out in partnership with other stakeholders.

Moreover, coordination with the Project-affected barangay and the Municipal LGU of Mariveles will also be carried out to ensure conformity of activities and projects to the development thrust of the local government.

The SDP as a framework plan shall be an indicative set of programs that will:

- Identify the key concerns to be addressed (including those of the second level scoping issues and concerns);
- Recommend and design measures in response to these concerns;
- Indicate the responsible agency or organization with respect to these measures; and
- Plan broad timelines to make these measures happen.

Manpower Requirement

The development of the golf course complex will generate the following employment at various implementation stages.

TABLE 5-1. MANPOWER REQUIREMENT DURING CONSTRUCTION PHASE

Construction Phase	Manpower Requirement
Survey	**4**
Earthmoving	**6**
Shaping	**25**
Civil Works	**25**
Material Processing	**14**
Lake Liner	**14**
Irrigation	**5**
Management Office	**5**
Sub-Total	**98**

The proponent will employ 90% of local skilled workers during the construction phase. These are the same workers employed during the construction of the Camaya Coast Resort. For the Operation Phase, the proponent will train local workers comprising minimum of 70% of the manpower requirement presented in Table 5-2.

TABLE 5-2. MANPOWER REQUIREMENT DURING OPERATION PHASE

Operation Phase	Manpower Requirement
Golf Course Maintenance	
Superintendent	1
Lead Man	4
Operators	5
Technician	5
Utilities	15
Sub-Total	**29**
Clubhouse	
Office	10
Waiters/Waitresses	15
Bartenders	4
Front Desks	4
Security Guards	6
Technicians	5
Golf Caddies	5
Utilities	3
Sub-Total	**52**

TABLE 5-3. SOCIAL DEVELOPMENT PLAN

Concern	Program Actions	Lead Organization	Responsible Community Member/Beneficiary	Indicative Timeline	Source of Fund / Indicative Cost
1. Economic empowerment/ Employment	• Set-up barangay public employment/business services offices • Seminar and educational tour on sustainable fishing, agriculture, agroforestry, and organic farming: - Pro-poor Livelihood programs - Program for the elderly - Technical skills for women • Livelihood project and enterprise development projects for women, elderly and out of school youth - Piggery and poultry - Handicraft training/seminar - Backyard gardening • Gender Responsive • Skills training for construction work • Skills training for caddies • Skills training for food preparation, etc.	Earth, Fairways and Green Leisure Club Association Inc., DA, BFAR, TESDA, MSWD, LGU Officer for Women's Concerns	• Barangay Committees • Communities within impact barangay • POs and NGOs of impact barangays	Pre-construction Construction Operation	Earth, Fairways and Green Leisure Club Association Inc. Php 250,000.00
2. Health	• Set-up community health program at project affected areas; regular monitoring and consultation on medical services • IEC on sanitation and distribution of toilet construction materials to residents without toilets • Quarterly Health Education and Sanitation Program • Health & Safety Training for employees • Maternal Care and Child Health Care: Prenatal, Intranatal, Postnatal, Child birth in health centers or hospitals • Nutrition Program: Supplemental feeding and In-	Earth, Fairways and Green Leisure Club Association Inc., DOH, DepEd, Municipal Health Officer	• Barangay Committee on Health, Barangay Health Workers • Residents affected by the project • POs and NGOs of impact barangay • Employees of the project • Barangay Nutrition scholars and	Pre-construction Construction Operation	Earth, Fairways and Green Leisure Club Association Inc. Php 150,000.00

Concern	Program Actions	Lead Organization	Responsible Community Member/Beneficiary	Indicative Timeline	Source of Fund / Indicative Cost
	school Supplemental Feeding Program • Health Care prioritizing non-employees of the company in health centers or hospitals		Health • Workers; Women and children of the affected barangays		
3. Hazards and disaster preparedness	• Disaster Risk Management Plan • IEC on Disaster Risk Management • Seminars/training for communities and Camaya Golf workers on Disaster Risk Preparedness and Mitigation • Provision of equipment and aid in response and recovery of affected communities	Earth, Fairways and Green Leisure Club Association Inc. in partnership with local authorities and community organizations	• Communities of impact barangays • Camaya Golf Employees	Pre-construction Construction Operation	Earth, Fairways and Green Leisure Club Association Inc. Php 150,000.00
4. Transportation	• Improvement of roads • Constant and frequent water sprinkling along unpaved roads (if any)	Camaya Golf in partnership with local authorities and community organizations	• Barangay Committees • Communities within impact barangay • POs and NGOs of impact barangay	Pre-construction Construction Operation	Earth, Fairways and Green Leisure Club Association Inc. Php 200,000.00
5. Peace and Order	• Provision of seminars and workshops • Provision of equipment and facilities as aid in keeping order in the community	Camaya Golf, PNP, Barangay LGU - Tanod	• Barangay Committees • Communities within impact barangay • POs and NGOs of impact barangay	Pre-construction Construction Operation	Earth, Fairways and Green Leisure Club Association Inc. Php 150,000.00

5.2 Information, Education and Communication Framework

A comprehensive and intensive Information Education and Communication (IEC) Campaign is designed for the better information and education of the communities and the general public pertaining the objectives, necessity and benefits of the project, and the processes involved with the construction and operation of the proposed project. These shall be done through the distribution and posting of written materials such as brochures, newsletters, media statements and articles, bulletins and posters, comics, and online presence. Moreover, non-written types such as fora, symposia, conferences, workshops, community discussions and hearings, interpersonal focus discussions, house-to-house and purok-to-purok information drives, information desk/center, community seminars, site visits, audio visual presentations, radio and TV programs and/or guestings, etc., can also be used for the campaign. The IEC materials and activities will also serve as a venue for continuous dialogue, feedback and check and balance mechanism for the parties involved.

Table 5-4 below presents the proposed IEC Plan for the Golf Course Project.

5.2.1 Complaints Management

Camaya Golf has its Complaints Management Guideline to ensure that complaints from any of the interested parties (i.e. stakeholders, employees, customer, community, government agencies/offices and other related entities who wish to express their dissatisfaction pertaining to the effects of the company's operations) are properly communicated and addressed. Below is a summary of the Complaints Management Guideline of Camaya Golf.

5.2.1.1 Responsibilities and Authorities

Legal Assistant - is responsible in recording complaints received such as complainant's information, complaint's details, source, date and time raised in the complaints blotter (logbook). It is his/ her responsibility to initially assess, notify the concerned department, follow through actions taken, and monitor its effectiveness. Thereafter, closing of complaints once settled and safekeeping of records.

Grievance Committee - is a team of Division/ Department Managers and Legal Assistant who is responsible to respond, investigate and validate complaints.

Concerned Department (Process Owner) - is responsible to initiate and implement immediate/ corrective actions and ensures consistency of actions deployed.

5.2.1.2 Receiving a Complaint

Complaints are received verbally or in writing at any of the following:

- at any Camaya Golf Office
- via any of Camaya Golf's contact numbers
- via any of Camaya Golf's advertised email address and fax numbers
- via Camaya Golf's website or official page

Personal information are collected, stored, used and disclosed. Any information transferred outside the company without the consent of the complainant may be a breach of information privacy.

Privacy Statement:

> *"Camaya Golf Course is collecting your personal details for the purpose of responding to your complaint. Your information will not be disclosed to a third party without your consent unless required or authorized* to *do* so *by law."*

5.2.1.3 Recording of a Complaint

Recordkeeping is the responsibility of the Legal Assistant. All complaints received shall be recorded in the Complaints Blotter. They are retained and destroyed under an approved retention and disposal schedule. Records/ files with confidential, sensitive and/ or personal information must be saved within the recordkeeping system with appropriate security classifications and security access controls.

5.2.1.4 Assessing a Complaint

After receiving a complaint, it is assessed to determine:

- if it will be managed under this procedure;
- if it will be accepted;
- how, where and by whom it should be managed.

The issues raised, the relevant information provided, the actions undertaken so far and the outcome requested must be considered to understand the complaint based on the complainant's perspective.

In addition, to be able to determine how to manage the complaint, factors such as the significance of the issues, the reasoning for any decisions or actions made so far, any relevant legislative, policy or process requirements, the likely outcome or remedy and any potential corrective actions or improvement must be considered.

To ensure that complaints are managed consistently and appropriately, the nature and implication of the issues raised must be reviewed to determine the best classification of the complaint. Below are the classification levels of complaints:

Typical Complaint – assessed as having a low level of risk and/or minimal level of detriment to the complainant or to the company. These complaints normally involve minimal investigation.

Intermediate Complaint – assessed as having a medium level of risk and/or moderate level of detriment to the complainant or to the company. These complaints may involve detailed investigation and may require referral to the senior/executive management.

Complex Complaint – assessed as being serious or significant, with a high or extreme level of detriment to the complainant or to the company. These complaints may involve extensive investigation and require immediate attention of the senior/executive management.

5.2.1.5 Investigating a Complaint

The key steps of the investigation process are the following:

- Identify the key issues;
- Assess if there is conflict of interest;
- Plan the investigation;
- Gather and evaluate evidences; and
- Make a decision.

5.2.1.6 Responding to and Reporting a Complaint

Following an investigation, a timely and meaningful feedback must be provided to the complainant and any relevant staff or business areas involved and/ or that might be affected by any findings or corrective actions.

Complaints are consistently and systematically categorized and reported to the top management.

TABLE 5-4. IEC PLAN/FRAMEWORK FOR THE PROJECT

Target Sector identified as Needing Project IEC	Major Topic/s of Concern in relation to Project	IEC Scheme/ Strategy/ Methods	Information Medium	Indicative timelines and Frequency	Indicative Cost
Communities of impact barangay; Earth, Fairways and Green Leisure Club Association Inc. employees, LGUs, POs, NGOs	Project details/background; - Proponent - Scope of the project - Schedule of activities - Project development - Benefits from the Project	• Conduct of Seminars, • Site visits, conference, forum and workshops, meetings with LGUs, Local newspaper, press releases, Leaflets, Billboards; • Distribution of info materials • Maintenance of Information desk and center	Print Media, Posters, brochures, Comics Multi-media press releases, broadcast, TV spots and social media	Pre-construction	Php 100,000
Communities of impact barangay; LGUs, POs, NGOs, Contractors	EIA Results - Compliance with the DENR requirements - Environmental Management Plan - Environmental Compliance and Monitoring - Environmental laws and related regulations on MMT, ECC, etc. - Clean-Air Act, Clean Water Act, Ecological Solid Waste Management Act and other laws and regulations.	• Public Meetings • Purok-to-purok information drive • Distribution of info materials • Maintenance of Information desk and center	Print Media, Posters, brochures, Comics Multi-media press releases, broadcast, TV spots and social media	Pre-construction Construction Operation	Php 100,000

6 ENVIRONMENTAL COMPLIANCE MONITORING

As required under DENR Memorandum Circular 2010-14 and the Revised Procedural Manual for DAO 2003-30, the following section presents the environmental compliance monitoring plan for the project to monitor the identified key environmental impacts of the Project. This monitoring plan includes "Environmental Quality Performance Level" (EQPL) values, which are threshold/limit levels identified for each critical parameter associated with the identified significant project impacts. The limit level shall be the regulated threshold of pollutant (standard that must not be exceeded) while the action level is set lower than the limit level wherein management measures must be implemented so as not to reach the regulated threshold.

The following mechanisms and monitoring schemes are discussed in the succeeding subsections:

- Self-monitoring plan;
- Multi-sectoral Monitoring Framework; and
- Environmental Guarantee and Monitoring Fund/ Contingent Liability and Rehabilitation Fund Commitments

6.1 Self-Monitoring Plan

The proponent will undertake regular self-monitoring for parameters indicated in **Table 6-1**. A quarterly environmental monitoring report in the form of the Self-Monitoring Report (SMR) will be prepared by the proponent and submitted to the DENR-EMB accordingly.

TABLE 6-1. SELF-MONITORING PLAN

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
								EQPL Range			Management Measures		
			Method	Frequency	Location			ALERT	Action	Limit	Alert Action		Limit
CONSTRUCTION PHASE													
Land	• Vegetation removal/ Loss of habitat • Threat to existence and/ or loss of important local species • Threat to abundance, frequency and distribution of important species	Species richness, abundance, diversity, evenness, dominance and presence of endemic and threatened species	Transect survey and netting	Annual	Direct impact areas and rehabilitated areas particularly reforestation/ re-vegetated areas	PCO/ Environmental Officer	100,000	10% decline in baseline species richness and abundance	30% decline in baseline species richness and abundance	50% decline in baseline species richness and abundance	Investigate whether the decline is project-related or non-project related	If project-related then inform concerned department/ project management If not project-related, then inform MMT. LGU and DENR.	If project related, evaluate existing rehabilitation measures being implemented. Implement a more effective rehabilitation measure as necessary. If not project-related, then inform MMT. LGU and DENR for proper action.
Water/Land	Generation of solid waste	Solid Wastes	Actual Monitoring Waste collection and segregation of personnel	Daily	Project site segregation/ garbage area	Building Administrator/ PCO	Minimal	Build-up of waste materials	Noticeable odor and pilings of solid wastes	Generation of foul odor and attraction of rodents/ insects	Ensure waste segregation and regular collection of wastes	Issue Notice to employees/ workers to implement further the segregation of wastes Remind/ coordinate with waste hauler to ensure regular hauling of wastes	Intensify the waste segregation practices. Collection of segregated wastes shall be scheduled accordingly. Domestic wastes such as leftovers must be placed in covered bins or properly tied up garbage bags if will not be collected by contracted waste collector.
Water	Impairment of	TSS	Grab	Quarterly	Artificial lake, project	PCO	Php 50,000	Not more than	Not more	Not more	Progressive clearing and earth moving/ conduct earth		

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme				
			Method	Frequency	Location			EQPL Range			Management Measures	
								ALERT	Action	Limit	Alert Action	Limit
	surface and groundwater quality		sampling		drainage, Tilin and Basay creek		Per sampling station	60mg/L increase	than 68mg/L increase	than 76mg/L increase	works during dry season if possible	
		pH	In-situ	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		6.75	7.65	8.55		
		Temperature	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		2.25°C change	2.55°C change	2.85°C change		
		BOD	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		7.55mg/L	8.5mg/L	9.5mg/L		
		Oil and Grease	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		7.55mg/L	8.5mg/L	9.5mg/L		
		Nitrate	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		5.255mg/L	5.95mg/L	6.65mg/L		
		Phosphate	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		0.38mg/L	0.43mg/L	0.48mg/L		
		Total Coliform	Direct sampling with sample container	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		7,500 MPN/100mL	8,500 MPN/100mL	9,500 MPN/100mL		
		Fecal Coliform	Direct sampling with sample container	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		300 MPN/100mL	340 MPN/100mL	380 MPN/100mL		
		Ammonia	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		0.375mg/L	0.425mg/L	0.475mg/L		
		Surfactants	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO		11.25mg/L	12.75mg/L	14.25mg/L		
Air	Generation of emission from construction equipment / vehicles	TSP PM10	Hi-volume/ Gravimetric/ AAS/ ICP/ UV-VIS 1-hour averaging	Semi-annually	Baseline air quality monitoring stations (may be adjusted accordingly)	PCO	PhP25,000per sampling	TSP: 161 ug/ncm PM10: 105 ug/Ncm	TSP: 184 ug/ncm PM10: 120 ug/Ncm	TSP: 230 ug/ncm PM10: 150 ug/Ncm	Regular monitoring of construction equipment	Request for maintenance More stringent implementation of	Request for maintenance, upgrade or replacement, if feasible

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measures		
								ALERT	Action	Limit	Alert Action		Limit
								Complaints lodged by community	Complaints lodged by community	Complaints lodged by community	Turn Off Engine While Parked Policy	traffic and parking policies	
People	Generation of Employment	Employment	Qualified locals	Entire Operation Stage		Admin/HR/ LGU	Minimal	Coordination with LGU			Coordination with LGU regarding number of available jobs and respective requirements.		
OPERATION PHASE													
Water	Impairment of surface and groundwater quality	TSS	Grab sampling	Quarterly	Artificial lake, project drainage, Tilin and Basay creek	PCO	Php 50,000 per sampling station	Not more than 60mg/L increase	Not more than 68mg/L increase	Not more than 76mg/L increase	Regular maintenance of water distribution system Intensify the implementation of IPM	Change/adjust fertilizer and pesticide requirement/ amount of application	Install liners to unlined artificial lakes Install liners to unlined artificial lakes
		pH	In-situ					6.75	7.65	8.55			
		Temperature	Grab sampling					2.25 ^{o}C change	2.55 ^{o}C change	2.85 ^{o}C change			
		BOD	Grab sampling					7.55mg/L	8.5mg/L	9.5mg/L			
		Oil and Grease	Grab sampling					7.55mg/L	8.5mg/L	9.5mg/L			
		Nitrate	Grab sampling					5.255mg/L	5.95mg/L	6.65mg/L			
		Phosphate	Grab sampling					0.38mg/L	0.43mg/L	0.48mg/L			
		Total Coliform	Direct sampling with sample container					7,500 MPN/100mL	8,500 MPN/100mL	9,500 MPN/100mL			
		Fecal Coliform	Direct sampling with sample container					300 MPN/100mL	340 MPN/100mL	380 MPN/100mL			
		Ammonia	Grab sampling					0.375mg/L	0.425mg/L	0.475mg/L			
		Surfactants	Grab sampling					11.25mg/L	12.75mg/L	14.25mg/L			
Water/Land	Generation of solid waste	Solid Wastes	Actual Monitoring Waste collection and segregation of personnel	Daily	Project site segregation/ garbage area	Building Administrator/ PCO	Minimal	Build-up of waste materials	Noticeable odor and pilings of solid wastes	Generation of foul odor and attraction of rodents/ insects	Ensure waste segregation and regular collection of wastes	Issue Notice to employees/ workers to implement further the segregation of wastes	Intensify the waste segregation practices. Collection of segregated

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measures		
								ALERT	Action	Limit	Alert Action		Limit
												Remind/ coordinate with waste hauler to ensure regular hauling of wastes	wastes shall be scheduled accordingly. Domestic wastes such as leftovers must be placed in covered bins or properly tied up garbage bags if will not be collected by contracted waste collector.
	Generation of hazardous waste i.e. empty fertilizer bags, empty containers of insect/pest control chemicals, used oil, BFLs, etc.	Hazardous Wastes	Segregation/ Collection	Daily All hazardous waste generated such as containers of fertilizers and pesticides, BFLs, used oil, and grease trap will be monitored on a daily basis. A record will be maintained and updated regularly.	Genset room/ Hazardous waste collection area	Building Administrator/ PCO	PhP25,000/year (might change depending on volume and other circumstances)	Accumulation of hazardous wastes	Significant increase of wastes i.e. use up nearly 80% of the storage drums	Hazardous wastes storage area can no longer handle the accumulated wastes	Properly segregate and store the materials. Proper labeling shall be done	Accounting of used materials. Contact DENR accredited hauler	Immediate haul of wastes and address the contamination by DENR accredited hauler/treater.
Air	Generation of smoke emission from gensets and service vehicles	NOx CO PM10 TSP	Hi-volume/ Gravimetric/ AAS/ ICP/ UV-VIS 1-hour averaging	Semi-annually	Genset Exhaust	PCO	PhP25,000per sampling	NOx: 140 ppm CO: 17,500 ug/m^3 TSP: 161 ug/ncm PM10: 105	NOx: 195 ppm CO: 26,250 ug/m^3 TSP: 184 ug/ncm PM10: 120	NOx: 260 ppm CO: 35,000 ug/m^3 TSP: 230 ug/ncm PM10: 150	Regular monitoring of gensets and vehicles Proper traffic management Turn Off Engine While Parked	Request for maintenance More stringent implementation of traffic and parking policies	Request for maintenance, upgrade or replacement, if feasible

Key Environmental Aspect Per Project Phase	Potential Impacts	Parameters to be Monitored	Sampling & Measurement Plan			Lead Person	Estimated Cost (Peso)	EQPL Management Scheme					
			Method	Frequency	Location			EQPL Range			Management Measures		
								ALERT	Action	Limit	Alert Action		Limit
								ug/Ncm Complaint lodged by community	ug/Ncm Complaint lodged by community	ug/Ncm Complaint lodged by community	Policy		
Air /People	Health impacts from excessive pesticide spraying	Occupational health and hazards	Inspection of records of work related illnesses.	Monthly reporting	Project area and closest households	PCO/ Maintenance Personnel	Minimal	5 work-related and illnesses in a month 1 valid complaint in a month	10 work-related and illnesses in a month 3 valid complaint in a month	15 work-related and illnesses in a month 5 valid complaint in a month	Use of PPE during pesticide spraying Adoption and implementation of an Integrated Pest Management Program. Conduct investigation and safety re-training	Use of PPE during pesticide spraying Adoption and implementation of an Integrated Pest Management Program. Conduct investigation and safety re-training	If project related, halt pesticide application and reconsider alternative options.
People	Generation of Employment	Employment	Qualified locals	Entire Operation Stage		Admin/HR/ LGU	Minimal	Coordination with LGU			Coordination with LGU regarding number of available jobs and respective requirements.		

6.2 Multi-Sectoral Monitoring Framework

DENR is requiring all proponents with projects identified as environmental critical projects (ECPs) to establish/form a Multi-Partite Monitoring Team (MMT). MMT is a community-based multi-sectoral team organized for the purpose of monitoring the proponent's compliance with ECC conditions, EMP and applicable laws, rules and regulations.

The said monitoring team, in reference to DENR Administrative Order 2017-15, shall be composed of the following members:

(a) The LGU representatives
- One (1) representative each from the Municipal/City Environment and Natural Resources Officer (MENRO/CENRO) (for projects whose DIA is limited to the City or Municipality) and provincial Government (PG) ENRO (for projects whose DIA covers more than 2 municipalities). In cases where there is no PG-ENRO and MENRO/ CENRO, the Municipal/Provincial Planning and Development Officer (MPDO/PPDO) or the chairman of the environment committee of the Sangguniang Bayan may be designated as representative to the MMT.
- The Rural Health Unit (RHU) Chief
- Concerned Barangay Captain

All existing LGU representatives to the MMT shall be replaced by these officers or their representatives.

(b) One (1) representative from the LGU-accredited local NGOs with mission/s specially related to environment management and/or other type of impacts of the proposed undertaking/project may be designated as representative to the MMT. In cases there is no such NGOs, it shall be open to other NGOs.

(c) Maximum of two (2) representatives from locally organized community leaders who can represent vulnerable sectors including indigenous populations, women and senior citizens and representatives from the academe may be included as member of the MMT in addition to the LGU-accredited NGO.

(d) Maximum of three (3) representatives from government agencies with related mandate on the type of project and its impacts during project implementation shall be included in the MMT membership, if not yet included. Examples of these government agencies are DOE for energy projects, MGB for mining projects, and PCG, BFAR, BMB or FMB, depending on the location. DENR participation/membership shall be limited only in cases where there are specific concerns related function related to biodiversity and forestry as endorsed by the concerned Bureau Director.

The MMT shall not exceed ten (10) members except in cases where the location of project facilities covers more than one (1) barangay. In such cases, additional member shall come from additional barangays/ and MENRO.

As a general rule, the representative from the MENRO/CENRO, the PG-ENRO or the representative from the lead government agency (e.g. DOE for energy projects, DOT for Tourism projects) shall serve as the MMT Chair. In cases where the said representatives do

not accept the chairmanship, the members of MMT elect among themselves and specify the procedures in its Manual of Operations.

As an independent entity whose membership represents the stakeholders/public, the MMT is expected to add credibility by being open and transparent in monitoring environmental impacts and compliance with the Philippine EIS System requirements. The MMT shall have the following specific functions:

(a) Conduct quarterly ocular site visit to validate the proponent's compliance with the ECC conditions and the Environmental Management and Monitoring Plan including the requirement to conduct self-monitoring and submit corresponding reports regularly.

The MMT may observe sampling activities conducted by the project proponent.

(b) Prepare and submit its report to EMB-CO and EMB-RO concerned using EMB-prescribed format at least semi-annually not later than July 30 for the 1st semester report and January 30 for the 2nd semester report.

(c) Institute an environmental emergency and complaints receiving and management mechanism which shall include systems for transmitting recommendations for necessary regulatory action to EMB in a timely manner to prevent adverse environmental impacts.

(a) A Memorandum of Agreement (MOA) shall be entered into by the above sectoral representative to be able to operationalize the MMT.

6.3 Environmental Fund Commitments

The Environmental Monitoring Fund (EMF) is a fund that a Proponent shall commit to establish in support of the activities of the MMT for the compliance monitoring. The EMF will be established as agreed upon and specified in the MOA between DENR-EMB and the Proponent, with conformity of the MMT members. An EMF is required for all MMTs of EIS based projects.

The initial determination of the EMF is included as part of the Environmental Management and Monitoring Plan and as established in the ECC for a particular project or undertaking. However, the actual amount to be allocated for the EMF shall be determined on the basis of the Annual Work and Financial Plan (AWFP) that would be agreed upon by the MMT, derived from the Proponent's Environmental Monitoring Plan (EMoP).

An appropriate basis for the determination of the EMF would be the cost of monitoring activities and environmental information programs as proposed by the Proponent in the Environmental Management Plan. The rates or amounts that will be used in the preparation of the Work and Financial Plan shall be in accordance with the rates agreed upon and within the limits set herein or as prescribed in pertinent government guidelines.

The proponent shall set aside an initial amount of PhP200,000.00, at least, for this purpose.

An Environmental Guarantee Fund (EGF) is a fund that proponents shall commit to establish when an ECC is issued for projects or undertakings determined by EMB to pose significant risk to answer for damage to life, property, and the environment caused by such risk, or requiring rehabilitation or restoration measures.

The EGF shall be established and used for the following risk-management related purposes:

(a) the immediate rehabilitation of areas affected by damage to the environment and the resulting deterioration of environmental quality as a direct consequence of project construction, operation, and abandonment;
(b) the just compensation of parties and communities affected by the negative impacts of the project;
(c) the conduct of scientific or research studies that will aid in the prevention or rehabilitation of accidents and/or risk-related environmental damages; or
(d) For contingency clean-up activities, environmental enhancement measures, damage prevention programs and social equity measures (e.g. livelihood, social development programs) including the necessary IEC and capability building activities related to the project.
(e) The proponent shall set aside an initial amount of PhP500,000.00, at least, for this purpose.

6.3.1 EMF and EGF Administration and Management

The EMF will be managed and administered by the MMT Executive Committee of the Project. The disbursement of the EMF will be carried out according to the annual monitoring work and financial plan submitted by the MMT, which will be reviewed and concurred with by the Proponent and approved by EMB.

An EGF Committee will be formed to manage, control, and operate the EGF in accordance with the agreed internal procedures established regarding the mechanisms for fund disbursement, processing, validation, accounting and documentation. The committee will be composed of the MMT Officers, with the EMB Regional Director as the Chairperson.

7 DECOMMISSIONING / ABANDONMENT / REHABILITATION POLICY

Once the Project is completed, there are no plans to abandon the project area as it shall be maintained as economically and environmentally possible. In a worst case scenario where the project will be decommissioned or abandoned, due to economic, financial, or any force majeure scenarios, the Proponent will ensure that key facilities that may pose potential environmental hazards will be properly addressed and decommissioned.

Priority facility that will be managed and decommissioned during unplanned scenarios will be the emptying of hazardous chemicals storage area. Remaining fertilizers and pesticides will be sold to interested buyers such as to the agricultural related business, or will be disposed of properly if no buyers are interested.

Also, should the facilities within the Project area be removed, the proponent shall ensure that the abandonment will be in accordance with the applicable laws and regulations of the national and local government units. An Abandonment Plan will be prepared and submitted to the Environmental Management Bureau, for review and consideration. Approved Abandonment Plan will be implemented accordingly to ensure that any environmental risk and hazards are addressed.

The succeeding items discuss plans that will be considered by the proponent during the course of abandonment or decommissioning phase.

7.1 Social Plan

In compliance to relevant labor laws, rules and regulations, the proponent will carry out the following program to its regular employees during abandonment and decommissioning phase.

- Retrenchment Package;
- Labor Support Policies and Programs;
- Job Search for employees;
- Skills Training and Education Programs;
- Enterprise Awareness and counseling.

7.1.1 Retrenchment Package

For the separation package to all company employees, existing laws, rules and regulations particularly the Labor Code will be strictly employed. Aside from the benefits that the workers may avail during closure, additional incentives will be provided. This incentive is on top of the regular mandates govern by existing laws and regulations. Also, part of the Company's Corporate Social Responsibility initiatives, the company will conduct micro-business trainings and seminars to laborers and the community in partnership with the local

government agencies. The trainings and seminars will be aimed to educate low ranking personnel of the company and the affected community other possible economic and business opportunities within the province or region.

7.1.2 Labor Support Policies and Programs

The Company will assist employees to improve the employment capacities by providing a broad range of trainings. This will assist the employees to make the transition to alternative jobs or in becoming self-employed. These services can be any of the following:

- **Job Search**. Provision of information to workers on labor markets and job-openings;
- **Skills Training and Education Programs**. Provision of job-related courses/trainings or courses focused toward a future career which may vary from office skills to artisan multi-skills training;
- **Enterprise Awareness**. To motivate those who consider self-employment but have not yet seen such as a viable alternative; and
- **Counseling.** To help workers cope both socially and financially after the loss of their job and should be focused on money matters and property management.

7.2 Decommissioning / Abandonment Criteria

Following the implementation of the closure actions described in the previous sections, it is necessary to have measurable criteria against which to assess the effectiveness of the plan and its implementation. These criteria will assist the company in identifying when the standard of closure achieved is adequate to ensure that potential environmental impacts is eliminated.

A general criterion that may be used as guide to monitor the effectiveness of the plan is presented in Table 7-1.

TABLE 7-1. ABANDONMENT CRITERIA

Category	Closure criteria	Indicators	Reporting Requirements
Surface water	Compliance with the Clean Water Act	Records Water quality Stations	Monitoring report
Air	Compliance with the standards of Clean Air Act	Records of air quality measurements for TSP	Monitoring Report
Soil Quality	Free from chemical and/or hazardous substances contamination	Soil quality in clubhouse, hazardous waste storage facilities and in golf course site.	Monitoring Report
Structural Safety / Stability	The site and facilities are safe for use by future stakeholders for similar	Structural assessment	Evidence of structural inspection and certification of

Category	Closure criteria	Indicators	Reporting Requirements
	uses or purposes.		building integrity and soundness.

7.3 Details of Maintenance and Monitoring Plan

Once decommissioning and abandonment works are complete, maintenance and monitoring program will be initiated to ensure the continuity and effectivity of the programs implemented. Maintenance and monitoring of any potential impacts to the environment is estimated to take place for a year after the abandonment phase, but may extend longer depending on monitoring results against abandonment criteria.

During the period it is likely that only a skeleton staff presence will be maintained on site. At specified intervals a monitoring team will visit the site to take scheduled samples and make assessments regarding the progress and the effectiveness of closure measures put in place, and assess if remedial work is required.

8 INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION

The proponent shall organize an Environmental Unit (EU) to effectively perform the self-monitoring activities of the project. The EU shall report directly to the management on the status of EMP implementation and recommends mitigating measures when necessary. The EU shall be responsible for the compliance of the management plan.

ENVIRONMENTAL UNIT

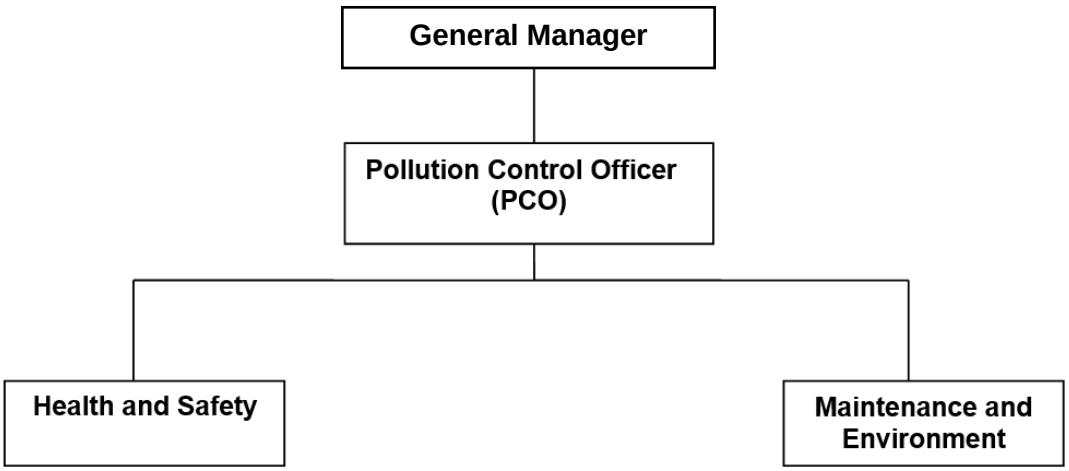


FIGURE 8-1. ORGANIZATIONAL CHART

The implementation of the Environmental Management Plan (EMP) provided in this document will be specifically handled by the Pollution Control Officer. The proponent, through the said department, is committed to comply with the conditions that will be stipulated in the ECC and other related environmental laws.

The proponent will also establish a partnership with relevant government agencies, various stakeholders and local host communities in relation to the project. This partnership is necessary to maintain a transparent and positive relationship for the project and its stakeholders, as well as to ensure compliance with environmental protection and enhancement measures.

8.1 Grievance Mechanism

Camaya Golf has its Complaints Management Guideline to ensure that complaints from any of the interested parties (i.e. stakeholders, employees, customer, community, government agencies/offices and other related entities who wish to express their dissatisfaction

pertaining to the effects of the company's operations) are properly communicated and addressed. Below is a summary of the Complaints Management Guideline of Camaya Golf.

8.1.1 Responsibilities and Authorities

Legal Assistant - is responsible in recording complaints received such as complainant's information, complaint's details, source, date and time raised in the complaints blotter (logbook). It is his/ her responsibility to initially assess, notify the concerned department, follow through actions taken, and monitor its effectiveness. Thereafter, closing of complaints once settled and safekeeping of records.

Grievance Committee - is a team of Division/ Department Managers and Legal Assistant who is responsible to respond, investigate and validate complaints.

Concerned Department (Process Owner) - is responsible to initiate and implement immediate/ corrective actions and ensures consistency of actions deployed.

8.1.2 Receiving a Complaint

Complaints are received verbally or in writing at any of the following:

- at any Camaya Golf Office
- via any of Camaya Golf's contact numbers
- via any of Camaya Golf's advertised email address and fax numbers
- via Camaya Golf's website or official page

Personal information are collected, stored, used and disclosed. Any information transferred outside the company without the consent of the complainant may be a breach of information privacy.

Privacy Statement:

> *"Camaya Golf Course is collecting your personal details for the purpose of responding to your complaint. Your information will not be disclosed to a third party without your consent unless required or authorized* to *do* so *by law."*

8.1.2.1 Recording of a Complaint

Recordkeeping is the responsibility of the Legal Assistant. All complaints received shall be recorded in the Complaints Blotter. They are retained and destroyed under an approved retention and disposal schedule. Records/ files with confidential, sensitive and/ or personal information must be saved within the recordkeeping system with appropriate security classifications and security access controls.

8.1.3 Assessing a Complaint

After receiving a complaint, it is assessed to determine:

- if it will be managed under this procedure;
- if it will be accepted;
- how, where and by whom it should be managed.

The issues raised, the relevant information provided, the actions undertaken so far and the outcome requested must be considered to understand the complaint based on the complainant's perspective.

In addition, to be able to determine how to manage the complaint, factors such as the significance of the issues, the reasoning for any decisions or actions made so far, any relevant legislative, policy or process requirements, the likely outcome or remedy and any potential corrective actions or improvement must be considered.

To ensure that complaints are managed consistently and appropriately, the nature and implication of the issues raised must be reviewed to determine the best classification of the complaint. Below are the classification levels of complaints:

Typical Complaint – assessed as having a low level of risk and/or minimal level of detriment to the complainant or to the company. These complaints normally involve minimal investigation.

Intermediate Complaint – assessed as having a medium level of risk and/or moderate level of detriment to the complainant or to the company. These complaints may involve detailed investigation and may require referral to the senior/executive management.

Complex Complaint – assessed as being serious or significant, with a high or extreme level of detriment to the complainant or to the company. These complaints may involve extensive investigation and require immediate attention of the senior/executive management.

8.1.4 Investigating a Complaint

The key steps of the investigation process are the following:

- Identify the key issues;
- Assess if there is conflict of interest;
- Plan the investigation;
- Gather and evaluate evidences; and
- Make a decision.

8.1.5 Responding to and Reporting a Complaint

Following an investigation, a timely and meaningful feedback must be provided to the complainant and any relevant staff or business areas involved and/ or that might be affected by any findings or corrective actions.

Complaints are consistently and systematically categorized and reported to the top management.

ANNEX

A – Proof of Authority over the Project Site

B – Compatibility with Existing Land Use

C – SEC Registration

D – Sworn Accountability of Proponent and Preparer

E – PEMAPS

F – Laboratory Certificates

G – Public Scoping Report

ANNEX A

Proof of Authority over the Project Site

ANNEX B

Compatibility with Existing Land Use

ANNEX C

SEC Registration

ANNEX D

Sworn Accountability of Proponent and Preparer

ANNEX E

PEMAPS

ANNEX F

Laboratory Certificates

ANNEX G

Public Scoping Report