CEBULANDMASTERS
We Build with You in Mind

CASA MIRA TOWERS PALAWAN

(EIS)

Submitted to:

Department of Environment and Natural Resources
Environmental Management Bureau (EMB)
Region IV-B – MIMAROPA
1515 L & S Building, Roxas Boulevard, Ermita, Manila

Project Fact Sheet

Name of Project:	**Casa Mira Towers Palawan**
Proponent:	**Cebu Landmasters, Inc.**
Office address and Contact numbers:	10th Floor Park Centrale, I.T. Park, Apas, Cebu City
Authority over the Project Area	**ATTY. NOEL C. FELONGCO I**
Project Size	Total Lot Area: 21,951.21 sq meters Gross Floor Area (GFA): 64,047.68 Construction Floor Area (CFA): 92,102.12 Total number of towers: 7 Total number of units: 2017 units Total retail spaces: 11 units @ 792.9 sq m Total Parking areas: 395 slots
Components:	• Construction of seven condominium towers • Total number of units = 2019 • All towers with 12 floors plus roof deck • Separate clubhouse building with 3 floors and swimming pool
Location of Project:	A lot at or near the corner of Lantanas Road and Libis C. Pastor Road, Brgy. San Pedro, Puerto Princesa City, Palawan
Project Type:	Non- Environmentally Critical Project (Non-ECP) by EMB Memorandum Circular No. 2014-005 (July 7, 2014) – Guidelines for Coverage Screening and Standardized Requirements under the Philippine EIS System, Amending Relevant Portions of MC 2007-002 Under Heading 3- Infrastructure Projects

	Heading 3.6 Buildings Including Housing, Storage Facilities, and Other Structures Classified as Commercial with residential units (mixed Use) under 3.6.1 or Office and Residential Building under 3.6.2
TCT No.	074-2021001248 074-2021001247 074-2021001246 074-2021001245 074-2021001244 074-2021001243 074-2021001242 074-2021001241 074-2021001240 074-2021001239 074-2021001238
Total Project Cost:	Php 1, 979, 285, 561.04
Total Manpower:	1,000 personnel during construction and 20 during operation
Proponent Contact Person:	**RONALD L. SABINAY** 09176394238 Email: ronald_sabinay@cebulandmasters.com
EIA Preparer and Contact Person:	**Environmental Counselors, Inc (ECI)** **Unit E, 9th Flr., Strata 100 Bldg., F. Ortigas Rd., Ortigas Center, Pasig City** **(02) 8936 – 6626 to 27** **ecisouth@gmail.com** **Engr. Aldwin A. Camance (EIA Team Leader)** Email: aldwin.camance@gmail.com

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Acronyms

A & D	Alienable and Disposable
ADL	Alienable and Disposable Land
Admin	Administration
AF	Affected Families
AGE	acute Gastroenteritis
Alt.	Altitude
AO	Administrative Order
ARI	Acute Respiratory Infection
Ave.	Average
BDCC	Barangay Disaster Coordinating Council
BHS	Barangay Health Stations
BHW	Barangay Health Workers
BMS	Biodiversity Monitoring System
BNS	Barangay Nutrition Scholar
BOD	Biochemical Oxygen Demand
BP	Batas Pambansa
Brgy	Barangay
BSPO	Barangay Services Point Officers
C	Dominance index
°C	degree Centigrade
CA	Cardiac Arrest
CAA	Clean Air Act
CADT	Certificate of Ancestral Domain Title
CARI	Control of Acute Respiratory Infections
CARP	Comprehensive Agrarian Reform Program
CAS	Chemical Abstracts Service
CBR	Crude Birth Rates
CBMS	Community Based Monitoring System
CDA	Community Development Assistance
CDD	Control of Diarrhea Disease
CDR	Crude Death Rate
CENRO	Community Environment and Natural Resources Office
CFA	Construction Floor Area, generally covers areas of a building that are to be constructed and are measured to the outside face of the external walls of the building and includes all lift shafts, stairwells, car park, etc.

CHED	Commission on Higher Education
CIDSS	Comprehensive Integrated Delivery of Social Services
CITES	Convention on International Trade in Endangered Species
CLI	Cebu Land Masters, Inc.
cm	centimeter
cms	cubic meter per second
CSR	Corporate Social Responsibility
CSRD	Corporate Social Responsibility Department
CVA	Cardio-Vascular Ailment
CVD	Cardio-Vascular Disease
CY	Calendar year
DA	Department of Agriculture
DAO	DENR Administrative Order
dBA	Decibel
DENR	Department of Environment and Natural Resources
DepEd	Department of Education
DIA	Direct Impact Areas
DILG	Department of Interior and Local Government
DIR	Direction
DLF	Development and Livelihood Fund
DMC	DENR Memorandum Circular
DOE	Department of Energy
DOH	Department of Health
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DP	Discharge Permit
DPT	Diphtheria, Polio and Tetanus vaccine
DPWH	Department of Public Works and Highway
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
E	East

E	Evenness index
EA	Environmental Assessment
ECC	Environmental Compliance Certificate
EDCOR	Economic Development Corporation
EERS	Environmental and External Relations Sector
EGF	Environmental Guarantee Fund
EGGAR	Engineering Geological and Geohazard Assessment Report
EHS	Environment Health and Safety
EIA	Environmental Impact Assessment
EIARC	EIAR Review Committee
EIS	Environmental Impact Statement
El	Elevation
EMB	Environmental Management Bureau
EMD	Environmental Management Department
EMF	Environmental Monitoring Fund
EMS	Environmental Management System
Eng'r	Engineer
Envi	Environment
EO	Executive Order
EOT	Expanded Program of Immunization
EPA	Environmental Protection Agency
EPT	Emergency Preparedness Team
EQPL	Environmental Quality Performance Level
ERA	Environmental Risk Assessment
ERP	Emergency Response Plan
ES	Elementary School
EU	Environmental Unit
FBI	Field-based investigating
FBI	Field Biotic Index
FFWSDO	Flood Forecasting and Warning System for Dam Operation
FGD	Focus Group Discussions

FGI	Foliage Gleaning Insectivore
FHSIS	Field Health Service Information System
FLAg	Forest Land Use Agreement
FPIC	Free and Prior Informed Consent
FS	Feasibility Study
FSL	Full Supply Level
FY	Fiscal year
g	Acceleration due to gravity
GI	Galvanized iron
g/m3	grams per cubic meter
GAs	Government Agencies
GHG	Greenhouse Gas
GFA	Gross Floor Area, is the area contained within the outer surface of external walls of a building measured at each floor level.
GID	Gastro Intestinal Disorder
GIS	Geographic Information System
GLC	Ground-level Concentration
GO	Government Organization
GOCC	Government Owned and Controlled Corporation
GSP	Geological Society of the Philippines
H	Horizontal
H	Shannon Wiener Index
HH	Households
HIV-AIDS	Human Immunodeficiency Virus-Acquired Immune Deficiency Syndrome
HNPs	Health and Nutrition Posts
I&C	Instrumentation and Control
ICC	Indigenous Cultural Communities
IEC	Information Education and Communication
IIEC	Indicative Information, Education, and Communications
IIPDP	Indicative Indigenous Peoples Development Plan
IMP	Impact Management Plan
IN	Insectivore/Nectarivore

IP	Indigenous People
IPHO	Integrated Provincial Health Office
IPM	Integrated Pest Management
IPRA Law	Indigenous People's Right Act
IRA	Internal Revenue Allotment
IRR	Implementing Rules and Regulations
ISF	Integrated Social Forestry
IUCN	International Union for the Conservation of Nature
kg	Kilogram
KII	Key Informant Interviews
km2	Square kilometer
km	Kilometer
LAeq	Equivalent Continuous Level
LGPMS	Local Governance Performance Measurement System
LGU	Local Government Unit
LM	Lineal meter
L/sec/m	Liter per second per meter
M	Magnitude
m3/d	cubic meter per day
m3/s	cubic meter per second
m3/y	cubic meter per year
masl	Meters above sea level
Max	Maximum
MBS	Sea level pressure
MC	Memorandum Circular
MCLUP	Municipal Comprehensive Land Use Plan
MCM	Million Cubic Meter
MDCC	Municipal Disaster Coordinating Council
mg/L	milligrams per liter
MGB	Mines and Geosciences Bureau
Min	Minimum

mm/yr.	Millimeter per year
MMT	Multi-sectoral Monitoring Team
MOA	Memorandum of Agreement
MOL	Minimum Operating Level
MPDC	Municipal Planning and Development Council
mps	Meter per second
MRF	Materials Recovery Facility
Ms	Estimated maximum surface magnitude
MSP	Musculo skeletal disorder
MSWD	Municipal Social Welfare and Development
MT	Metric Ton
Mt	Mountain
MTIP-DP	Medium-Term Philippine Development Plan
NAAQS	National Ambient Air Quality Standards
NAMRIA	National Mapping and Resource Information Authority
NARRA	National Resettlement and Rehabilitation Administration
NCIP	National Commission on Indigenous People
NDCC	National Disaster Coordinating Council
NE	North East
NEDA	National Economic Development Authority
NFA	National Food Authority
NGA	National Government Agencies
NGOs	Non-Government Organizations
NHA	National Housing Authority
ni	Number of individuals
m	meter
NMYC	National Manpower and Youth Council
NO2	Nitrogen Dioxide
NO3	Nitrate
NOx	Nitrogen Oxides
NPCC	National Pollution Control Commission

NSO	National Statistics Office
OFW	Overseas Filipino Worker
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PAWB	Protected Areas and Wildlife Bureau
PCO	Pollution Control Officer
PD	Presidential Decree
PFL	Public Forest Land
PGA	Peak ground acceleration in g
PGR	Population growth rate
PHILCOA	Philippine Coconut Authority
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PhP	Philippine Peso
PIA	Philippine Information Agency
PM10	Particulate Matter (less than 10 microns)
PM 2.5	Particulate Matter (less than 2.5 microns)
PMF	Probable Maximum Flood
PMS	Preventive Maintenance Service
PPM	Parts per million
PMT	Project Management Team
PNSDW	Philippine National Standards for Drinking Water
PO	People's Organization
PPE	Personal Protective Equipment
SOW	Scope of Work
TBA	To be advised
TM	Transverse Mercator Projection
UTM	Universal Transverse Mercator Projection
WD	Water depth
WGS84	World Geodetic System 1984

Executive Summary

E.S. 1.0 Brief Project Description

Location	A lot at or near the corner of Lantanas Road and Libis C. Pastor Road, Brgy San Pedro, Puerto Princesa City, Palawan
Rationale	In 2020, the recorded total population in Puerto Princesa City was 307,079 and the average annual population growth rate from 2015 to 2020 was 3.98 percent. While Puerto Princesa is the second largest city in the Philippines and also the least dense, most of its population (about ¾) is concentrated in 1.7% of the land area, particularly in the peninsula west of Puerto Princesa Bay. With the reputation of the island as a tourist paradise, there is an increasing need for housing and condominium development along the urbanized area of the city
Process Technology	The current practice in commercial building design and construction has not changed in many years. The first step in construction is fencing the property for security and site preparation. Site preparation includes site clearing, site surveying, soil testing, and site plan design. Mobilization of manpower and equipment is next followed by development of the building structure and formworks for the building support. Excavation for the building foundation is next followed by concrete works and building of the main building and structure. Flooring, walling, column building, masonry and plastering, waterproofing, electrical works, and finishing works are done next.
Project Components	• Construction of seven condominium towers • Total number of units = 2017 • All towers with 12 floors plus roof deck • Separate clubhouse building with 3 floors and swimming pool
Description of Pre-Construction Phase	The activities of pre-construction phase include preparation of engineering plans and design, and securing all regulatory requirements, such as environmental compliance certificate (ECC), and corresponding local permits. No environmental impacts or aspects are expected in this phase.
Description of Construction Phase	The first step in construction is fencing the property for security and site preparation. Site preparation includes site clearing, site surveying, soil testing, and site plan design. Mobilization of manpower and equipment is next followed by development of the building structure and formworks for the building support. Excavation for the building foundation is next followed by concrete works and building of the main building and structure. Flooring, walling, column

	building, masonry and plastering, waterproofing, electrical works, and finishing works are done next.
Description of Operations Phase	The condominium buildings will start pre-selling as soon as all the permits and plans are gathered and finalized. It shall be ready for habitation after construction for which up to 2,019 families are envisioned to occupy once completed Expected waste types are the types typically seen from residential establishments including solids which vary from plastic and food wrappers/containers, plastic and paper cups, bottles and tin cans, and food wastes. About 5,000 kg per day is expected from the wastes of residents and support staff
Description of Abandonment Phase	The abandonment is not likely in the next 25 to 30 years, given the structural life of the condominium building. It is also important to note that in that span of years, minor repairs or retrofitting may have been done/required that would further prolong its structural integrity. But in case of an unlikely abandonment of the project, given the fact that the building will mostly utilize pre-fabricated materials, it can easily be disassembled and removed from the site for intended reuse. Thus, abandonment of the building can be easily accomplished. Combine it with the proposed environmental management plan where all wastes are handled on-site or treated by an authorized waste treater, then minimal clean-up is necessary. Impacts of the abandonment activity would be noise, dust and solid wastes.
Project Cost	Php 1, 979, 285, 561.04
Project Duration and Schedule	Construction activities are poised to start in September of 2022 with full development of the three stages in 5-7 years

E.S. 2.0 Brief Summary of Project's EIA Process

Terms of Reference of the EIA Study	The Philippine Environmental Impact Statement System (PEISS), under Presidential Decree No. 1586, is a key planning tool for any major project that needs the incorporation of sustainable development. The main purpose of sustainable development activities is to support the project's intended business interest, while preserving or minimizing its negative effects to its surrounding environment and host communities

	The Proponent, CEBU LANDMASTERS Inc., intends to build a condominium complex in the heart of Puerto Princesa's vibrant city scene in order to anticipate the needs for more housing developments as the city emerges from the COVID slowdown of the tourism industry The Proponent is required to apply for an Environmental Compliance Certificate (ECC) from the DENR-EMB MIMAROPA Region prior to any development in the project site. Pre-requisite to the acquisition of the ECC for the project is the submission of an Environmental Impact Statement as stated on the EMB Memorandum Circular 005-2014 (Revised Guidelines for Coverage Screening and Standardized Requirements under the Philippine EIS System). This EIS used the standard EIS Scoping and Screening Form as a guide in the impact analysis.
LEGAL Framework	This EIS Report was prepared based on the following laws and regulations and documents: 1) DENR Administrative Order (DAO) 2003-30 otherwise known as the Revised Implementing Rules and Regulation of PD 1586 establishing the Philippine Environmental Impact Statement System / Revised Procedural Manual (RPM) 2008 edition; 2) Republic Act No. (RA) 7611 (June 19, 1992), the Strategic Environmental Plan (SEP) for Palawan Act, provided for the adoption of a comprehensive framework for the sustainable development of Palawan, compatible with protecting and enhancing the natural resources and endangered environment of the province 3) DAO 2016-08/2021-19 and DAO 2021-19, or the Revised Effluent Standards for the CWA 4) DAO 2000-81, the IRR for RA 8749 Clean Air Act; 5) DAO 2005-10, the IRR of RA 9275 Clean Water Act; 6) DAO 2017-015 Guidelines on Public Participation under the Philippine Environmental Impact Statement (PEIS) System 7) RA 9003 Ecological Solid Waste Management Act; 8) Requirements of the Local Government Units; 9) Sound engineering practices on the building construction; 10) Other relevant DENR environmental laws and regulations; and, 11) Comprehensive Land Use Plan (CLUP) and LGU Profile of Puerto Princesa in Palawan

<table>
<tr><td>EIA Study Team</td><td><table>
<tr><th>Consultants and Team Members</th><th>Module</th></tr>
<tr><td>Engr. Aldwin A. Camance</td><td>Team Leader/Environmental Specialist</td></tr>
<tr><td>Camellia Cammayo</td><td>Assistant/Environmental Specialist</td></tr>
<tr><td>Allaine Patricia Unido</td><td>Technical Assistant</td></tr>
</table></td></tr>
<tr><td>EIA Study Schedule</td><td>EIS was started in January 2022 and completed in April 2022.</td></tr>
<tr><td>EIA Methodologies</td><td>Preparation of the EIS report was based on the laws and regulations and requirements under DAO 2003-30 (Philippine Environmental Impact Statement System / Revised Procedural Manual (RPM), DAO 2016-08/2021-19 and DAO 2021-19 for the Revised Effluent Standards, DAO 2000-81 and DA0 2005-10 for Clean Air and Clean Water act, respectively. DAO 2017-015 for the guidelines on Public Participation under PEIS System. RA 9003 for the Ecological Solid Waste Management Act. As well as requirements in compliance to LGUs, sound engineering practices of submarine fiber-optic lines and other relevant environmental laws and regulations.

The Comprehensive Land Use Plan and LGU profile of Puerto Princesa were also used as well as published geology studies,, local charts, information in the EGS database, published data from the internet, information gathered from national departments, information from national and privatized telecommunications organizations.</td></tr>
<tr><td>Land</td><td>Investigation of the existing environmental setting was done to compile and assess data for impact identification, prediction and assessment. Environmental component on Land includes Land Use and Classification and Geology wherein the methodology and approach involve the review of CLUPs, data on protected areas of Palawan , review of reports and information from MGB, PHIVOLCS, PAGASA, NAMRIA assess impacts on the compatibility, protection afforded in the area and susceptibility of the area to natural hazards.</td></tr>
<tr><td>Water</td><td>For Water, the impact assessment on the installation activities comprises baseline survey for Hydrology and Hydrogeology where CLUP of the host LGU and other data taken from MGB, NAMRIA and PHIVOLCS were reviewed. Water quality, where</td></tr>
</table>

	water samples were collected and analyzed for physicochemical analyses with reference to the guidelines set by DAO 2016-08/2021-19 and DAO 2021-19 and marine water ecology data were collected through marine dives.
Air and Noise	Baseline survey for air includes collection and review of existing literature and maps of the project from PAGASA station for Meteorology and Climatology. Conduct of ambient air quality and ambient noise characterization to assess potential impacts of construction, installation and operations on the existing local environment.
People	We have socioeconomic and public health to consider for environmental component. With this, public scoping, review of CLUP and socioeconomic profile, relevant studies from PSA and other critical data were gathered for this study to assess impacts and risks of the project during the activities.
Public Participation	Interview of select and key informants were either chosen randomly or within an institution.

E.S. 3.0 Summary of Baseline Characterization

Table ES-0-1 Summary of Land Sector Baseline Information

Land Environment Component	Baseline Information
LAND USE AND CLASSIFICATION	The land use plan of Puerto Princesa shows that the area is zoned residential as of the last land use plan. The proponents will endeavor to change the classification to commercial / residential in nature.
GEOMORPHOLOGY	In Puerto Princesa City, more than half (57,43%) of the total land area have flat to gentle slopes, 15 percent have moderate slope of 8 to 18 percent and about 38 percent has steep slopes (30 percent and above).
GEOLOGY	The northern part of the city is comprised of ultramafic rocks. In particular, the Langogan area is characterized by metamorphic rocks consisting of quartz-feldspathic and mica schists, phyllites, slate and quartzites. The ultramafic rocks consist of unaltered serpentenized pridotite, dunite and pyrexomite. In the middle portion particularly in the Irawan area, metamorphic rocks of the Inagawan Formation can be found. The area is also partly composed of sedimentary Iwahig Formation, alluvium of unconsolidated gravel, sand, pebbles and silt. Some ultramafic rocks of the Palawan Ophiolite Complex also characterize the area. Babuyan area is made up of Irahuan Metavolcanics which resemble the quartz-hematite schist in appearance and are also friable and weather into dark reddish gray platy fragments which are usually scattered near outcrops of riverbeds. St. Paul limestone outcrops as small patches are found in the south and

Land Environment Component	Baseline Information
	midwestern part of the catchment. It is comprised of a very thick, massive, marbleized limestone with very well-developed karst.
SEISMOLOGY	The nearest active fault in Palawan is the Southern Mindoro fault. It is located in the north-east of Palawan and is about 409.9 kilometers away from Puerto Princesa City Earthquake records of magnitude M5 or above in the Philippines during the last 25 years (1994-2020) have been retrieved from the United States Geological Survey (USGS)**.** There were no earthquakes in the Palawan region except in the very north along the Manila Trench. These earthquakes were shallow and did not cause any subsequent Tsunamis along the Palawan coastline.
SOIL	There are nine soil types found in Puerto Princesa City namely, Bolinao Clay, Tagburos Clay, Tapul Clay Loam, Guimbalaon Clay, Bay Clay Loam, Babuyan Silt Clay Loam, Babuyan Clay, Malaglag Clay, and Hydrosol. Lowland soils found in the city are mostly alluvial in formation and are usually fertile soils; hence they comprise prime agricultural lands. This type of soil formation is suitable for irrigation and has potential for good yields of rice. Upland soils are usually formed in place from underlying bedrocks. They are usually thin compared to alluvial deposits and are also prone to erosion in the absence of vegetation cover. The site soil is a mix of Tagburos Clay and Hydrosol.
EARTHQUAKE HAZARDS	Considering the distance of the nearest fault line in the project areas in Puerto Princesa, the project areas is not prone to ground shaking during earthquake. Based on the earthquake-induced landslide susceptibility map of Region IV-B, some of the areas in Puerto Princes have low to medium susceptible to earthquake-induced landslide. However, the built-up area where the project is located has no susceptibility to earthquake induced landslide
LIQUEFACTION	In Puerto Princesa City, about 7.2 percent are generally susceptible to liquefaction while 92.8 percent are not susceptible. The proposed site is generally not susceptible to liquefaction
VOLCANISM	The nearest potentially active volcano is Tumatangas volcano which is about 482.0 kilometers away while the nearest active volcano is the Bud Dajo Volcano about 486.3 kilometers away
RIN INDUCED LANDSLIDE	About 38.8 percent of the total land area is susceptible to rain-induced landslide. About 0.2 percent has very high susceptibility, 9.8 percent

Land Environment Component	Baseline Information
	has high susceptibility, 10.6 percent has moderate susceptibility and 8.2 percent has low susceptibility. The proposed area is only moderately susceptible to rain-induced landslide according to georisk.ph and MGB

Table ES-0-2 Summary of Water Sector Baseline Information

Water Environment Component	Baseline Information
HYDROLOGY AND HYDROGEOLOGY	Puerto Princesa City has a total of 111,349 hectares of watershed catchment areas that is composed of eight watershed river basins. Out of the eight, five watersheds have major river basins while three have medium-sized river basins. There are no rivers or creeks at or near the project site. River basins with the largest area include Babuyan River, Montible River, Langogan River, Inagawan River and Bacungan River. The medium watersheds in the city are the Cabayugan, Irawan and Sabang.
SEABED SEDIMENTS	Away from the shorelines, much of the seabed is reported to be sand, silt and mud, as shown in the map below. Hence, the seabed at or near the Puerto Princesa Bay where the project is located may be composed of sand
TIDES and SEA LEVELS	The global tide wave sweeps across the Pacific Ocean towards the Philippine archipelago. The direct channels from the Pacific Ocean into the center of the Visayas Sea are constricted, slowing the tide wave as it propagates from the east. As the wave propagates along the channels between the Visayan Islands, the amplitude and phase of the tidal harmonic constituents are modified considerably
STORM SURGES	Based on the mapping done by MGB, Philvolcs and Georisk.ph, the project is sufficiently distant enough from the shore to withstand any and all storm surges
EXTREME WATER LEVELS	In terms of flood susceptibility, about 5.3 percent of the total land area in Puerto Princesa has high susceptibility to flooding. These are located near the coastal areas. Furthermore, about 1.8 percent are moderately susceptible to flooding and about 1.1 percent have low susceptibility. Majority or about 91.8 percent of the total land area is not prone to flooding. The proposed location has no to low susceptibility to flooding
TSUNAMI	Tsunamis are long-wavelength, long-period sea waves generated by an abrupt movement of large volumes of water, generally caused either by vertical displacement of the seabed along fault lines by earthquakes with Magnitude 7 or above, by volcanic eruption, volcanic collapse or submarine landslides. They have minimal effect on a cable

Water Environment Component	Baseline Information
	in deep water but have the potential for devastating impact around landfalls. Based on the tsunami hazard map of Puerto Princesa, the project area is not in a tsunami prone area
WATER QUALITY	Air Quality in the area is still relatively good since this is far from the main roads, but the prevalence of tricycles and jeepneys may exacerbate the air quality problems in the near future. Only Total Suspended Particulates are exceeded in the air quality monitoring done for the site

Table E.S.-0-3 Summary of Air Sector Baseline Information

Air Environment Component	Baseline Information
CLIMATE	The climate in general is classified as Type III under the Modified Corona's Classification System used by PAGASA. It means that areas have no very pronounced maximum rain period with a short dry season lasting only from one to three months.
WIND SPEED	Within the study area, the Admiralty Pilot NP33 states that, averaged over many years, the frequency of sustained mean speeds of more than 28 knots (Beaufort scale ≥7; >13.9 m/s) varies seasonally and across the study area. From November – March: 4% - 8% of the time from the northern Sulu Sea.
TEMPERATURE AND HUMIDITY	Based on the monitoring station in Puerto Princesa City, the coldest month was September with mean temperature of 27.3 degrees Celsius (˚C) while the hottest month was May with mean temperature of 28.8 degrees Celsius (˚C).
RAINFALL	The annual amount of rainfall recorded in Puerto Princesa City monitoring station is 1,527.3 mm with 146 rain days. The highest rainfall was observed in October with amount of 216.1 mm and lowest in February with 23.7 mm.
TYPHOONS	Since methodical records began in the mid-20th Century, an annual average of 19 tropical cyclones or storms has entered the Philippines' Area of Responsibility; and of these usually 6 to 9 make landfall. There is considerable variability around these averages. The most active season for tropical typhoon strikes on the island archipelago was 1993, when 19 tropical storms moved through the country. In 1958, just one tropical cyclone crossed the Philippines. On an annual timescale, activity decreases to a minimum in February, before increasing steadily through June, and spiking from July through October. Activity falls off significantly in November. Although less

Air Environment Component	Baseline Information
	frequent, the most severe events in the southern parts of the Philippines tend to occur between September until early January
AIR QUALITY	Air Quality in the area is still relatively good since this is far from the main roads, but the prevalence of tricycles and jeepneys may exacerbate the air quality problems in the near future. Only Total Suspended Particulates are exceeded in the air quality monitoring done for the site

Table ES-0-4 Summary of People Sector Baseline Information

People Environment Component	Baseline Information
DEMOGRAPHY	In 2020, the recorded total population in Puerto Princesa City is 307,079, The average annual population growth rate from 2015 to 2020 is 3.98 percent for Puerto Princesa
INDIGENOUS PEOPLE	There are no known Ancestral Domain Claim (CADC) nor Ancestral Domain Title (CADT) covering the project areas. There are four approved CADC applications and five are still pending application in Puerto Princesa City. None are within the project site
LITERACY RATE	The City of Puerto Princesa has a literacy rate of 99.5 percent
EMPLOYMENT	In 2015, Puerto Princesa has 101,222. gainful workers who are 15 years old and above. Gainful workers in Puerto Princesa were Service and Sales Workers and were engaged to elementary occupations
ECONOMY AND INDUSTRY	The major economic activities in Puerto Princesa City include agricultural activities such as crop, livestock and poultry production. Since majority of the barangays are located within the coastal area of the city. Many of the households are engaged to fishing activities. Also, being included in the New Seven Wonders of Nature, the city has become a destination for tourists.

E.S. 4.0 Summary of Impact Assessment and Environmental Management Plan

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
Construction Phase						
The Land						
Clearing and grubbing	Aesthetics and Visual Effects	Change in the aesthetic character of the area	Proper stockpiling of excavated material.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
Cut and fill		Modification of land forms	Provision of erosion control measures such as riprap, retaining walls	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
Stockpiling of temporary construction spoils		Soil erosion/Sedimentation	Provision of erosion control measures such as riprap, retaining walls, and reforestation of the watershed	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Change in physical and chemical properties of soil	Can be minimized by proper disposal of waste that may contain harmful chemicals to the soil	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
			In line with the rain reforestation program of the Government, native or indigenous species would be used in the replacement/reforestation activities, as much as possible. Re-introduction of dipterocarps would be pursued			
The Water						
Stockpiling of temporary construction spoils		Sedimentation in downstream and upstream of creeks and rivers	Provision of sediment control structures.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Increase in surface runoff	Provision of diversion structures that will prevent the siltation of drainage canals	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Need of water supply for construction workers	Can be supplied by local water district (Puerto Princesa Water District)		Part of construction cost	part of construction budget / allocated through contract with contractor
The Air						
Clearing and grubbing	Climate and Air Quality	Dust generation/Increase of suspended particulates during construction	Can be minimized by keeping the construction area with enough moisture. Placing of dust netting will also be done	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
	Contribution to GHG emissions	GHG emissions of the project are not that significant, it is recommended, however, to implement reduction and adaptation programs related to GHG emissions	Reduce carbon footprint during project construction by a) implementing vehicle fleet management, b) use heavy equipment and trucks that are fuel efficient, and c) reduce vehicle trips as necessary.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
			Offset GHG emissions by implementing a reforestation program for the project.		Part of construction cost	part of construction budget / allocated through contract with contractor
Operation of heavy equipment		Increase in concentration of gas pollutants (gaseous emissions from vehicles)	Keep vehicles' engines in good running condition. Implement a periodic maintenance scheme	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Noise/Vibration	Increase in noise level due to vehicles and to noise/vibration producing equipment	Select routes that will avoid populated areas. Provide silencer for mufflers of vehicles.		Part of construction cost	part of construction budget / allocated through contract with contractor
The People						
Employment of workers	Population	Increase in population due to in-migration of people could trigger social conflicts between residents and construction workers	Give priority to the people of the project area in hiring construction workers.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
	Labor and Employment	Generation of employment and other economic services	The hiring of construction workers will open up employment in the project area.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Health and Sanitation	Spread of communicable diseases from migrant workers	Make routine medical check-up on workers. Disinfection of waterlogged areas.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Increase in solid and liquid waste	Provision of waste disposal facilities in campsites.		Part of construction cost	part of construction budget / allocated through contract with contractor
		Generation of noise and health pollutants	Select routes that will avoid populated areas. Provide silencer for mufflers of vehicles.		Part of construction cost	part of construction budget / allocated through contract with contractor
	Waste Management					
		Solid waste generation and problems of storage/disposal	Use excavated materials as filling materials as much as possible.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Wastewater generation	Provision of drainage facilities.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Operation and maintenance of heavy equipment	Oil and gasoline	Locate proper sites for garage and for maintenance of vehicles	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
Operational/Maintenance Phase						

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
The Land						
Operation and maintenance of facilities	Aesthetics and Visual Effects	Change in (improved) visual quality	The visual quality will improve with further industrial activity			
	Ground stability	Decrease of ground stability due to runoff and erosion	Provision of erosion control measures such as riprap, retaining walls, etc. whenever necessary.			
The Water						
		Contamination and depletion of surface and groundwater	Ensure the proper operation of the wastewater treatment system such that wastewater will be minimized.			
The Air						
	Climate	Change in micro-climate of area affected. Decrease in heat sink due to the development of built-up areas	This impact is due mostly to the effects of climate change and urbanization which increases temperature within the city			
	Air quality	Dust generation due to increase in traffic volume	Can be minimized by observing speed limits.			

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
		Increase in GHG gases due to operation of generators and cooking devices				
The People						
	Population	Increase in population due to migration of workers	Limit the hiring of additional workers from outside of the area.			
	Labor and Employment	Generation of employment and other economic services	Additional employment required for operation	Qualified workers in the area		
	Livelihood and Income	Change in revenue generation of the community	Revenue generation is expected to increase with the increase in income	Entrepreneurs in the area		
Abandonment Phase						
The Land						
Removal of Structures	Community Safety	Spills of hazardous substances	Undertake Environmental Site Assessment of the property before reuse	CLI	Part of abandonment cost	part of construction budget / allocated through contract with contractor

E.S. 5.0 Summary of Environmental Monitoring Plan

Key Environmental Aspect per Project Phase	Potential Impacts per Envt'l Sector	Parameters to be monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
								EQPL Range			Management Measure		
			Method	Frequency	Location			Alert	Action	Limit	Alert	Action	Limit
CONSTRUCTION PHASE													
Construction of condominium units	Degradation of surface water quality	Color, Turbidity, TSS, pH, DO, BOD, COD, Nitrates Oil & Grease and Pb and PCB	In-situ sampling , grab sampling and laboratory analysis	Quarterly		PCO Analysis by a Third-party consultant	Include in monitoring budget	Surface Water Quality for Class C as stipulated in DAO 2016-08/2021-19: DENR Standard Limit for Class C as stipulated in DAO 2016-08/2021-19 for Surface water pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 6.0 mg/L O&G – 1.8 mg/L Pb – 0.03 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 42 mg/L O&G – 4.25 mg/L	Surface Water Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 8.0 – 8.2 DO – 5.5 mg/L (Min) TSS – not more than 20% increase of the baseline data BOD – 6.5 mg/L O&G – 1.9 mg/L Pb – 0.04 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 5.5 mg/L (Min) TSS – not more than 10% increase of the baseline data	Surface Water Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 6.5 – 8.5 DO – 5.0 mg/L (Min) TSS – not more than 30% increase of the baseline data BOD – 7 (10) mg/L O&G – 2.0 mg/L Pb – 0.05 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 5.0 mg/L (Min)	Reconsider flow rate and rate of particle settlement from treatment ponds to ensure effectiveness	Addition of embankment and control measures to reduce runoff	Conduct immediate de-silting of ponds Establishment of additional aeration ponds

								Pb – 0.085 mg/L	BOD – 45 mg/L O&G – 4.50 mg/L Pb – 0.090 mg/L	TSS – not more than 10% increase of the baseline data BOD – 47.5 mg/L O&G – 4.75 mg/L Pb – 0.095 mg/L			
	Increase in ambient noise level	Noise level (dB)	Noise Meter	quarterly	Worksite and established monitoring stations	PCO Third party consultant					Identify other of possible source of noise Issuance of ear plugs	Maintenance, adjustment or replacement of mufflers and installation of noise reduction apparatus	Change of equipment or noise minimization device Limit operations during daytime hours
	Generation of solid waste	Volume of solid waste generated including volume recycled and disposed of	Estimation of volume	Weekly	Within plant site and adjacent area	PCO	Include in O&M budget	Foul odor from the site	Sighting of pest such as rats and roaches	-	Review of housekeeping practices when pests are present at holding areas Spread of disease to surrounding areas	Pest eradication Immediate clean-up and disposal of accumulated wastes	All wastes should be contained and disposed to an accredited waste hauler and disposal facility
	Generation of hazardous wastes	Volume and types of hazardous wastes generated	Estimation of volume	Weekly	Within plant site and adjacent area	PCO	Include in O&M budget	Generation of more than 5 m^3/week	Storage of 5 m^3/week	Storage of more than 5 m^3/week	Engage the services of an accredited hauler and treater	Install a secure and leak proof temporary storage facility	
	Threat to workers / public health and safety	Safety record, accident/ fatality incidence/ occurrence	Record keeping	Daily	Construction area	Safety officer	Minimal cost	Increase in frequency of non-lost time accident	Occurrence of non-fatal lost time accident	Occurrence of fatal lost time accident	Conduct quarterly safety briefing and orientation to laborers and workers	Conduct daily inspection of construction area Conduct daily briefing on	Work stoppage along accident area and identify proper safety measures and implement specific safety

											Installation of safety signages along accident prone areas within the construction site	safety program	procedures and protocol
	Social impacts	Number of jobs generated for locals, training programs and other social development programs	Record keeping	Monthly	Barangays Camugao and Camansi	PCO and ComRel	Minimal cost	Number of locally hired employees fall down to less than 40% of the total workforce	Number of locally hired employees fall down to less than 20% of the total workforce	No locals are employed by the company in the last six months	Review hiring policies Review SMR programs and determine reasons for the poor implementation of the program	Implement more skills training program to empower residents Identify alternatives for the program to improve accomplishment	
	Complaints Management	Number of valid complaints	Record keeping	Weekly	Plant site	PCO and ComRel	Minimal cost for record keeping	Formal complaint submitted can be resolved at the ComRel level	Intervention from the Management is needed to resolve a formal complaint	Complaint is broadcasted over mass media	Institution of grievance system Conduct IEC to inform and justify the activities being undertaken during construction	Notify Admin for complaint and take remedial measures to address complaints Investigate all complaints, conduct dialogue with communities and implement mitigating measures	Conduct in depth investigation and identify root cause for valid complaints Institute measures to avoid occurrence of similar problems Compensate affected communities
Operations Phase													
Operations of the condominium Property	Degradation of surface water quality	Color, Turbidity, TSS, pH, DO, BOD, COD, Nitrates Oil & Grease and Pb and PCB	In-situ sampling , grab sampling and	Quarterly		PCO Third party consultant	Include in monitoring budget	DENR Standard Limit for Class C as stipulated in DAO 2016-08/2021-19 for Surface water	DENR Standard Limit for Class C as stipulated in DAO 2016-	DENR Standard Limit for Class C as stipulated in DAO 2016-	Conduct maintenance of the WWTP Reconsider flow rate of	Temporarily stop effluent discharge and re-assess holding capacity of	Stop milling operations

			laboratory analysis					pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 6.0 mg/L O&G – 1.8 mg/L Pb – 0.03 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 42 mg/L O&G – 4.25 mg/L Pb – 0.085 mg/L	08/2021-19 for Surface water pH 8.0 – 8.2 DO – 5.5 mg/L (Min) TSS – not more than 20% increase of the baseline data BOD – 6.5 mg/L O&G – 1.9 mg/L Pb – 0.04 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 5.5 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 45 mg/L O&G – 4.50 mg/L Pb – 0.090 mg/L	08/2021-19 for Surface water pH 6.5 – 8.5 DO – 5.0 mg/L (Min) TSS – not more than 30% increase of the baseline data BOD – 7 (10) mg/L O&G – 2.0 mg/L Pb – 0.05 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 5.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 47.5 mg/L O&G – 4.75 mg/L Pb – 0.095 mg/L	treated effluent from the STP to the discharge canal	the pond and treatment method	

	Degradation of ground water quality	Color, Turbidity, TSS, pH, Nitrates Oil & Grease and Pb and PCB	In-situ sampling , grab sampling and laboratory analysis	Quarterly		PCO Third party consultant	Include in monitoring budget	pH 7.5 – 8.0 TDS – 425 mg/L Nitrates – 0.026 mg/L Pb – 0.0085 mg/L	pH 8.0 – 8.2 TDS – 450 mg/L Nitrates – 0.028 mg/L Pb – 0.009 mg/L	pH 6.5 – 8.5 TDS – 475 mg/L Nitrates – 0.029 mg/L Pb – 0.0095 mg/L	Conduct maintenance of the WWTP Reconsider flow rate of treated effluent from the STP to the discharge canal	Temporarily stop effluent discharge and re-assess holding capacity of the pond and treatment method	Stop milling operations
	Generation of solid and hazardous waste	Volume of solid, oil sludges and sludges form the WWTP, hazardous waste generated	Record keeping of generated solid and hazwaste, mode of disposal and volume disposed or reused and recycled	Monthly	Hazardous waste storage facility	PCO DENR-accredited hazwaste treater	Include in O&M budget	Accumulation of solid and hazardous wastes	Evidence of leakage, spillage or signs of damage of hazardous waste containers	Complaints from workers and communities	Continuous collection, treatment and disposal by DENR-accredited hazwaste treater	Reduction on the use of materials that are potential source of hazardous wastes Immediate disposal or treatment of hazardous wastes	Use of alternative materials which are more environment friendly
	Air Quality Degradation	Ambient PM-10, TSP,	ambient air monitoring for PM-10, TSP, Stack sampling for PM10 and TSP	Quarterly (stack is semiannual)	at stablished sampling sites	PCO	Include in O&M budget	DENR Standard Limit as stipulated in the IRR of Clean Air Act for ambient concentrations: TSP – 184.5 µg/Ncm PM-10 – 120.5 µg/Ncm Stack sampling PM10 – to be determined TSP - to be determined	DENR Standard Limit as stipulated in the IRR of Clean Air Act for ambient concentrations: TSP – 207.5 µg/Ncm PM-10 – 135.5 µg/Ncm Stack sampling PM10 – to be determined TSP - to be determined	DENR Standard Limit as stipulated in the IRR of Clean Air Act for ambient concentrations: TSP – 230 µg/Ncm PM-10 – 150 µg/Ncm Stack sampling PM10 – to be determined TSP - to be determined		Temporarily halt operation and do corrective measures Conduct of maintenance of equipment/ machinery identified as the source of pollution Increase frequency of water spraying	Stop operations and resume only when corrective measures were in place Replace equipment that emits high concentration of pollutants or use better fuel Increase frequency of water spraying

	Increase in ambient noise level	Noise level (dB)	Noise Meter	Monthly	Plant site and residential areas	PCO	Include in monitoring budget	inside the work area: 77 dBA	inside the work area: 81dBA	inside the work area: 86 dBA		Maintenance, adjustment or replacement of noise reduction apparatus	Change of equipment or noise minimization device Limit operations during daytime hours
	Threat to workers / public health and safety	Safety record, accident/ fatality incidence/ occurrence	Record keeping	Daily	Facility sites, access roads, stockyard	Safety officer	Minimal cost	Increase in frequency of non-lost time accident	Occurrence of non-fatal lost time accident	Occurrence of fatal lost time accident	Conduct quarterly safety briefing and orientation to laborers and workers Installation of safety signages along accident prone areas within the construction site	Conduct daily inspection of work site Conduct daily briefing on safety program	Work stoppage along accident area and identify proper safety measures and implement specific safety procedures and protocol
	Social impacts	Number of jobs generated for locals; training programs; and other social development programs	Record keeping; Social Impact Assessment	Monthly	Host communities and secondary impact areas	PCO and ComRel SIA Third party consultant	Minimal cost	Number of locally hired employees fall down to less than 40% of the total workforce SDP falls below 80% of target	Number of locally hired employees fall down to less than 20% of the total workforce SDP falls below 80% of target	No locals are employed by the company in the last six months SDP falls below 40% of target	Review hiring policies Review SDP and determine reasons for the poor implementation of the program	Implement more skills training program to empower residents Identify alternatives for the SDP projects to improve accomplishment	
	Complaints management	Number of valid complaints	Record keeping	Daily	Host communities and secondary impact areas	PCO and ComRel	Minimal cost	Formal complaint submitted can be resolved at the ComRel level	Intervention from the Management is needed to resolve a formal complaint	Complaint is broadcasted over mass media	Institution of grievance system Conduct regular IEC to inform and justify the activities	Notify Admin for complaint and take remedial measures to address complaints	Conduct in depth investigation and identify root cause for all valid complaints

											being undertaken	Investigate all complaints, conduct dialogue with communities and implement mitigating measures Compensate affected communities	Institute measures to avoid occurrence of similar problems

E.S. 6.0 EMF and EGF Commitments

The Environmental Guarantee Fund (EGF) refers to the fund to be set up by CEBU LANDMASTERS and readily accessible and disbursable for the immediate clean-up or rehabilitation of areas affected by damages, if any, resulting in the deterioration of environmental quality as a direct consequence of a project's construction, operation or abandonment. It will likewise use to compensate parties and communities directly affected by the negative impacts of construction or operations, or to fund community-based environment related program including, but not limited to, information and education and emergency preparedness programs.

Since the CEBU LANDMASTERS Project will be building a condominium complex within the built-up area of the city, there will be minimal environmental damage, but which will be within the limits as will be expected for construction activities in the area. The proposed amount for the EMF is P400,000 which will be replenished early as required for monitoring activities. For the EGF, the amount proposed is P500,000. The amount will be subject to review and approval of EMB Region 4B and shall be replenished, if necessary.

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

- 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.
- the conduct of scientific or research studies that will aid in the prevention or rehabilitation of accidents and/or risk-related environmental damages; or
- for contingency clean-up activities and the necessary IEC and capability building activities to significantly minimize or buffer environmental risk- related impacts.

E.S. 7.0 Public Participation

Summary Matrix of Accomplished IEC/Social Preparation Activities with List of Issues & Proponent's Response

There is already a close coordination with the Local Government Unit of Puerto Princesa City for the proposed project. Cebu Landmasters, Inc. has been coordinating with the Barangay and Local Government Unit (LGU) for the approval for the construction and operation of the Casa Mira Towers Palawan in the site. Attached is the Minutes of Meeting during the Initial Public Scoping of the proposed project of Barangay San Pedro, Puerto Princesa City, Plawan.

The IEC activity of Casa Mira Towers Palawan starts at 4PM in the afternoon on March 10, 2022 held at Barangay Multi – Purpose Hall, Conception Castro Building, Brgy. San Pedro, Puerto Princesa City, Palawan. Mr. John Carlo Tria the overall Project Director/ Consultant of Environmental Counselors, Inc. led the program and, introduced the team members (Engr. Aldwin Camance, Team Lerader and Allaine Patricia Unido, Technical Staff) and the speaker Vice President of Cebu Landmasters, Inc. (CLI) Mr. Jess Kabigting. The activity went well, attendees participate especially during the open forum regarding the project. (**Annex 6.22**)

SECTION 1.0 PROJECT DESCRIPTION

1.1. Project Location and Area

The proposed Casa Mira Towers Palawan will be located in a 21,951.21 sq meter plot of land at or near the corner of Lantanas Road and Libis C. Pastor Road, Brgy San Pedro, Puerto Princesa City, Palawan. The location and vicinity maps of the proposed established plus the coordinates of the lot are provided below.

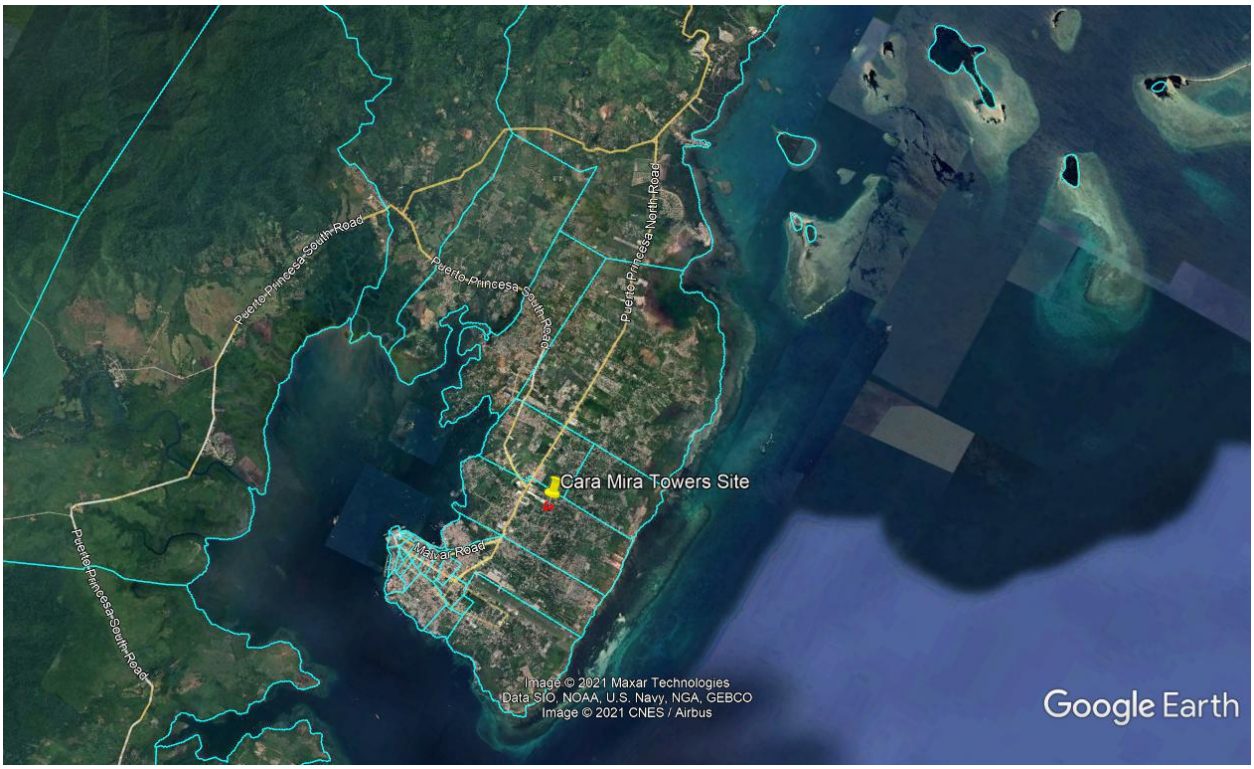


Figure 1-1 General Location of the Casa Mira Towers vis-à-vis the built-up area in the city peninsula

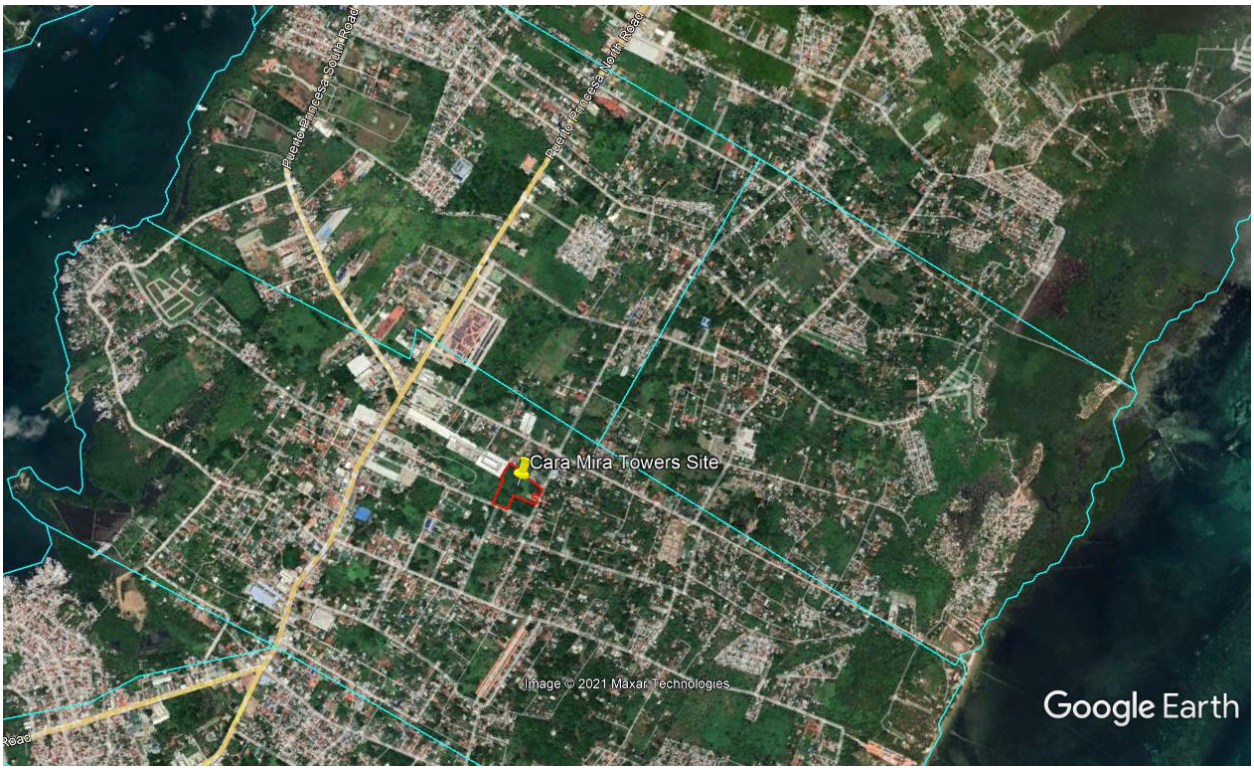


Figure 1-2 close up of the location of the Casa Mira Palawan plot of land within the Puerto Princesa CBD

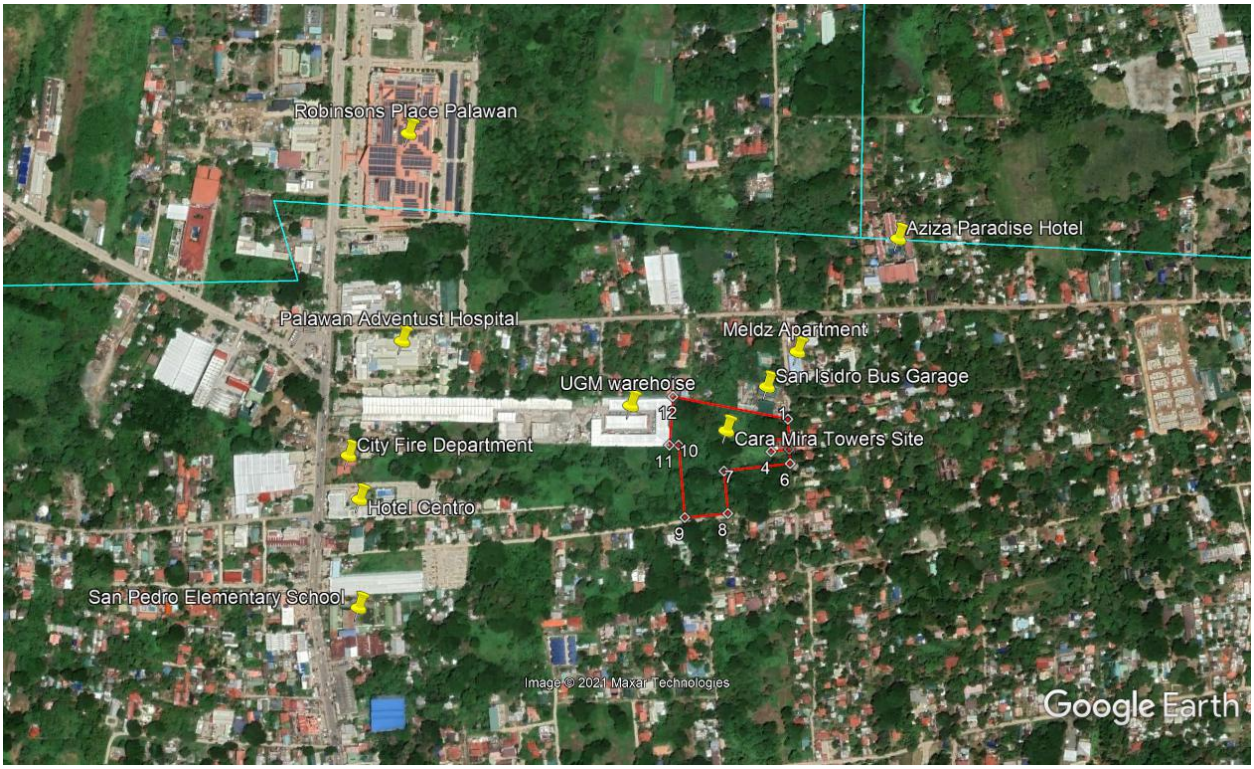


Figure 1-3 Places near the Casa Mira Towers site

Table 1-1 Coordinates of the points of the Casa Mira Towers Palawan as per SEP clearance

Corner	Longitude	Latitude
1	118.752	9.763679
2	118.753	9.763608
3	118.753	9.763507
4	118.753	9.763464
5	118.754	9.762636
6	118.753	9.762614
7	118.753	9.762596
8	118.753	9.761973
9	118.753	9.76194
10	118.726	9.7619
11	118.753	9.762981
12	118.752	9.762982
13	118.754	9.76345
14	118.754	9.763384
15	118.754	9.763325
16	118.754	9.763035
17	118.754	9.763035
18	118.754	9.762885
19	118.754	9.762915
20	118.754	9.762777
21	118.754	9.762763
22	118.754	9.762734
23	118.754	9.762717
24	118.754	9.762702
25	118.754	9.762713
26	118.754	9.762976
27	118.754	9.763114
28	118.754	9.763252

1.2. EIA Study Area

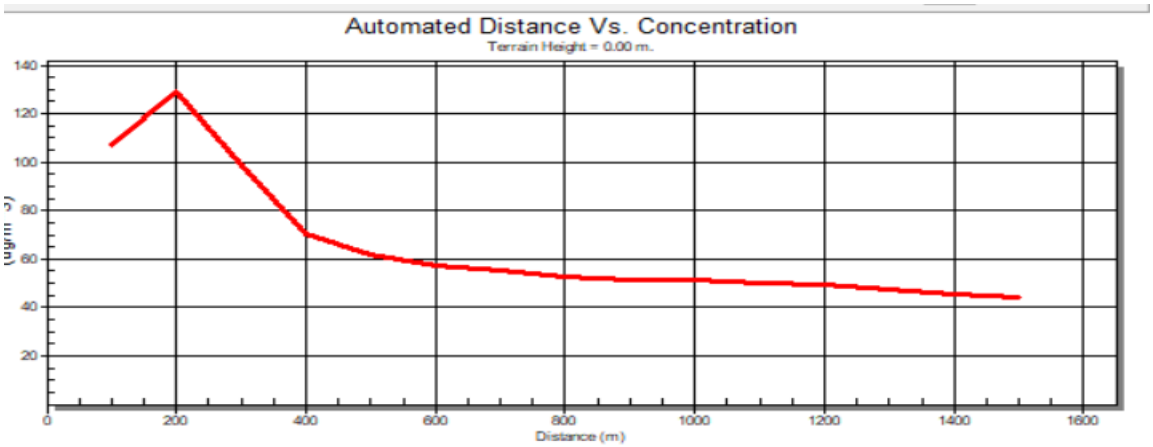
Primary impacts are often called direct impacts, while secondary impacts are referred to as indirect or induced impacts. The term does not mean to imply secondary importance or secondary significance of the impact but rather, secondary refers to timing and scope of these impacts. Primary impacts of a development action are those effects that are caused by that action and generally occur at the same time and place as the action. They are usually associated with the construction, operation, maintenance of a facility or activity, and are generally obvious and quantifiable. Secondary impacts of a development action span the potential effects of additional changes that are likely to occur later in time or at a different place as a result of the implementation of the development. These include additional construction or

development, traffic increases, and changes in population growth and migration. The direct and indirect impact areas are provided below.

The direct and indirect impact areas are defined by DAO 2017-15 and are provided below.

1.3. Direct Impact Area for Air Quality

Direct Impact Areas for Air Quality include areas where projected ground level concentrations of emissions are higher than the ambient standards based on air modelling. Because the proposed project will have seven 12 story buildings, the estimated extent of effects of dust emissions will be for a radius of about 1 to 1.5 kilometers from the site, which is denoted by the effect radius as provided below. Most of the affected region will be residential areas since the barangay is zoned mostly residential.



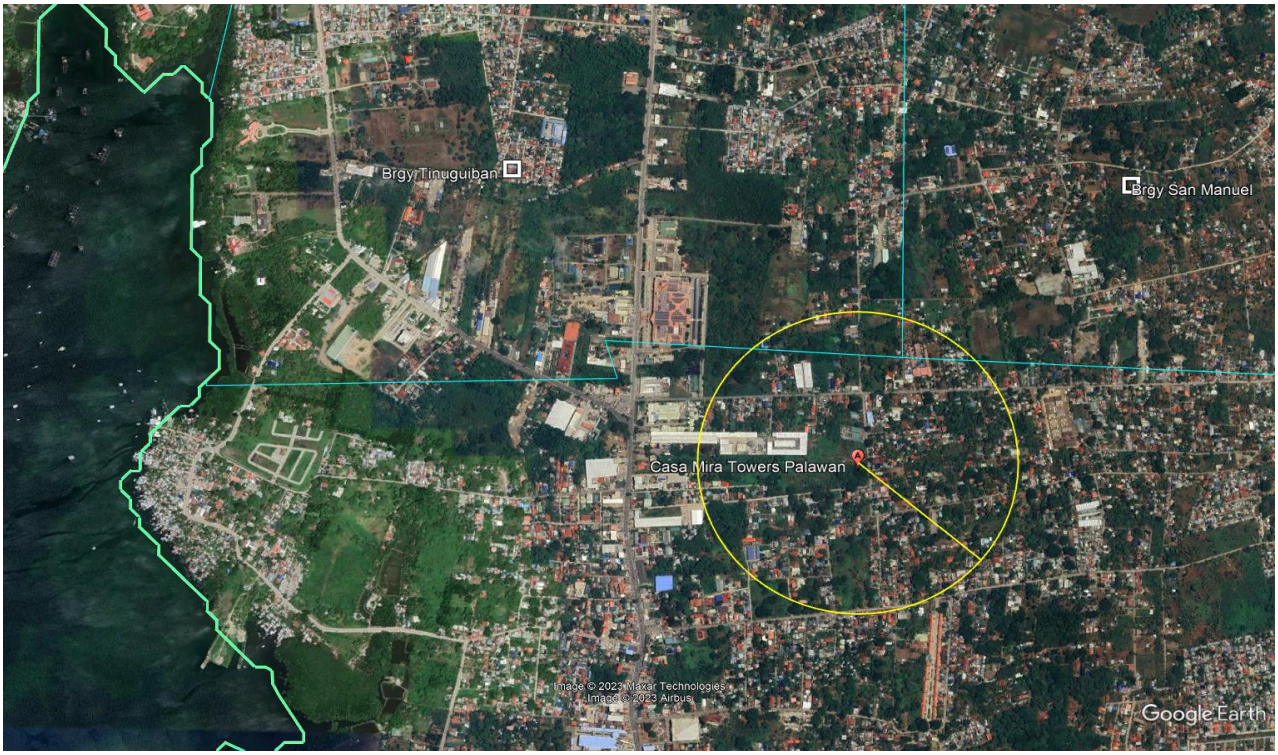


Figure 1-4 Air Quality Impact Area (Author'own)

1.4. Direct Impact Area for Water Quality and Quantity Impacts

Direct Impact Areas for Water Quality are where water quality is projected to exceed ambient standards, or the marine environment could be contaminated. There are no rivers or lakes in the area as shown below, so the affected areas will be the Puerto Princesa Bay and the Visayan Sea. There is estimated to be limited effects on marine waters at either the Sulu Sea or the Puerto Princesa Bay

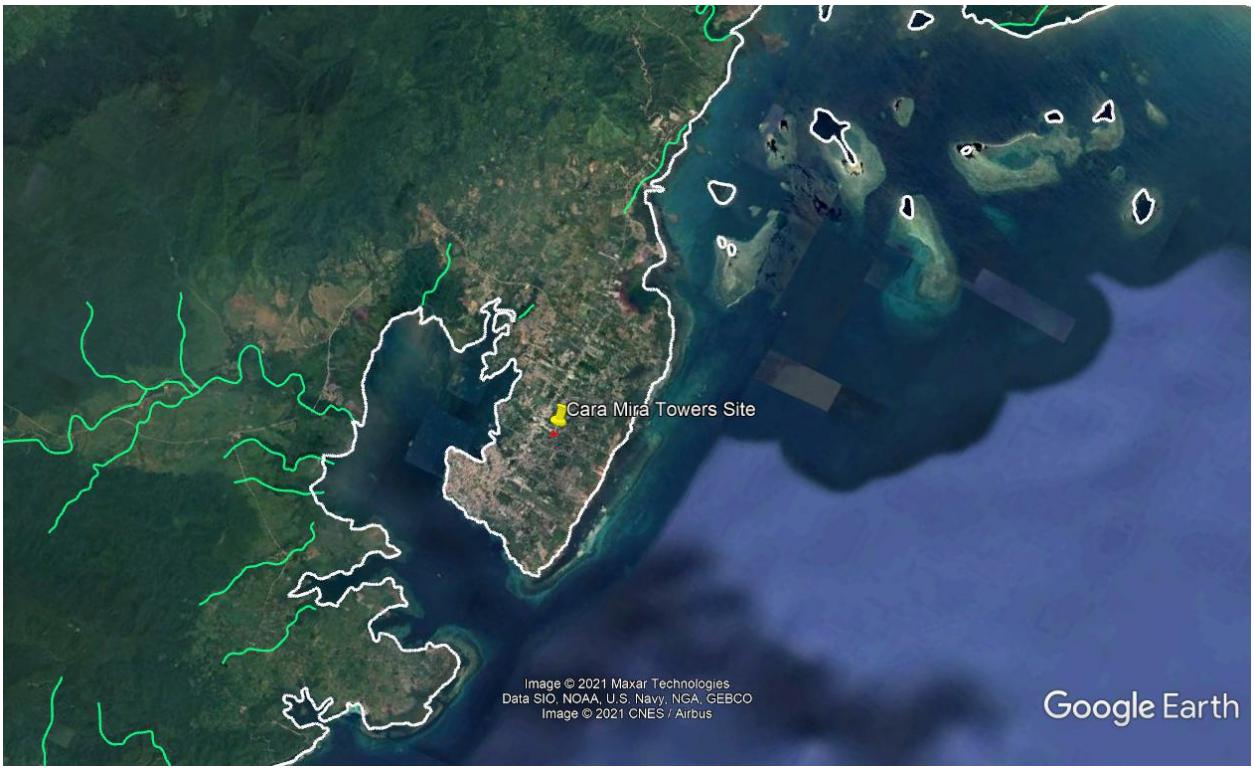


Figure 1-5 Rivers and marine waters near the project site

1.5. Direct Impact Area for Land

Direct Impact Areas on Land are those directly vulnerable to potential flooding or which may cause changes in the deposition of sand in the shores of the area. The area is not in a flood prone or landslide prone area so there will be little to no impact on flooding. Most of the flood prone areas are on the coastline as shown in the next figure.

Figure 1-6 Flood Prone areas in Puerto Princesa (source: georisk.ph)

1.6. Direct Impact Area on People

Direct Impact Areas for People Sector include the populations in the barangays and the city which will benefit from generation of taxes, royalties, social development fund provisions, and permit fees during the life of the project. There will also be 2,019 new dwelling units that may be used as either residences or as vacation rooms for the tourists.

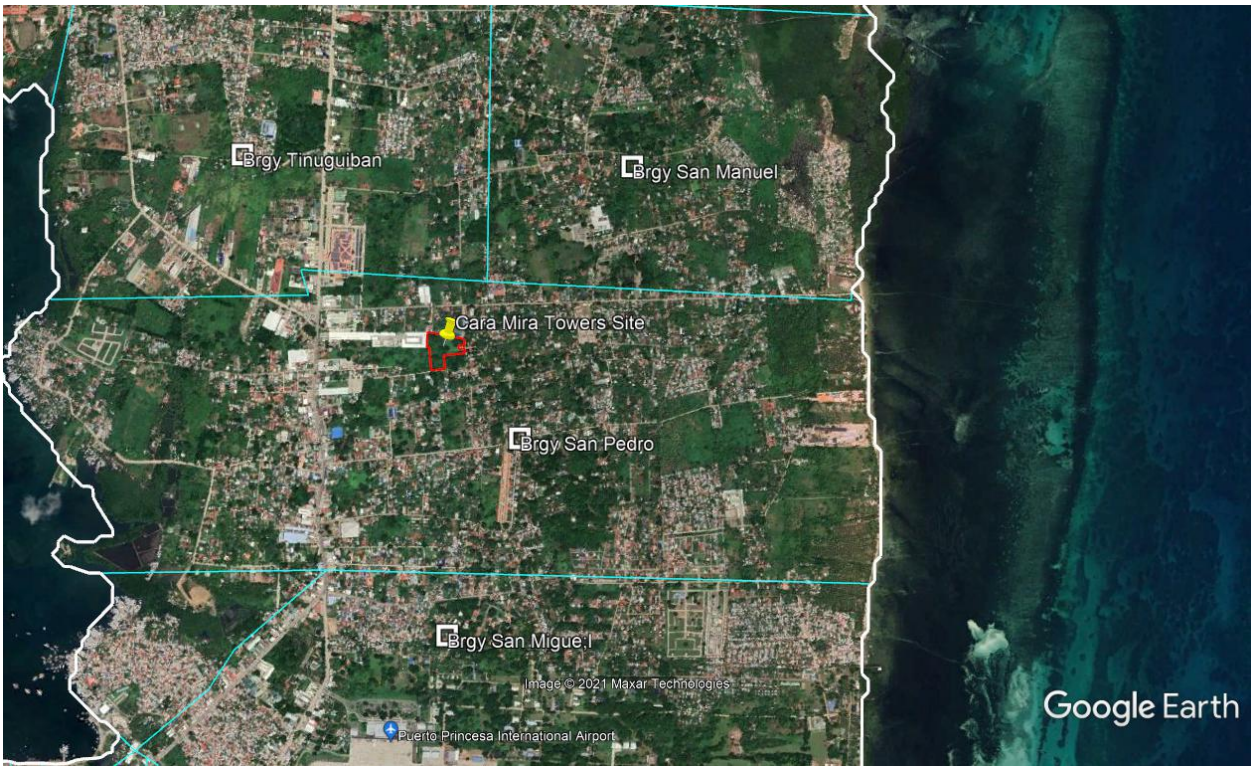


Figure 1-7 Barangays near the project area (Author'own)

1.7. Project Rationale

Casa Mira Towers Palawan is poised to be the newest addition to Cebu Landmasters Inc.'s award-winning flagship brand—Casa Mira Vertical Project. The development aims to create a nature-inspired residential development that captures the innate beauty of the rock formations found in Palawan. Holistically designed to integrate laid-back outdoor living with resort and wellness lifestyle, it seeks to transcend condo living for the new normal.

The development is strategically located in a 2.1-hectare property along Lansanas Road in Barangay San Pedro, Puerto Princesa City Palawan. Around 60% of area will be dedicated to open spaces and amenities. Keeping the Casa Mira promise of more space, more amenities, and more value to every Filipino family.

The development would consist of seven mid-rise condominium units that will ease the burden for housing in the growing city, which is experiencing rapid growth due to the tourism demand in one of the hottest tourism destinations in the country. The units are priced to be affordable and reasonable for every Filipino family to live in. The provision of a mid-rise condominium allows for a greater number of families to be housed in a smaller area, which will meet the requirements of the market in the area. There is likewise a robust demand for housing units from investors abroad, particularly from returning residents and balikbayans, which CLI hopes to cater to.

Moreover, the provision of a well landscaped residential facility in the tourism destination provides the resident (and the occasional tourist) with the ambience commensurate to the surroundings of Puerto Princesa. The condominium complex would also be covered under the new regulations of DOH, Department order 2019-0047 for sewage and wastewater treatment systems which will greatly reduce the wastewater pollutant components that will be released from the site.

1.8. Project Alternatives

Project alternatives provide design concepts and options encountered at the early stages of project design development that require management decisions. Basically, it starts with a project description and comparison of the various alternative plans that were considered in the feasibility study and project impact analysis as basis for final approved plans.

The EIA guidelines require that the Proponent provide a discussion of the consequences of not carrying out the project as against full project implementation as to the proposed project plan.

1.9. No action, No use for the Area

The “no action – no use of the area” alternative means that the project will not push through, and that no activity would take place in the area. The area will be left vacant with some tree growth, although since the site is zone residential, this lot would probably become housing units for about 100 families at 200 sq meters per lot. The probable impacts of construction and operation of the residential project will not be felt nor experienced at all. This scenario fits well for the surrounding environment. However, such an action corresponds to lost opportunity, not only for the city, but more importantly to the qualified locals who were deprived of job opportunities.

Moreover, cancelling the project will mean the residential requirements of the city of Puerto Princesa will take longer to meet and the vision of developing the city into a premier tourist destination will not include this large development. Puerto Princesa has already inaugurated a new airport terminal in 2017 and a new expanded seaport in 2021 in anticipation of this development and this midrise condominium should help in the development of this vision.

1.10. Full Project as to the Proposed Project Development Plan

This section assumes full project implementation, that is, the construction and operation of seven MID-RISE residential condominiums with 2,019 new units for families within the Puerto Princesa Central Business District. This will allow the development of the city as a premier tourist spot to continue and provide a site for the development of urban centers within the province. While there will be impacts to the environment due to the construction activities and subsequent habitation of families and business in the condominium complex, the potential of using less land for more residential units in a compact environment with adequate wastewater treatment facilities should be taken into consideration.

The establishment of the condominium complex and means additional commercial and economic potential activities to the existing stores and stalls in the area. This shall further stir up the city's local trade and commercial activities while providing additional source of goods, services or entertainment to the populace. These condominiums may also be used as vacation houses for people from crowded cities, which will ease the burden on building more tourism facilities such as resorts and hotels, which may cause more environmental impacts than residential developments owing to the fact that people often consume more and dispose more when in hotels than in homes.

During the construction stage, it is expected that there will be an increase in the demand for construction supplies and goods and services. At this stage alone, an initial number of 200 workers will be required which may increase to 400 up to 600 workers during the peak of construction. During operation of the mall, it will generate approximately 600 to 800 jobs from daily-hire, contractual, seasonal to permanent job placements.

At full occupancy, up to 2,019 families will be housed in the complex, with up to 10,200 people and personnel living in the complex. Considering transients, swimming pool area, utilities, and other factors, the water demand is estimated to be about 1,136.36 cubic meters per day with a sewage flow of 909.088 cubic meters per day and a peak flow 1,854.55 cubic meters per day for design purposes of the wastewater treatment system.

Total solid waste generation is estimated to be 5 tons per day for a fully occupied complex.

1.11. Comparison of the Project Alternatives

The full project development and no action alternatives are of contrasting objectives that may result in either advantages or disadvantages.

Obviously, the "no action" alternative will have no environmental impact as the site will remain an empty lot with no commercial use. However, the full project implementation opens up a variety of opportunities such as employment to qualified locals/individuals and taxes (realty and sales) for the local government and host barangay as well. Condominiums will require utilities such as electricity and water. This in turn will add up to the resource users/consumers in the area. In relation, the operation would result in generation of solid and liquid wastes which require proper handling and disposal.

1.12. Project Components / Project Development Plan

The main project components as per SEP clearance are as follows:

Facilities	No. of Units	Area (sq. m.)/ Capacity	Specification/Description/Remarks
1. Residential Units	2,017	45,319.85	
2. Commercial Spaces			
• Retail @ Podium I	4	448.30 sq. m.	
• Retail @ Podium 2	7	344.60 sq. m.	
3. Amenities			

Facilities	No. of Units	Area (sq. m.)/ Capacity	Specification/Description/Remarks
• Swimming Pool	1	714.7	Located Ground Floor
• Gym	1	65.2	Area@ Tower 4
• Function Hall	2	231.42	Located @ Clubhouse
• Chapel	1	122.89	Located at Clubhouse
4. Open/Common Spaces		7,328.47	
5. Road System		5,716.15	
6. Common Parking Space			
• Podium 1	144	3,491.73	
• Podium 2	176	4,352.56	
• Surface Parking	75	937.83	
7. Material Recovery Facility		651.83	
8. Administration Area / Office			
• Administration Office		65.06	Located @ Ground floor at Utili Buildin
• Security Office		247.6	Located @ Tower 5
• Maintenance Office		139.36	Located @ Ground floor at Utility Building
9. Utilities			
Electrical Room / Generator Room / Transformer Room		221.65	Located @ Ground floor at Utility Building

Condominium development projects involves vertical construction which are designed to utilize a variety of concrete structures assembled to attain desired structural building design. The structural forms and foundations of the four condominiums building will mostly be cast-in-place. Concrete will be used in a variety of structures from paneling all the way to massive building construction. The entire 2.1 hectares of land will be used for the development as seen in **Figure 1-10**.

The Site Development plan is shown in **Figure 1-12.** The ground floor plans of each tower plus the clubhouse is likewise shown in **Figure 1-13**. **Table 1-2** provides the area tabulations for each of the buildings to be built while the rest show pictures of the site when completed. A total of 264 parking slots will be provided.

Figure 1-8 Exterior Perspective of the development

Figure 1-9 Another exterior perspective of the development

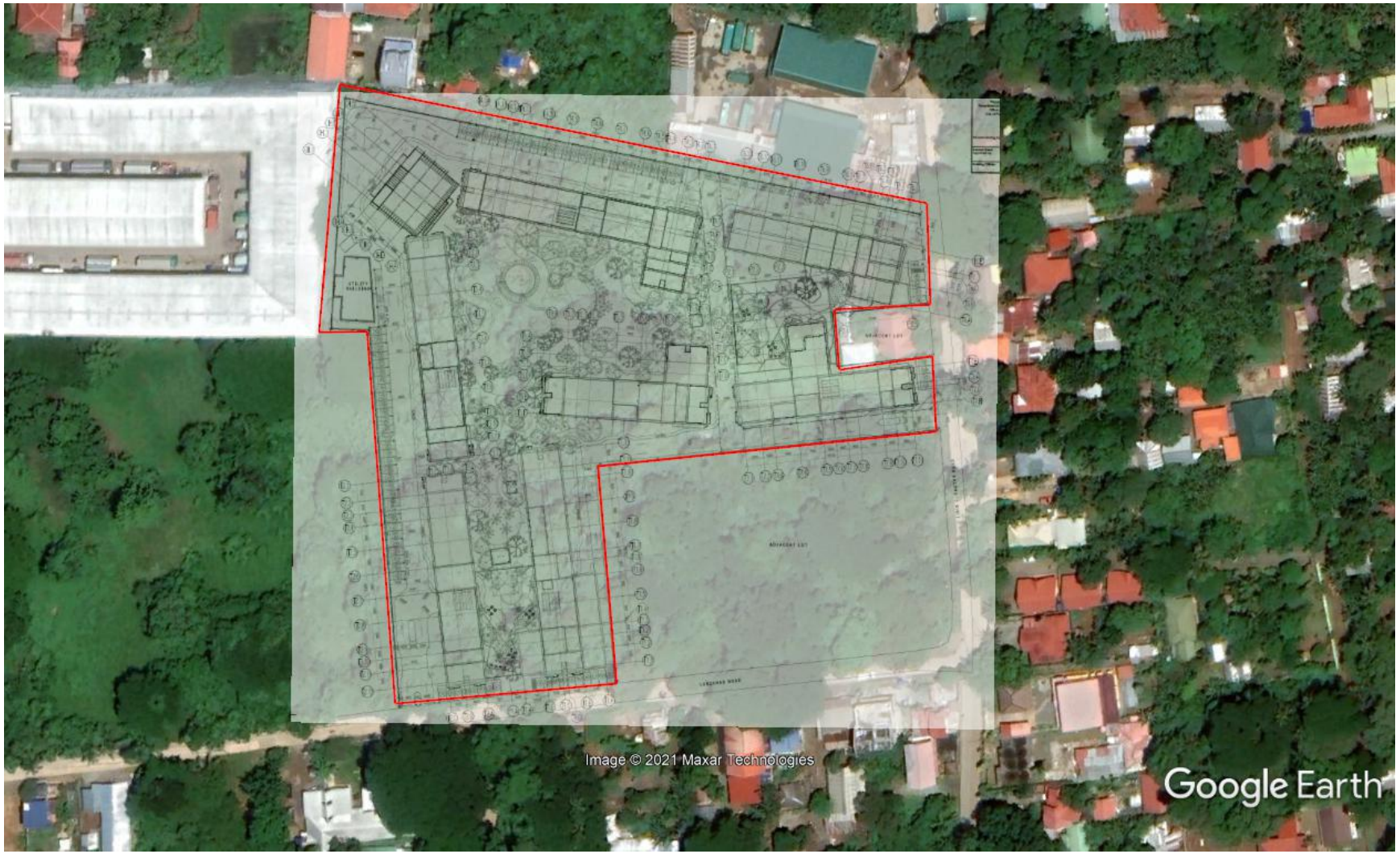


Figure 1-10 Masterplan overlaid over the project area

Figure 1-11 Interior perspective with the swimming pool

Figure 1-12 Lot Development Plan

Figure 1-13 Ground Floor Plan

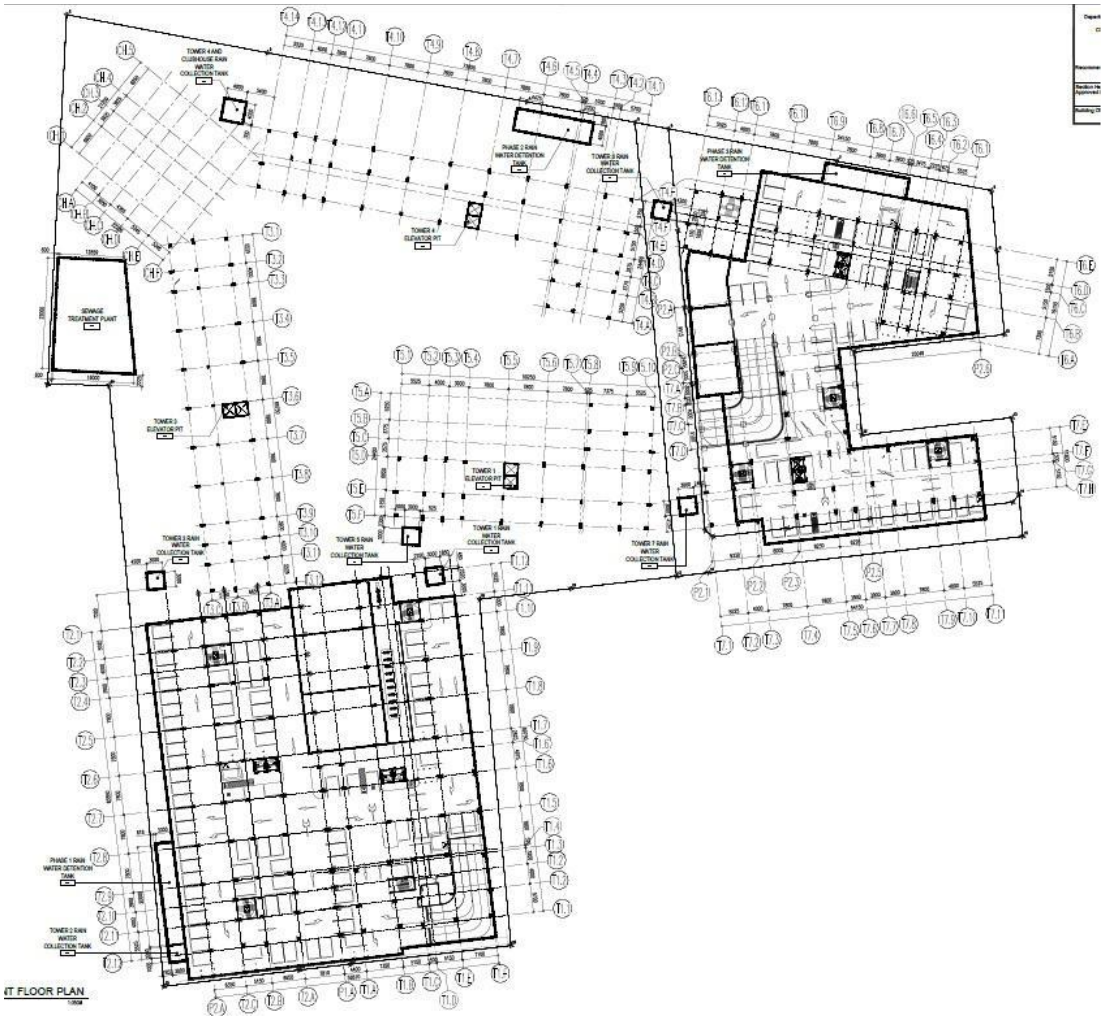


Figure 1-14 Underground Tank Plan

Table 1-2 Area Tabulation

UNIT MIX	NO. OF STOREY	CFA	GFA	NSA/NLA	NO. OF UNITS	NO. OF RETAIL UNITS	NO. OF PARKING
PHASE 1							
PODIUM 1							
BASEMENT FLOOR	1	3,491.73	124.93	-		-	64
GROUND FLOOR	1	1,755.81	540.66	448.3		4	19
2ND FLOOR	1	1,259.91	14.96	-		-	20
3RD FLOOR	1	1,225.79	14.96	-		-	19
4TH FLOOR	1	1,225.79	14.96	-		-	22
5TH FLOOR	1	907.47	108.21			-	-
TOTAL	6	9866.5	818.68	448.3		4	144
TOWER 1							
GROUND FLOOR	1	426.61	371.88	258.27		-	-
2ND FLOOR	1	648.40	577.00	346.36		-	-
3RD FLOOR	1	653.68	589.95	440.60		-	-
4TH FLOOR	1	640.95	589.95	440.60		-	-
5TH FLOOR	1	780.19	713.87	481.58		-	-
6TH FLOOR	1	790.90	721.77	552.31		-	-
7TH FLOOR	1	804.77	627.04	386.53		-	-
8TH FLOOR	1	714.62	640.98	461.48	227	-	-
9TH FLOOR	1	660.53	602.41	461.48		-	-
10TH FLOOR	1	714.62	640.98	501.65		-	-
11TH FLOOR	1	695.85	564.91	421.28		-	-
12TH FLOOR	1	629.56	564.91	421.28		-	-
ROOF DECK	-	623.95	33.48	-		-	-
ROOF	-	164.19		-		-	-

UNIT MIX	NO. OF STOREY	CFA	GFA	NSA/NLA	NO. OF UNITS	NO. OF RETAIL UNITS	NO. OF PARKING
TOTAL	12	8948.82	7239.13	5173.42		-	-
TOWER 2							
GROUND FLOOR	1	415.61	380.04	258.27	253	-	-
2ND FLOOR	1	735.5	654.72	505.32		-	-
3RD FLOOR	1	701.96	656.18	505.32		-	-
4TH FLOOR	1	726.17	654.63	505.32		-	-
5TH FLOOR	1	912.96	826.44	570.64		-	-
6TH FLOOR	1	910.66	843.94	645.05		-	-
7TH FLOOR	1	913.93	767.13	497.29		-	-
8TH FLOOR	1	865.83	642.02	460.91		-	-
9TH FLOOR	1	650.82	604.18	460.91		-	-
10TH FLOOR	1	711.55	642.02	501.08		-	-
11TH FLOOR	1	695.47	603.34	460.91		-	-
12TH FLOOR	1	662.87	505.01	365.9		-	-
ROOF DECK	-	547.48	35.63	-		-	-
ROOF	-	141.79		-		-	-
TOTAL	12	9592.6	7815.28	5736.92		-	-
UTILITY BUILDING							
GROUND FLOOR	1	221.65	63.56	-		-	-
2ND FLOOR	1	221.65	19.79	-		-	-
ROOF	-	221.65	-	-		-	-
TOTAL	2	664.95	83.35	-		-	-
GUARD HOUSE							
GUARD HOUSE A	1	8.00	8.00	-		-	-

UNIT MIX	NO. OF STOREY	CFA	GFA	NSA/NLA	NO. OF UNITS	NO. OF RETAIL UNITS	NO. OF PARKING
GUARD HOUSE B	1	8.00	8.00	-			
TOTAL	-	16.00	16.00	-		-	-
TOTAL (PHASE 1)		29,088.87	15,972.44	11,358.64	480	4	144
PHASE 2							
TOWER 3							
GROUND FLOOR	1	822.97	730.83	553.87		-	-
2ND FLOOR	1	822.98	741.87	523.75		-	-
3RD FLOOR	1	829.43	681.09	528.51		-	-
4TH FLOOR	1	731.58	677.67	512.87		-	-
5TH FLOOR	1	749.41	578.69	388.19		-	-
6TH FLOOR	1	641.72	457.82	387.31		-	-
7TH FLOOR	1	656.05	585.23	451.94		-	-
8TH FLOOR	1	648.9	585.23	411.92	241	-	-
9TH FLOOR	1	596.47	547.67	411.92		-	-
10TH FLOOR	1	652.55	585.23	451.94		-	-
11TH FLOOR	1	641.01	585.23	451.94		-	-
12TH FLOOR	1	647.1	450.74	323.75		-	-
ROOF DECK	-	492.3	14.97	-		-	-
ROOF	-	153.52	-	-		-	-
TOTAL	12	9085.99	7222.27	5397.91		-	-
TOWER 4							
GROUND FLOOR	1	1108.03	1010.55	737.73		-	-
2ND FLOOR	1	1108.51	1026.59	829.11		-	-
3RD FLOOR	1	1126.63	957.22	767.12	384	-	-
4TH FLOOR	1	1022.5	955.94	755.88		-	-
5TH FLOOR	1	1055.89	899.92	656.44		-	-

UNIT MIX	NO. OF STOREY	CFA	GFA	NSA/NLA	NO. OF UNITS	NO. OF RETAIL UNITS	NO. OF PARKING
6TH FLOOR	1	978.26	855.69	627.53		-	-
7TH FLOOR	1	957.32	861.16	692.17		-	-
8TH FLOOR	1	941.22	861.16	692.17		-	-
9TH FLOOR	1	943.55	861.16	652.72		-	-
10TH FLOOR	1	899.69	823.3	652.72		-	-
11TH FLOOR	1	943.55	861.16	692.17		-	-
12TH FLOOR	1	933.77	679.16	523.6		-	-
ROOF DECK	-	743.26	32.77	-		-	-
ROOF	-	153.92	-	-		-	-
TOTAL	12	12916.1	10685.78	8279.36		-	-
TOWER 5							
GROUND FLOOR	1	879.83	805	560.06		-	-
2ND FLOOR	1	890.98	815.8	651.46		-	-
3RD FLOOR	1	902.05	815.8	651.46		-	-
4TH FLOOR	1	882.59	815.8	651.46		-	-
5TH FLOOR	1	898.45	808.6	587.35		-	-
6TH FLOOR	1	880.2	808.75	587.35		-	-
7TH FLOOR	1	903.23	815.80	651.46		-	-
8TH FLOOR	1	894.7	815.80	651.46	345	-	-
9TH FLOOR	1	891.95	815.80	611.29		-	-
10TH FLOOR	1	853.38	777.16	611.29		-	-
11TH FLOOR	1	891.95	815.80	651.46		-	-
12TH FLOOR	1	887.5	680.34	523.42		-	-
ROOF DECK	-	745.11	32.5	-		-	-
ROOF	-	158.89	-	-		-	-
TOTAL	12	11560.81	9622.95	7389.52		-	-
CLUBHOUSE							

UNIT MIX	NO. OF STOREY	CFA	GFA	NSA/NLA	NO. OF UNITS	NO. OF RETAIL UNITS	NO. OF PARKING
GROUND FLOOR	1	549.98	393.67	-		-	-
2ND FLOOR	1	298.37	179.41	-		-	-
ROOF DECK	-	535.86	46.08	-		-	-
ROOF	-	102.01	-	-		-	-
TOTAL	2	1,486.22	619.16	-		-	-
SHOWER & TOILET BUILDING							
SHOWER & TOILET BUILDING	1	58.70	-	-		-	-
TOTAL	1	58.70	-	-		-	-
POOL AREA							
WOOD DECK	2	95.03	-	-		-	-
SWIMMING POOL	-	619.67	-	-		-	-
TOTAL	2	714.70	-	-		-	-
RETAIL PODS							
RETAIL POD A	1	16.00	16.00	16.00		1	
RETAIL POD B	1	16.00	16.00	16.00		1	
TOTAL	-	32.00	32.00	32.00		2	
Surface Parking (Tower 4, 5 & 6)							
Phase 1							6
Phase 2							51
Phase 3							18
Total Surface Parking							75
TOTAL (PHASE 2)		35,854.52	28,182.16	21,098.79	970	2	75
PHASE 3							
TOWER 6							
GROUND FLOOR	1	476.34	422.35	298.71	271	-	-
2ND FLOOR	1	475.91	432.52	325.71		-	-

UNIT MIX	NO. OF STOREY	CFA	GFA	NSA/NLA	NO. OF UNITS	NO. OF RETAIL UNITS	NO. OF PARKING
3RD FLOOR	1	476.61	432.52	325.71		-	-
4TH FLOOR	1	484.15	432.52	325.73		-	-
5TH FLOOR	1	866.42	773.69	537.27		-	-
6TH FLOOR	1	865.68	773.49	621.98		-	-
7TH FLOOR	1	845.23	762.56	526.63		-	-
8TH FLOOR	1	865.43	780.06	581.44		-	-
9TH FLOOR	1	793.56	742.05	581.44		-	-
10TH FLOOR	1	865.41	780.06	621.61		-	-
11TH FLOOR	1	834.82	780.06	621.61		-	-
12TH FLOOR	1	857.24	711.94	557.46		-	-
ROOF DECK	-	776.05	34.64	-		-	-
ROOF	-	155.36	-	-		-	-
TOTAL	12	9638.21	7858.46	5925.3		-	-
TOWER 7							
GROUND FLOOR	1	519.02	464.94	338.61		-	-
2ND FLOOR	1	514.08	475.61	365.90		-	-
3RD FLOOR	1	515.12	475.61	365.90		-	-
4TH FLOOR	1	529.18	475.61	365.90		-	-
5TH FLOOR	1	1196.04	1005.02	714.06		-	-
6TH FLOOR	1	1117.57	1009.99	784.58		-	-
7TH FLOOR	1	1082.15	808.92	545.76	296	-	-
8TH FLOOR	1	918.70	825.44	622.12		-	-
9TH FLOOR	1	846.29	786.95	622.12		-	-
10TH FLOOR	1	918.70	825.44	662.29		-	-
11TH FLOOR	1	918.70	747.75	581.95		-	-
12TH FLOOR	1	833.64	747.75	581.95		-	-
ROOF DECK	-	832.07	15.04	-		-	-

UNIT MIX	NO. OF STOREY	CFA	GFA	NSA/NLA	NO. OF UNITS	NO. OF RETAIL UNITS	NO. OF PARKING
ROOF	-	207.38	-	-		-	-
TOTAL	12	10948.64	8664.07	6551.14		-	-
PODIUM 2							
BASEMENT FLOOR	1	4,352.56	129.22	-		-	94
GROUND FLOOR	1	1,640.98	496.79	343.98		7	
2ND FLOOR	1	1,615.05	30.86	-		-	26
3RD FLOOR	1	1,661.14	30.36	-		-	27
4TH FLOOR	1	1,657.76	30.29	-		-	29
5TH FLOOR	1	581.69	106.25	-		-	
TOTAL	6	11509.18	823.77	343.98		7	176
RETAIL PODS							
RETAIL POD C	1	12.00	12.00	12.00		1	
RETAIL POD D	1	30.00	30.00	30.00		1	
TOTAL	-	42.00	42.00	42.00		2	
GUARD HOUSE							
GUARD HOUSE C	1	8.00	8.00	-		-	-
TOTAL	-	8.00	8.00	-		-	-
TOTAL (PHASE 3)		32,146.03	17,396.30	12,862.42	567	9	176
GRAND TOTAL		**97,089.42**	**61,550.90**	**45,319.85**	**2,017**	**15**	**395**

1.13. Description of Project Phases and Corresponding Timeframes (Activities/Environmental Aspects, Associated Wastes and Built-in Pollution Control Measures)

1.13.1. Pre-Construction/Pre-Operational Phase

The activities of pre-construction phase include preparation of engineering plans and design, and securing all regulatory requirements, such as environmental compliance certificate (ECC), and corresponding local permits. The property is already fenced so no further fencing may be required save for the repair of some areas. No environmental impacts or aspects are expected in this phase.

1.13.2. Construction and Development of a Condominium Complex

Prior to any vertical construction, land preparation is a pre-requisite. This involves clearing and grubbing, excavation for foundations and soil base stabilization activities. The buildings of the former Mitsubishi property have been removed. However, the initially planned site is the paved area where Mitsubishi parked its cars. The site is paved and free of any structures.

The seven towers building will be built based on CLI's approved architectural and engineering design and layout. It will be erected and assembled made from construction materials and products specified for each of the compartments, such as concrete walling and panels, roofing, trusses and beams, claddings and fixtures.

It is expected that the main environmental impacts of this type of development are dust, construction wastes, noise and vibrations from various activities during the construction phase. To some observers, the mere presence or on-going construction activities in any given area is an eye sore on the landscape. However, all these impacts are expected to be short term (limited to the construction timeframe) and at tolerable levels.

The project proponent in coordination with the Project management team, the awarded contractor and suppliers shall comply and execute the construction of the project based on the plans, general notes and specifications issued by the designers and consultants, which shall conform to the National Building Code of the Philippines and its implementing rules and regulations. Likewise, the same contractors, sub-contractors, and suppliers should conform to relevant labor and safety rules and to environmental laws and regulations, such as the solid waste management act, the clean air act, the clean water act, and the environmental management plan as included in this EIS.

The main contractor shall be in charge of the construction management, materials and supplies, equipment, development works, labor and supervision, and related undertakings to complete the project.

The activities to be undertaken during the construction phase are as follows:

- Mobilization of construction team and equipment

- Pile driving and substructure stabilization
- Form works and scaffolding works
- Electrical Works
- Mechanical Works
- Plumbing and sanitary works
- Fire protection
- Ceiling works and finishing
- Flooring works
- Interior wall installation
- Interior and exterior painting works
- Installation of doors and windows
- Plastering and retouching
- Telephone and cabling works
- Demobilization

Contractors shall procure necessary construction materials such as gravel, sand, pipes, cement, and other readily available materials, from hardware stores and businesses in the locality in order to ensure that the benefits of the development redound more to the host LGU. Only when these materials cannot be supplied within the city will these be procured from outside of Binan or nearby provinces. Shown below is CLI construction schedule.

1.13.2.1. Project Laydown and Construction Spoils area

The initial project laydown and construction spoils area will be the open area in the middle of the buildings and the area to be used for Phase 3 development since this area will be utilized at a latter stage of construction. These are provided in the following illustration. This laydown area in the middle of th e developments will continually be used until phase 3 development.

Figure 1-15 Project Laydown and Spoils Area for Phase 1 and 2

For construction spoils, the construction contractor shall be tasked to maintain a small spoils area and ensure close coordination with the city waste services for regular collection of these wastes, which will be non-hazardous in nature. Since the development is new, there will be no major buildings to be demolished and construction spoils will be minimal (hardened cement and excess mostly). Excess metals and materials may be recycled and resold so the construction spoils will be kept to a minimum

1.13.2.2. Power and Water Sources

Power will mostly be sourced from the local power supplier and local water utilities as soon as the construction phase starts. During the construction stage, electricity will be a necessity for the temporary site facilities to house the construction engineers, supervisors, foreman and workers/laborers. The site camp will include the temporary dwellings, sanitary and waste storage facilities and other support systems.

Water and electricity estimates will vary widely depending on the activity that is being done. At a minimum, the 300 workers would need about 4.5 cubic meters of water per day. Electricity requirements is estimated to be about 100,000 k-wh per month during the construction phase.

1.13.2.3. Waste Management Facilities

During the construction phase, the construction contractor will be tasked to segregate the construction spoils so as to recycle and reuse all excess materials as much as possible. The major construction wastes are glass, plastics, wood and steel, surplus mortar, surplus concrete, broken bricks, green wastes (grass, bushes) and excavated soil. Unusable materials will be collected by the city waste management system.

Hazardous wastes will include waste paints and thinners and their containers. These will be placed in a temporary hazardous waste facility that will be enclosed and bunded and will be required in the construction environment and safety management plan for the construction contractor.

Portalets shall be available for construction workers on site. About 10-15 portalets will be available per shift for an average of 15 construction workers per shift on a two shift schedule (150 workers per shift)

1.13.3. Operational Phase

The condominium buildings will start pre-selling as soon as all the permits and plans are gathered and finalized. It shall be ready for habitation after construction for which up to 2,019 families are envisioned to occupy once completed.

Expected waste types are the types typically seen from residential establishments including solids which vary from plastic and food wrappers/containers, plastic and paper cups, bottles and tin cans, and food wastes. About 5,000 kg per day is expected from the wastes of residents and support staff.

1.13.3.1. Power and Water Source

Power and water sources for the operations phase will come from the local power supplier and local water utilities providers in the area.

Typically, a normal condominium unit with air-conditioning and refrigerators will consume about 800 kw-hr of electricity a month or 19.4 million kwh of electricity per year if all the units are occupied. Including lights and other common uses, the condominium complex is expected to use up to 23 million kwh per year.

Each of the seven towers will have one 300 KVA diesel generator for emergency power.

Demand for water is also inevitable during the construction period. At the on-set of construction, water usage will be required during the production of concrete materials for building structures, roads and pathways, drainage and other building furniture. It has to be noted though, that pre-fabricated concrete slabs, panels and structures will be utilized and thus fabrication will mostly be done off-site. These products will utilize water, but its supply will be provided by concrete batching plants for assigned contractors. This means the project assumes that contractors to be commissioned would have their own concrete production/batching plant, and with corresponding permits and clearances, i.e., ECC, water rights permit, LGU permit, etc.

Supply of domestic water will be tapped from the local water district. The water consumption of the workers and facilities is considered low and temporary as the duration of construction is estimated at 16 months.

During operations, water requirement of the 2,019 residential apartments, retail establishments, swimming pool, and other uses is estimated at 1,136.36 cubic meters per day with a peak flow of 1,854.55 cubic meters. Fire reserve water of 90,000 gallons shall also be provided.

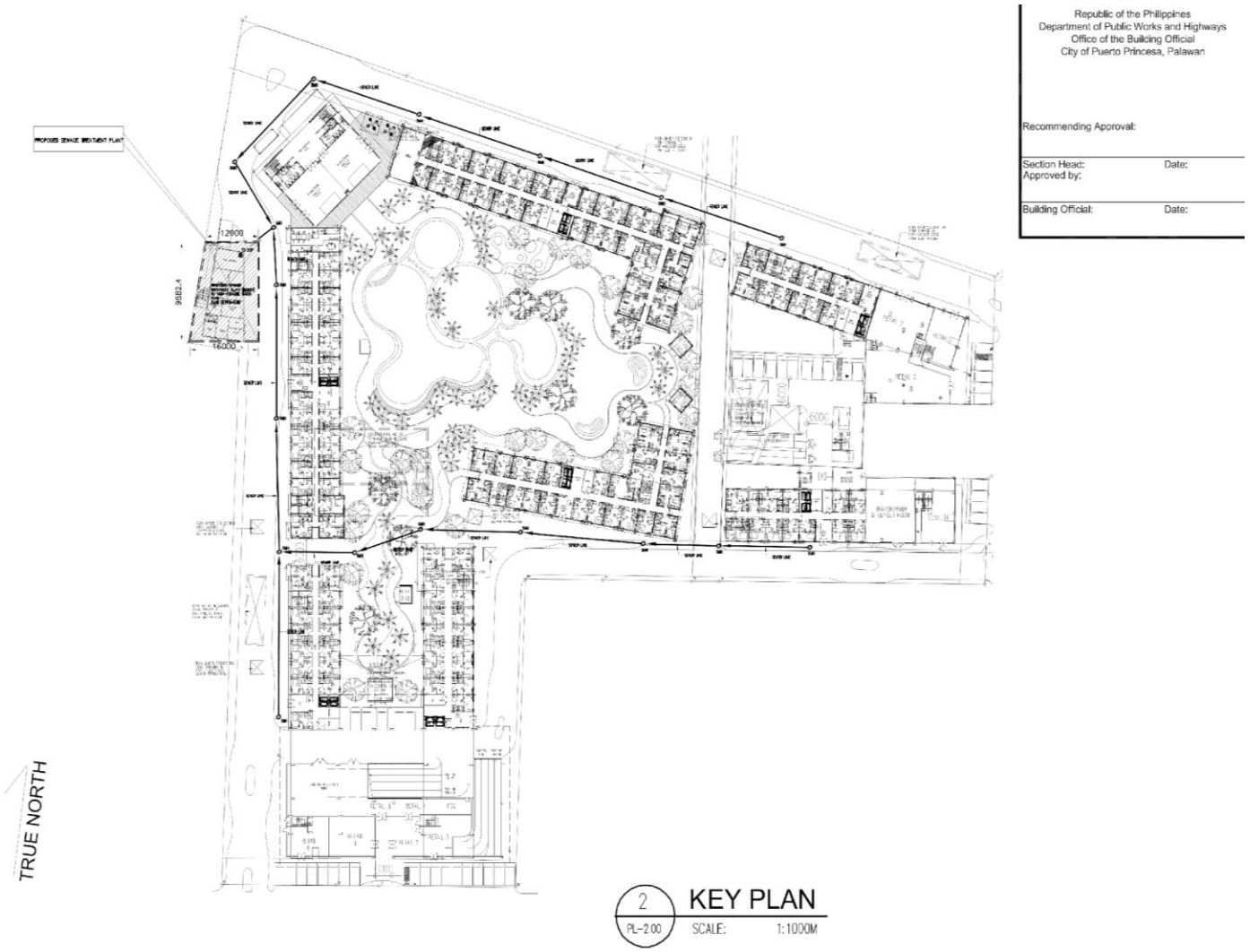
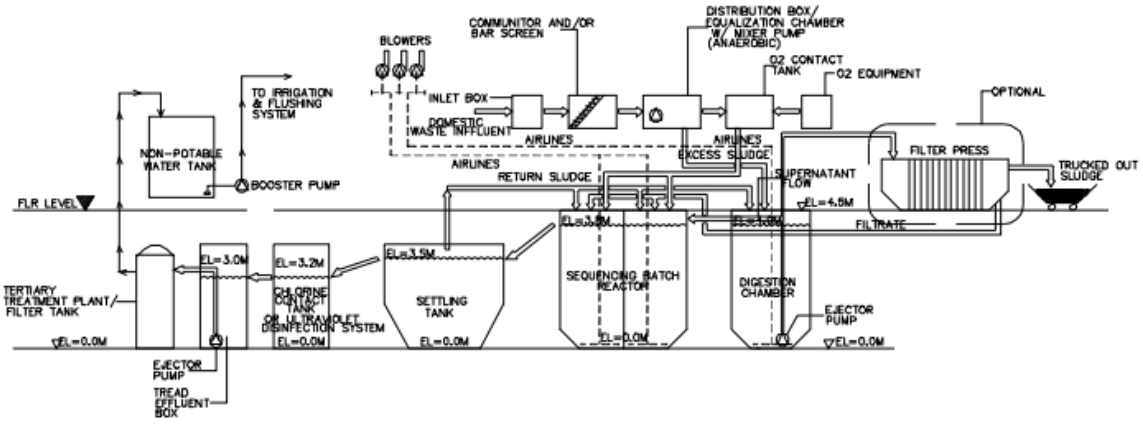
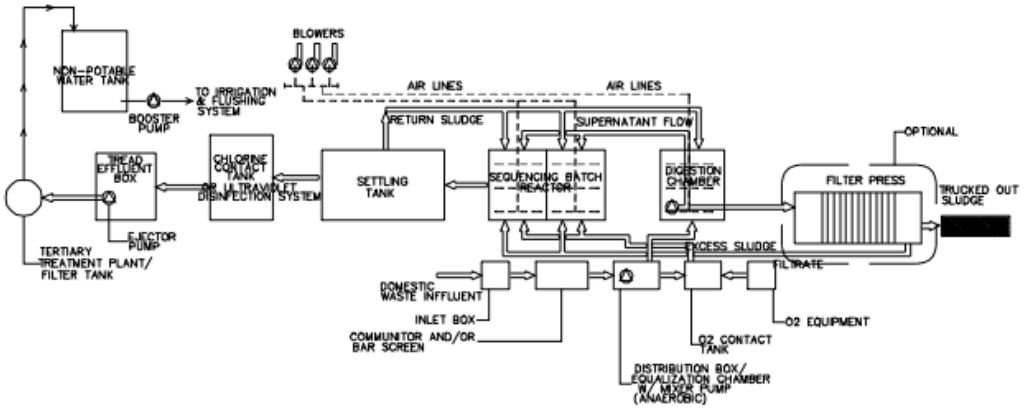


Figure 1-16 Drainage Plan



VERTICAL FLOW DIAGRAM



HORIZONTAL FLOW DIAGRAM

2 SCHEMATIC FLOW DIAGRAM

PL-01 SCALE: NTS

Figure 1-17 Proposed Sewage Treatment

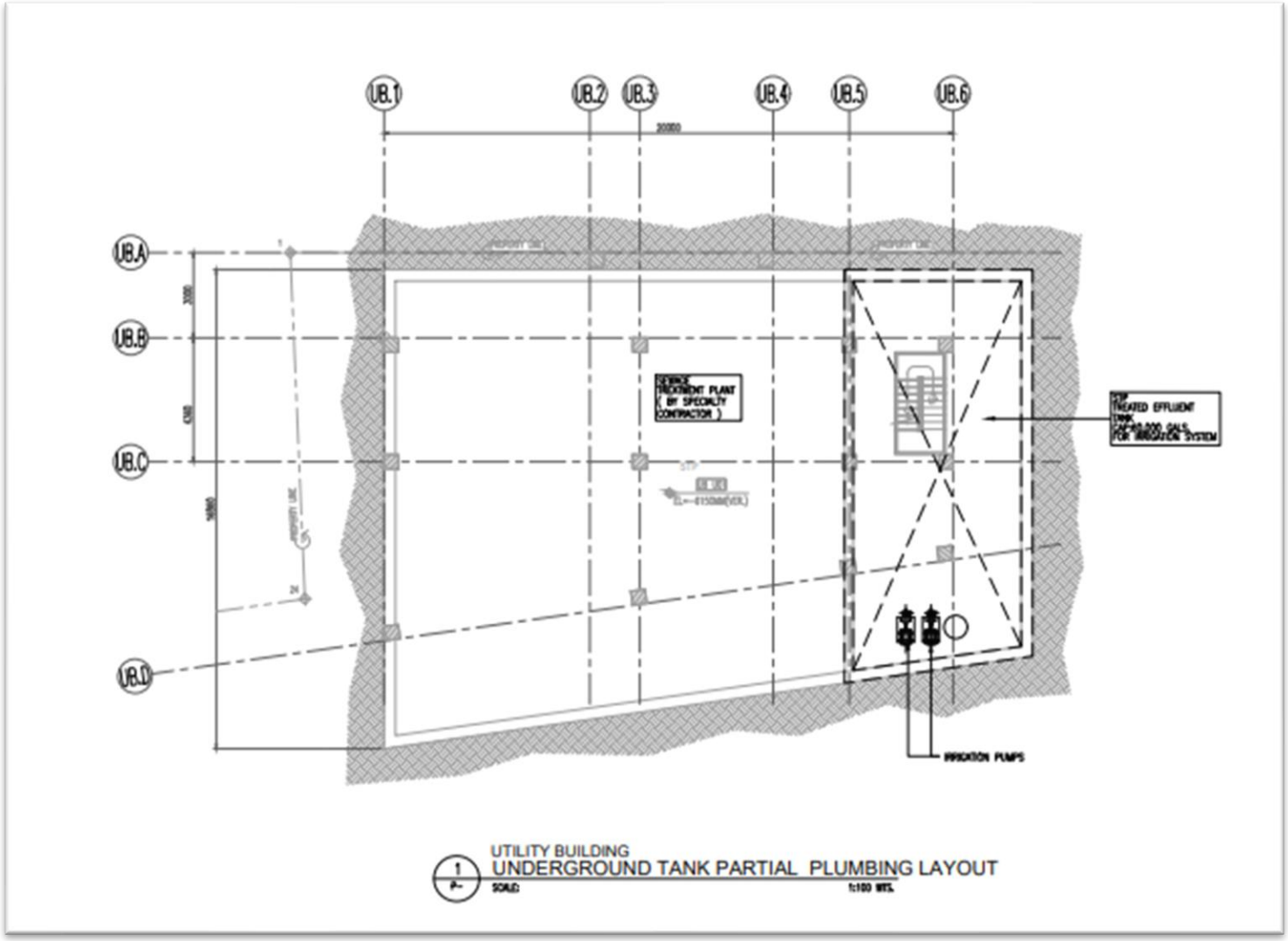


Figure 1-18 Underground Tank Partial Plumbing Layout

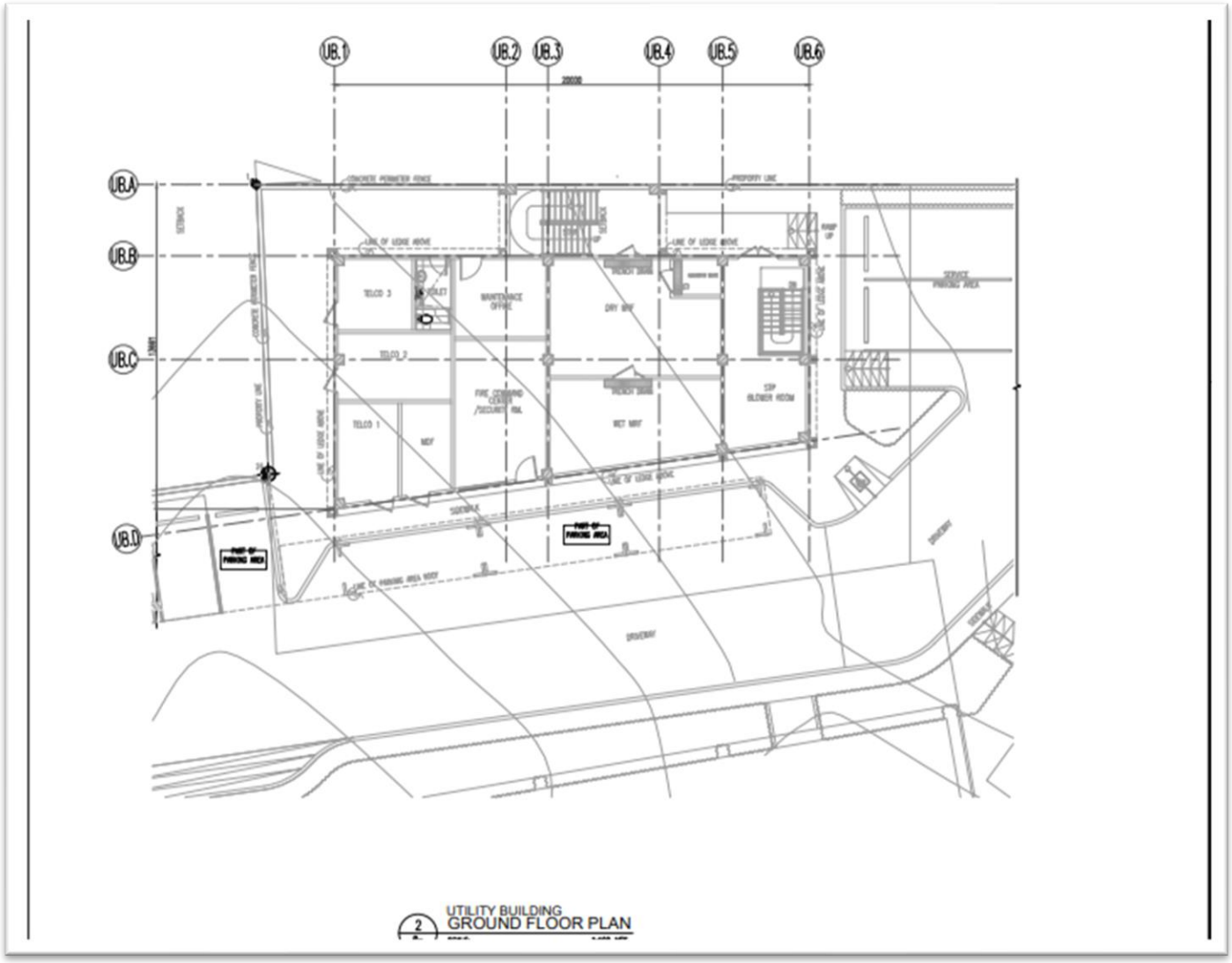


Figure 1-19 Utilities plan

1.13.3.2. Drainage System and Storm Management

The proposed project will be provided with an efficient drainage system to address surface and subsurface rainwater including ground seepage. It includes adequate cross-drains and collection system, sufficient counter-measures to address flooding, major drainage structures, surface water infiltration and drainage outfalls. The drainage system comprises of a network of pipe culverts, roadside ditches, and internal drainage systems within the mall complex along the road pavement. The design of the drainage is provided as Error! Reference source not found. while the design of the wastewater treatment system is provided under Error! Reference source not found.

To avoid storm damage to the development complex property, an emergency plan equipped with personnel and machineries will be on stand-by on short notice mobilization. This is also similar with emergency measures during fire control.

1.13.3.3. Waste Management and Safety/Emergency Facilities

Waste management facilities will include sewage treatment plant (STP), oil-water separators, Hazardous waste storage area, and exhaust gas mufflers for diesel-engine powered stand-by generator sets.

There will be minimal hazardous wastes that will be generated by the operations of the project since the generators will be standby generators only and will require minimal maintenance that shall produce waste oil. Dewatered sludge shall be removed from the site or will be placed as soil conditioner The waste oil shall be placed in a hazardous waste management facility that will meet the requirements of RA6969.

A MRF shall also be part of the utilities area as provided in the design in **Error! Reference source not found.**.

1.13.3.4. Wastewater Treatment system

The design parameters for the wastewater treatment systemed are based on **SEQUENCE BATCH REACTOR** of the **ACTIVATED SLUDGE PROCESS with TERTIARY TREATMENT**. It is expected to have an efficiency of at least 90% for BOD and Suspended Solid removal. The schematic diagram of the system is provided as

The proposed STP will be concealed type and located below grade level. All influent shall flow by gravity to lift station integrated to the proposed Sewage Treatment Plant.

1.13.3.4.1. Design Parameters

The design considerations are as follows

- The wastewater treatment system shall be a two (2)-basin sequencing batch reactor , which shall be designed for organic (BOD_5/COD) and nutrient (NH_3-N) removal. The sewage treatment plant shall be designed to incorporate nitrification-denitrification.
- The sewage treatment process shall be combination of anaerobic process to treat nitrate and aerobic to avoid concerns with confined space / safety considerations, and the potential for odor / explosive gases.
- Peak hours are expected to be from 9:00 am to 1:00 pm and 4:00 pm to 8:00 pm.. Therefore only 8 out of 24 hours will be critical. Wastewater and sewage generation will be mostly within these hours. However, health facilities considered full occupancy 24 hours, 7 days a week. To handle the anticipated highly fluctuating flow and loading to the STP, an equalization tank with an effective capacity of 4 hours minimum shall be provided.
- The peak flow factor shall be 2.4. This factor shall be used for sizing of the influent lift sump, bar screen and other equipment.
- All other unit processes (equalization tank, biological treatment, disinfection, etc). shall be designed on the basis of average flow.
- Ventilation, which is required if the process tanks are to be covered or enclosed, shall be a minimum of 12 - 15 air changes per hour. Fresh air intake shall be provided. Exhaust air shall be directed outside the building and away from public thoroughfares.
- All metalworks within the process tanks (aeration distribution piping, cat ladders, supports, guiderails, chains, etc.) within the process tanks shall be SS304 to minimize maintenance requirements. Access inside the process tanks after the STP has commenced operation should be minimized / avoided.
- All key equipment (pumps and blowers) shall be provided with on-line standby equipment. Submit complete brochures and pump selection data curve.
- Decanter shall be fixed type or non-moving and shall be made of durable non-corrosive material and preferably with no moving parts. Decanter shall be air, hydraulic or electric operated. The accumulation of solids in the decanter header shall not be allowed. All mounting brackets and hardware shall be made of stainless-steel materials. Proposed decanter shall be subject for approval and requires to submit complete construction plans and technical specification. Submit complete brochure and technical specifications.
- The air diffusing mechanism shall be of non-corrosive and non-clogging type only and shall be arranged in such a manner that it is easy in servicing and positive diffusion for both regulation and complete shut-off of the air supply
- Ultraviolet disinfection system (low maintenance type) shall be used for disinfection of treated effluent. (Submit brochures and technical specification) . An alternate disinfection system shall be using Chlorine disinfection system.

- All Structural/Civil Works shall be designed based on latest available (as of Dec 2008) National Building Code and other governing Codes and Standards enforced in the Philippines, like the ASEP Structural Code, etc. duly signed and sealed by a duly licensed engineering practitioner.

1.13.3.4.2. Design Basis

1.13.3.4.2.1. Influent Parameters

The following figures were used as the basis for the plant design: -

i)	*Nature of Wastewater*	*Commercial / Residential*
ii)	*Average Sewage Flow/ Day*	*210,000 US GALS. (795.45 CU..M.)*
iii)	*Discharge Pattern*	*Continuous(~4 hrs/day)*
iv)	*Peak Factor*	*2.4*
v)	*Influent BOD_5 concentration*	*300 mg/L*
vi)	*Influent TSS concentration*	*300 mg/L*
vii)	*Influent COD concentration*	*600 mg/L*
viii)	*Influent TKN concentration*	*80 mg/L*
ix)	*Influent Oil & Grease*	*$\leq$ 50 mg/L*
x)	*Total coliform concentration*	*$> 10^6 – 10^8$ MPN/100 mL*

For any parameters not listed above, the discharge standards shall at no time exceed those set under Class C Inland Waters.

1.13.3.4.2.1. PROCESS DESCRIPTION

The sewage treatment plant shall comprise of primary (screening and equalization), and secondary (sequencing batch reactor) treatment, disinfection (ultraviolet disinfection), and sludge

dewatering. The operation of the system shall be automatic and controlled by a PLC. High level alarms shall be installed in all tanks.

Central grease tank or grease / oil separation system shall be provided to served grease producing sinks prior to disposal to central sewage treatment plant.

The STP Process shall incorporate the following unit processes:

- *Lift station with lift pump*
- *Screening*
- *Anerobic chamber*
- *Influent Lift Sump*
- *Equalization*
- *Activated Sludge Treatment using Sequencing Batch Reactor*
- *Ultraviolet Disinfection or Chlorination system*
- *Sludge Digestion and Dewatering*

The full treatment process is described as follows:

o ***Lift Station with lift pumps***

Lift station with lift pump shall be provided in case invert elevation of influent sewage pipe is much lower than the STP. This is necessary to avoid deep excavation for STP construction. Two (2) lift pump shall be provided (1-duty, 1-stand-by).

o ***Screening prior to the STP***

Appropriate screening should be provided at all drains leading to the STP. This will minimize passage of large non-sanitary waste items (bags, ropes, rags, mops, etc.) to the STP.

o ***Influent Lift Sump***

An influent lift sump shall be provided to transfer influent wastewater to the equalization tank. Influent shall be transferred by at least two pumps (1 duty, 1 standby). Pump and sump pit sizing shall be based on peak flow using a 2.4 peak factor. Pump starts shall be not more than 5 times per hour. Levels sensors shall control the activation of the sump pumps based on the volume of influent.

o ***Anaerobic Chamber***

Properly sized anaerobic tank shall be provided to treat ammonia, nitrates and other nutrients. Provide ventilation of methane arrestors.

o ***Manual Screening***

Sewage influent will flow to the STP by gravity. Influent will first be directed to a bar screen channel with a manual bar-screen, with bar spacings of 5 mm. The bar screen will trap large solids and non-biodegradable debris and prevent them from entering the plant. The bar screen channel will allow operator access so that the screenings and debris could be removed and

packaged for disposal with other solid waste. The bar screen shall be designed to handle the peak flow of up to 2.4 x Average Flow. A bypass screen shall also be provided to prevent overflow in case of screen blockage of abnormally high flows. The influent will flow from the bar screen into the anaerobic chamber from anaerobic chamber by gravity.

o ***Equalization Tank / Advance Oxidation Tank***

From anaerobic chamber, wastewater will be stored temporarily in an Equalization Tank (ET), which acts to equalize the flow in terms of both hydraulic and organic loading. The equalization tank shall have effective holding capacity 4 hours minimum at average flow.

Two submersible pumps, one duty and one standby, will be installed in the Equalization Tank to transfer wastewater to the SBR basins for biological treatment.

The equalization tank shall be aerated using coarse bubble diffusers to ensure proper mixing and to prevent odor and septicity. Air shall be supplied at a rate of 0.01 – 0.015 m^3 / m^3 min.The blower providing air to the equalization tank shall be shared with the aerobic sludge digestor. There shall be two blowers (1 duty, 1 stand by)

o ***SBR Basins/ Aeration Basin***

Two (2) SBR Basins shall be constructed, with bioselector to maintain optimal F:M ratio within the STP.

The main biological treatment process will take place in the SBR Basin under cyclic sequential operation of three phases; aeration, settlement and decant, described below.

- *Aeration Phase*

Aeration requirement by the process for mixing, carbonaceous oxidation and nitrification will be supplied by two positive displacement air blowers, one duty and one standby, via submerged fine bubble diffusers.

- *Settlement Phase*

Immediately after the aeration sequence, settlement / clarification will occur. The conditions in the basin become anoxic. Denitrification and further organics removal occur during this phase.

- *Decant Phase*

Following the settlement phase, the decant sequence will be initiated to remove the clear, treated liquor from the Top Water Level (TWL) to the Bottom Water Level (BWL), the minimum level of decant.

The treated effluent will be removed by a surface skimming decanter and will fall into the effluent tank by gravity. The decanter will be sized to ensure uniform drawoff rate, without disturbance of the settled sludge interface.

Denitrification and organics removal will continue to occur during this phase.

Excess sludge will be wasted to the Sludge Holding Tank during the decant phase in SBR basin.

At the end of decant phase, the cycle will be repeated with the start of aeration.

The cyclic/sequential operation will be controlled automatically by a Programmable Logic Controller (PLC) inside the Control Panel. The PLC shall be configured to allow operator modification of the duration of operation of any equipment or treatment phase. Manual override for control of the process equipment shall also be provided.

*A fourth Phase, **Idle**, shall be incorporated into the design and the operation protocol. This phase shall be utlised in case the STP is operating at lower than design conditions, in order to minimize power consumption and equipment operation.*

- *Effluent Holding Tank*

Treated wastewater from the SBR will be directed, via the decanters, to the Effluent Holding Tank.

Two effluent lift pumps (1 duty and 1 standby) shall be installed in the effluent holding tank for discharging the treated effluent, via the ultraviolet disinfection system, to the discharge point or for application to the surrounding trees and plants in the complex. Effluent holding tanks will have a capacity of at least 4 hours of flow or about 100 cubic meters.

- *Ultraviolet Disinfection*

Effluent from the STP shall be disinfected by an ultraviolet disinfection system or chlorination when decided by circumstances. The selected ultraviolet disinfection system shall be a low maintenance type system suitable for disinfection of secondary treated effluent (ie. Uses UV transparent Teflon sleeving). Quartz sleeving systems shall not be allowed due to problems with maintenance and scaling.

A sampling port, for sampling of treated effluent by the operator and the control authorities, shall be provided after the ultraviolet disinfection system.

- *Flow Measurement*

An electromagnetic type flow meter shall be installed after the Ultraviolet Disinfection system for monitoring of effluent flow from the STP.

The flow meter shall be non-resettable type.

- *Aerobic Sludge Digestor & Sludge Dewatering*

Excessive sludge shall be wasted from the SBR Basin during the decant phase, by two (2) sludge wasting pumps (1 duty, 1 standby) to the Aerobic Sludge Digestor. Wasted sludge will be further digested aerobically using Coarse Bubble Diffusers supplied with air from the Air Blower shared with the Equalization Tank. Retention of the Aerobic Sludge Digestor shall be 7 days.

Digested sludge shall be fed to a recessed plate filter press using an air operated diaphragm pump, for dewatering. Polymer shall be fed to the sludge to enhance flocculation. Exact dosing of polymer shall be determined by jar testing on site when the plant is operational.

Supernatant from the Aerobic Sludge Digestor, and filtrate from the filter press shall be directed back to the Equalization Tank by gravity, for treatment.

- *Tertiary Treatment*

Provide coagulation system sand and activated carbon filter or equivalent for phosphorous removal and to meet quality of water. Phosphorus removal is usually dine at the sedimentation stage of the SBR where phosphorus is removed. However, tertiary treatment will be activated during high phosphorus loads.

1.13.3.5. Lighting/Illumination System

The proposed project will be provided with all the necessary lighting system to serve as illumination of the building features, facilities, or areas that may require security, care or alertness. The lighting will also illuminate areas of concerns such as pedestrian walkways, vehicle entry-exit ramps and service bays. As much as possible, solar lighting/illumination system will be used.

1.13.3.6. Landscape

Landscaping of the perimeter and open spaces will consist of different types of ornamental plants, indoor and outdoor drought-tolerant and/or perennial plants. The perimeter may be lined with some tree cover along facades and routes for beautification, and to act as windbreak. The inside swimming pool / common area will also be landscaped to reflect the kind of environment that will be seen in the western part of the city.

Figure 1-20 Interior Landscaping Plan

1.14. Abandonment Phase

The abandonment is not likely in the next 25 to 30 years, given the structural life of the condominium building. It is also important to note that in that span of years, minor repairs or retrofitting may have been done/required that would further prolong its structural integrity.

But in case of an unlikely abandonment of the project, given the fact that the building will mostly utilize pre-fabricated materials, it can easily be disassembled and removed from the site for intended reuse. Thus, abandonment of the building can be easily accomplished. Combine it with the proposed environmental management plan where all wastes are handled on-site or treated by an authorized waste treater, then minimal clean-up is necessary. Impacts of the abandonment activity would be noise, dust and solid wastes.

1.15. Manpower

The proposed organizational structure is shown in Figure 1-21.

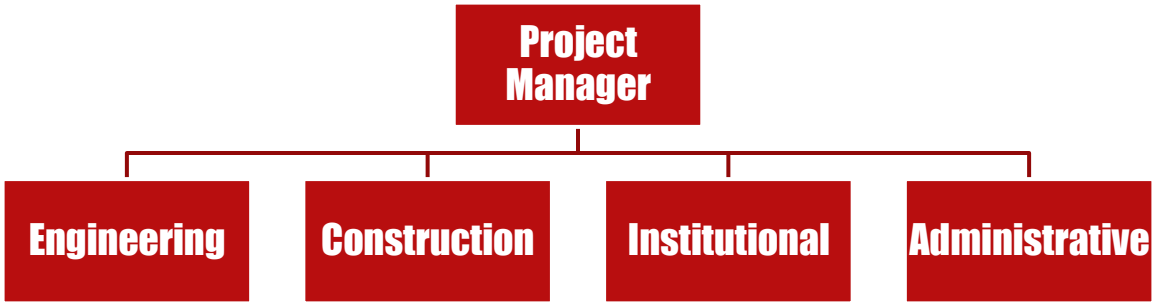


Figure 1-21 Proposed Organizational Structure

A total of about 300 workers will be hired for the construction activities. A permanent office staff of four personnel will be within the project office throughout the project operation period.

1.16. Indicative Project Investment Cost (Philippine Peso)

1.16.1. Investment Cost

The Total Investment cost is estimated at Php 1, 979, 285, 561.04

1.17. Project Duration and Schedule

The project is expected to be developed in phases over the course of 5-7 years with the first phase slated for start of construction in September of 2022. Full development according to the project plan is expected in mid-2027 to 2028. **The second and third phases will be done one years after the first and second phases have been completed, respectively.** This is done so that each building is expected to be developed in 1.5 years.

Figure 1-22 Three phases of development

SECTION 2.0 BASELINE ENVIRONMENTAL CONDITIONS, IMPACT ASSESSMENT, AND MITIGATION

2.1. LAND

2.1.1. Land Use and Classification

Puerto Princesa is the only city in the province of Palawan and is call “City in the Forest”. Puerto Princesa located in the midsection of the Palawan Island. It is bounded to the east by the Sulu Sea, to the west by the West Philippine Sea, to the north by the Municipality of San Vicente and Roxas, and to the south by the municipality of Aborlan. It is approximately 567km from Manila, 280km from Panay Island, and 460km from Zamboanga City on the southern Philippine Island of Mindanao. Puerto Princesa is administratively and politically divided into 66 barangays, 35 of which are classified as urban barangays and 31 as rural barangay.

Puerto Princesa City has a total land area of 219,339.40 hectares, 68.76 percent of which is considered as unclassified public forest. Only about 23 percent (50,301 has) is alienable, and disposable (A&D) and 8.3 percent (18,211 has) is classified forest or timberland. Furthermore, of the A&D land, about 13,550 has is used as urban area which are mostly used for agriculture and as residential area. The general classification map is presented in Figure 2-1. The proposed area will be located in A&D land.

About 150,939.41 hectares in the city is identified as protected areas, as shown in Table 2-1. The ECAN zones are also identified within the city, as presented in **Error! Reference source not found.**. As shown in the figure, the proposed location is located within commercial zone.

Most of the forested areas and elevation above 500 meters have been classified as core zone and controlled zone by the ECAN Zoni ng Map of Palawan. About 50% of the total land area of Puerto Princesa City are declared core zones while about 25% have been declared as controlled zones for the protection and conservation of the remaining last frontier forest.

Table 2-1: Protected Areas in Puerto Princesa City

Protected Areas	Area (hectares)
NIPAS	63,409.88
Non-NIPAS Protected Areas	87,529.53
Other reservations	16,352.63
Environmental critical areas	7,336.56
Protected agricultural areas	1,150.46
Total	**150,939.41**

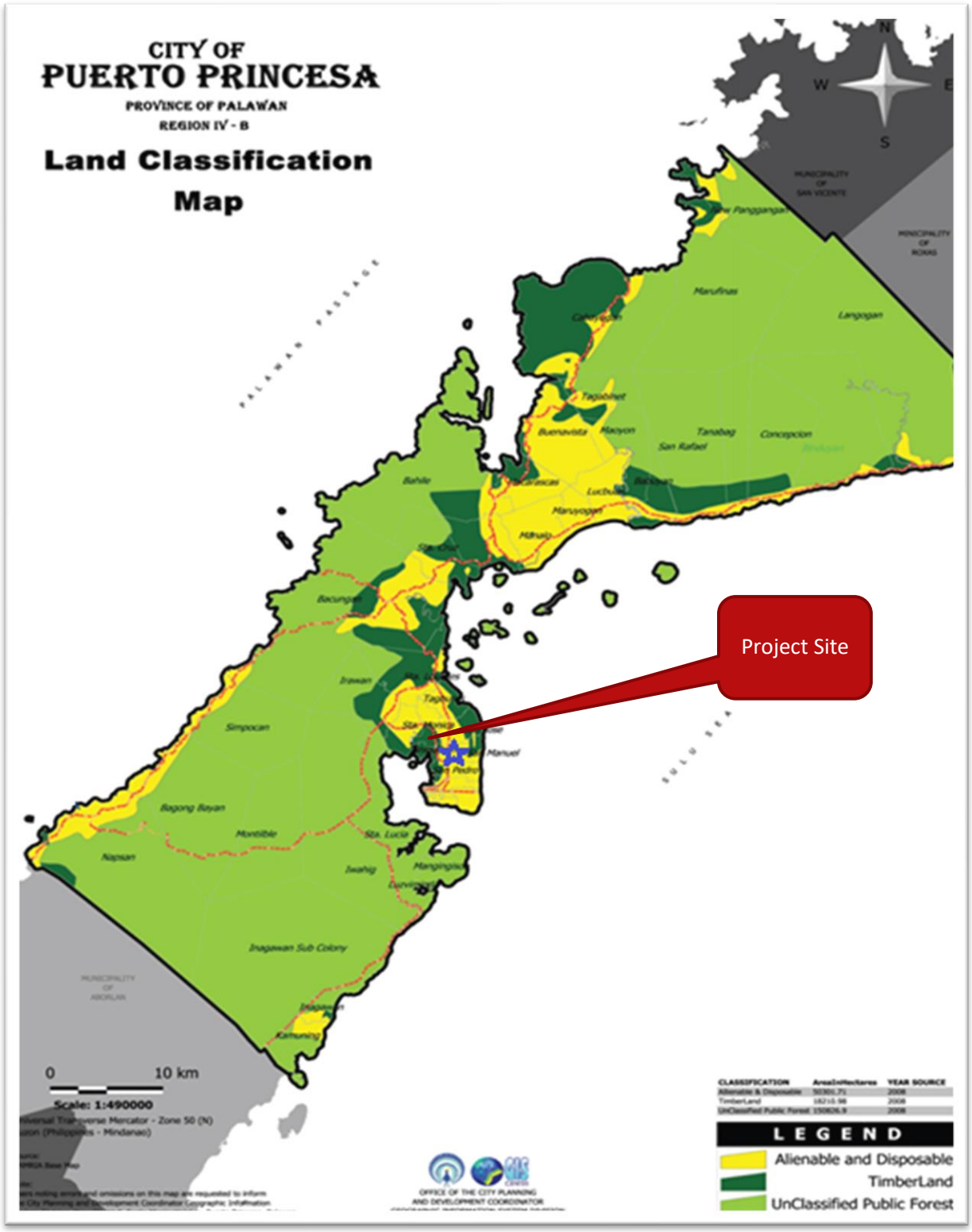


Figure 2-1: Existing General Land Classification Map of Puerto Princesa

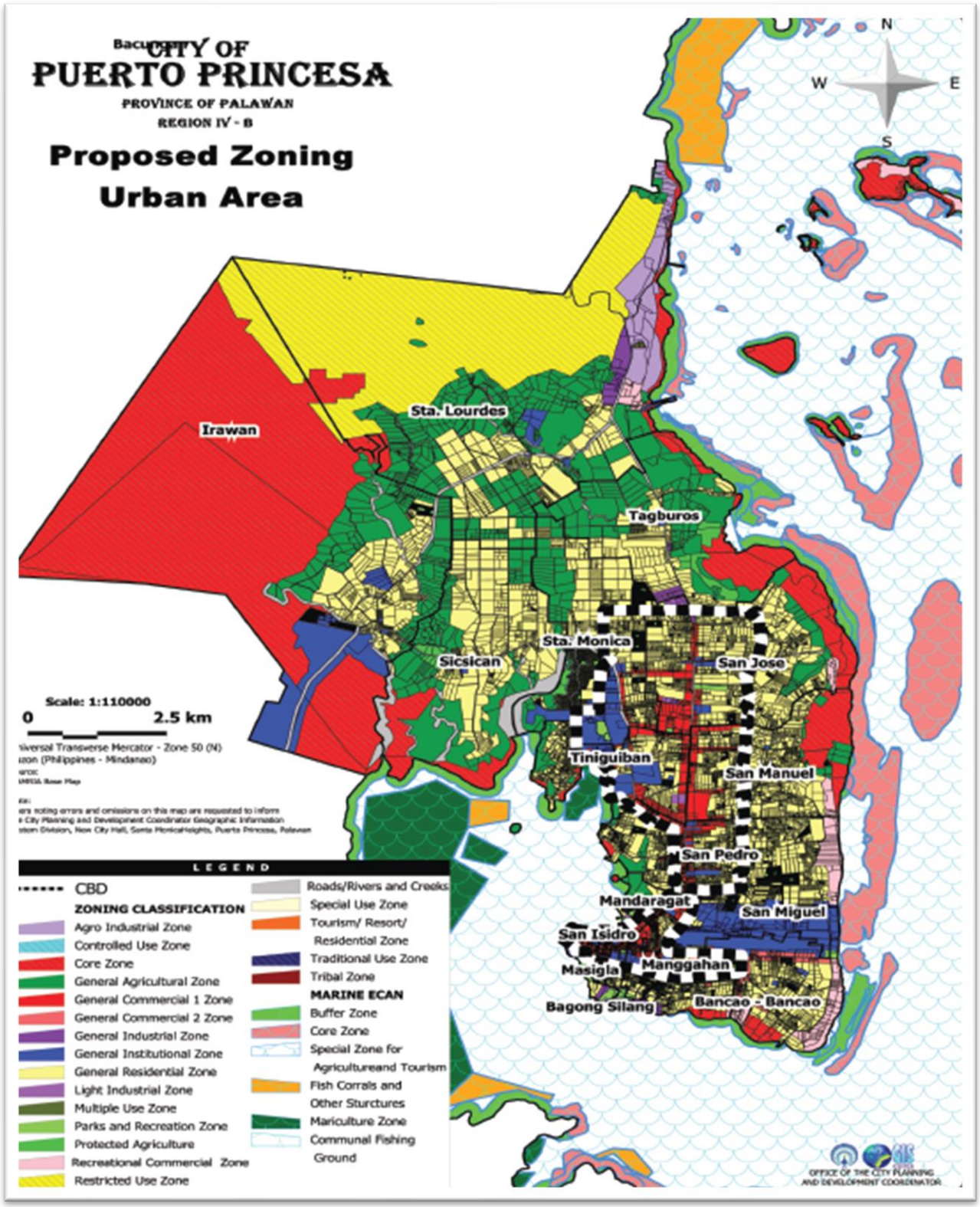


Figure 2-2 Proposed Zoning Map in Puerto Princesa City

2.1.1.1. Encroachment in Environmental Critical Areas

Table 2-2 Environmentally Critical Area (ECA) Categorization of the Project Site

ECA Class	Yes	No	Remarks
A – Area declared by law as a national park, watershed, reserve, wildlife preserves or sanctuary	✓		The proposed project is located within the province of Palawan, which is declared as a Game Refuge and Bird Sanctuary as provided under Presidential Proclamation 219 series of 1967 and amended by Proclamation number 530B series of 1969. There are two nearby RAMSAR sites, the PUERTO PRINCESA SUBTERRANEAN RIVER NATIONAL PARK at a distance of 44 kilometers northeast from the site and the TUBBATAHA REEFS NATURAL PARK, about 134 kilometers distance from the site
B – Area set aside as aesthetic, potential tourist spot		✓	The area is in a heavily built up area near the airport and commercial districts of Puerto Princesa
C – Area which constitutes the habitat for any endangered or threatened species of indigenous Philippine wildlife (flora and fauna)		✓	There are no habitats for any endangered species in the area since the site is in the downtown area of a major city in the province. However, outside of the major city, the Palawan rainforests host a variety of endemic birds and wildlife.
D – Area of unique historic, archaeological, geological, or scientific interest		✓	No archaeological sites located in the project site. The ancestral domains have been mapped and no burial sites are located here.
E – Area which is traditionally occupied by cultural community or tribe		✓	There are no ancestral lands in the area
F – Area frequently visited and/or hard-hit by natural calamities (geologic hazards, floods, typhoons, volcanic activity, etc.)		✓	Area is in a low susceptibility area area for rain-induced landslide risks and has no nearby faults for risk of ground rupture.
G – Area with critical slope		✓	Area is in flat area and there are no highly sloping lands within the vicinity
H – Area classified as prime agricultural land		✓	No prime agricultural lands in the area

ECA Class	Yes	No	Remarks
I – Recharge area of aquifers		✓	The area has been mapped to have rocks with no groundwater
J – Waterbody	✓		The proposed project is in the middle of the Puerto Princesa Peninsula which is bounded on both sides by seas
K – Mangrove area	✓		There are mangrove areas near the project site as provided below
L – Coral reef	✓		Coral reefs and sea grass areas are found in Honda bay as provided in the figures below

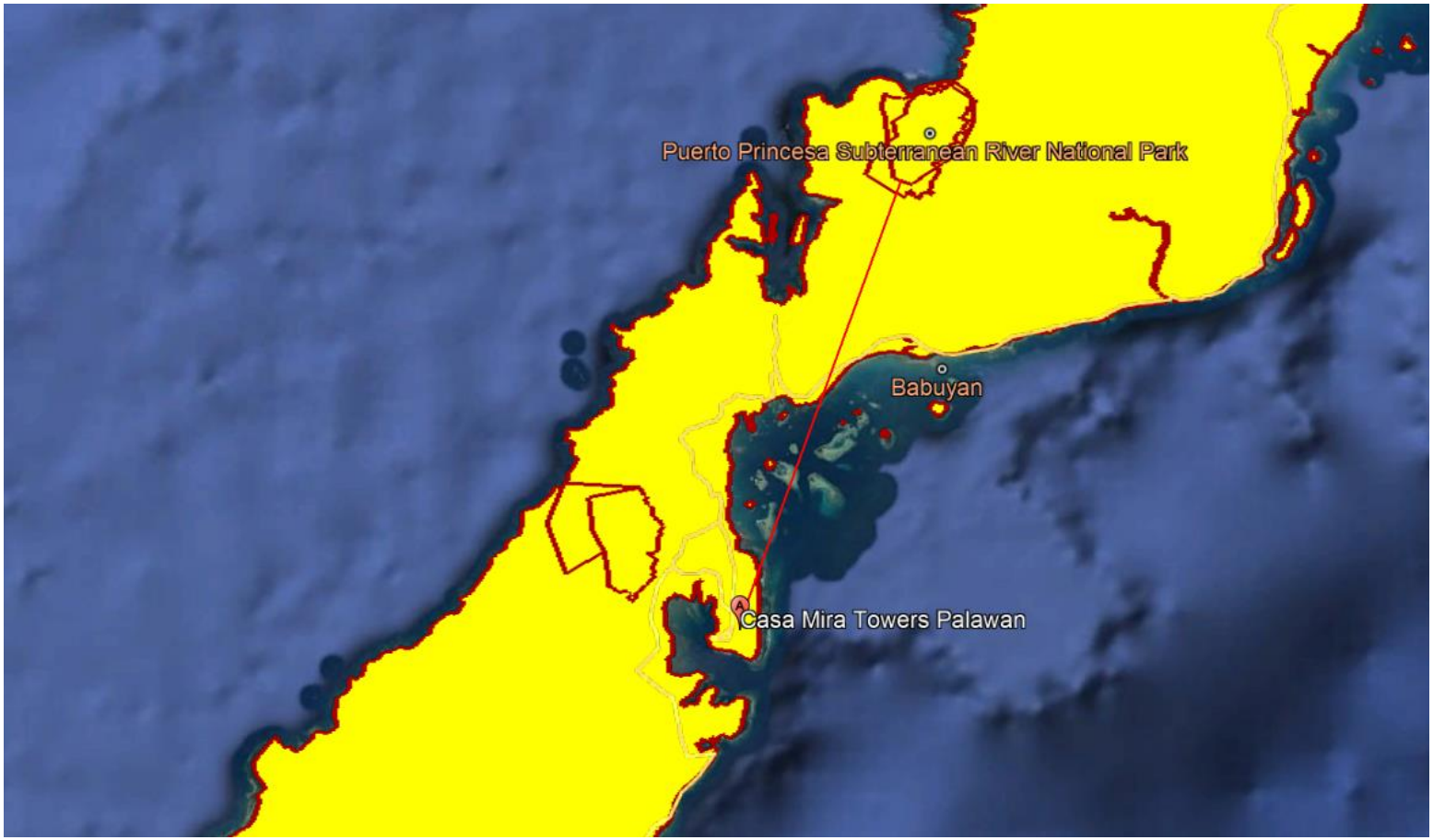


Figure 2-3 Distance to the Puerto Princesa Subterranean National Park

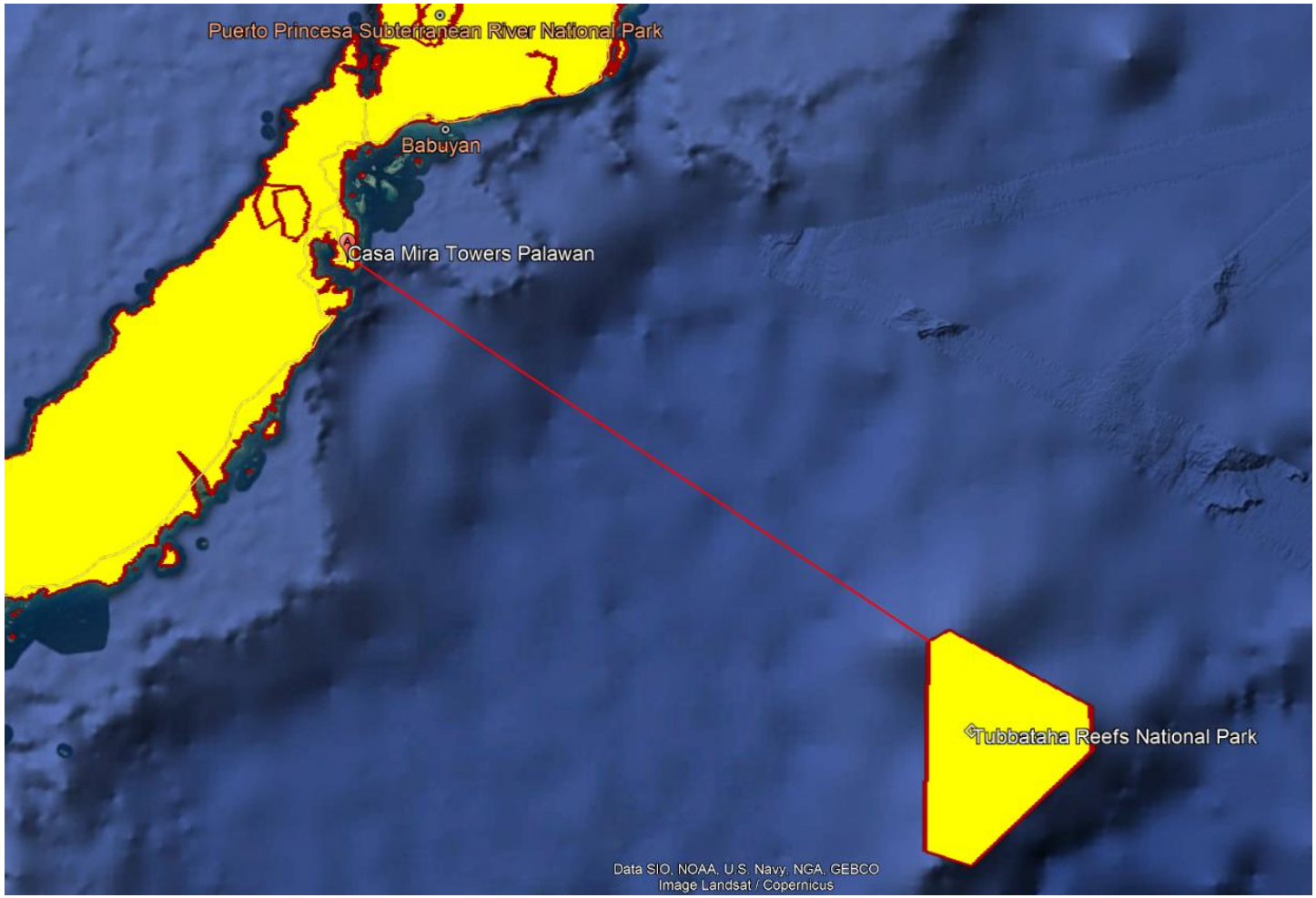


Figure 2-4 Distance to the Tubbataha Reefs National Park

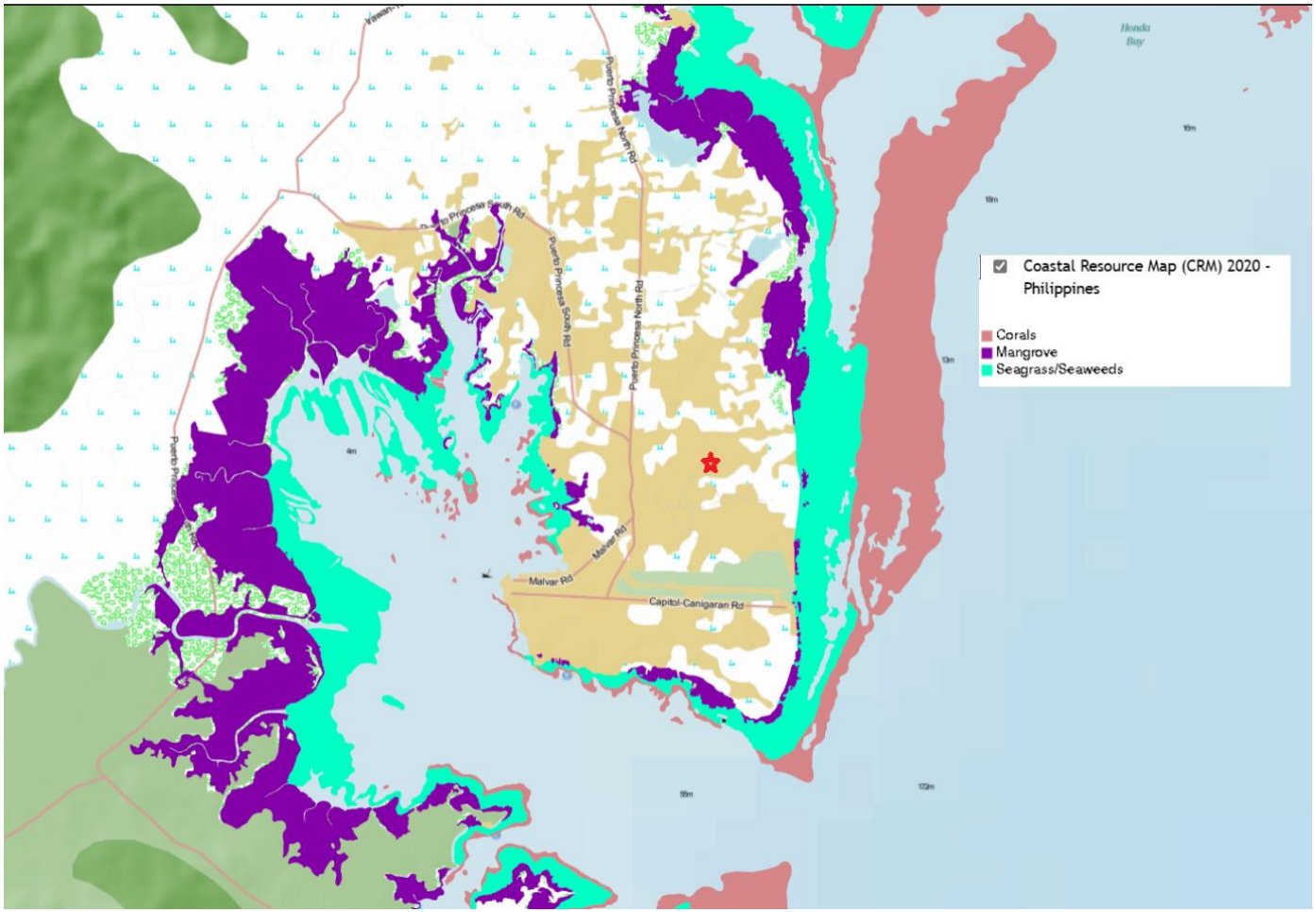


Figure 2-5 Coastal resources map of Palawan 2020 (source Geoportal. Ph)

2.1.2. *Geomorphology*

In Puerto Princesa City, more than half (57,43%) of the total land area have flat to gentle slopes, 15 percent have moderate slope of 8 to 18 percent and about 38 percent has steep slopes (30 percent and above). The proposed location has flat slope (see **Figure 2-6**).

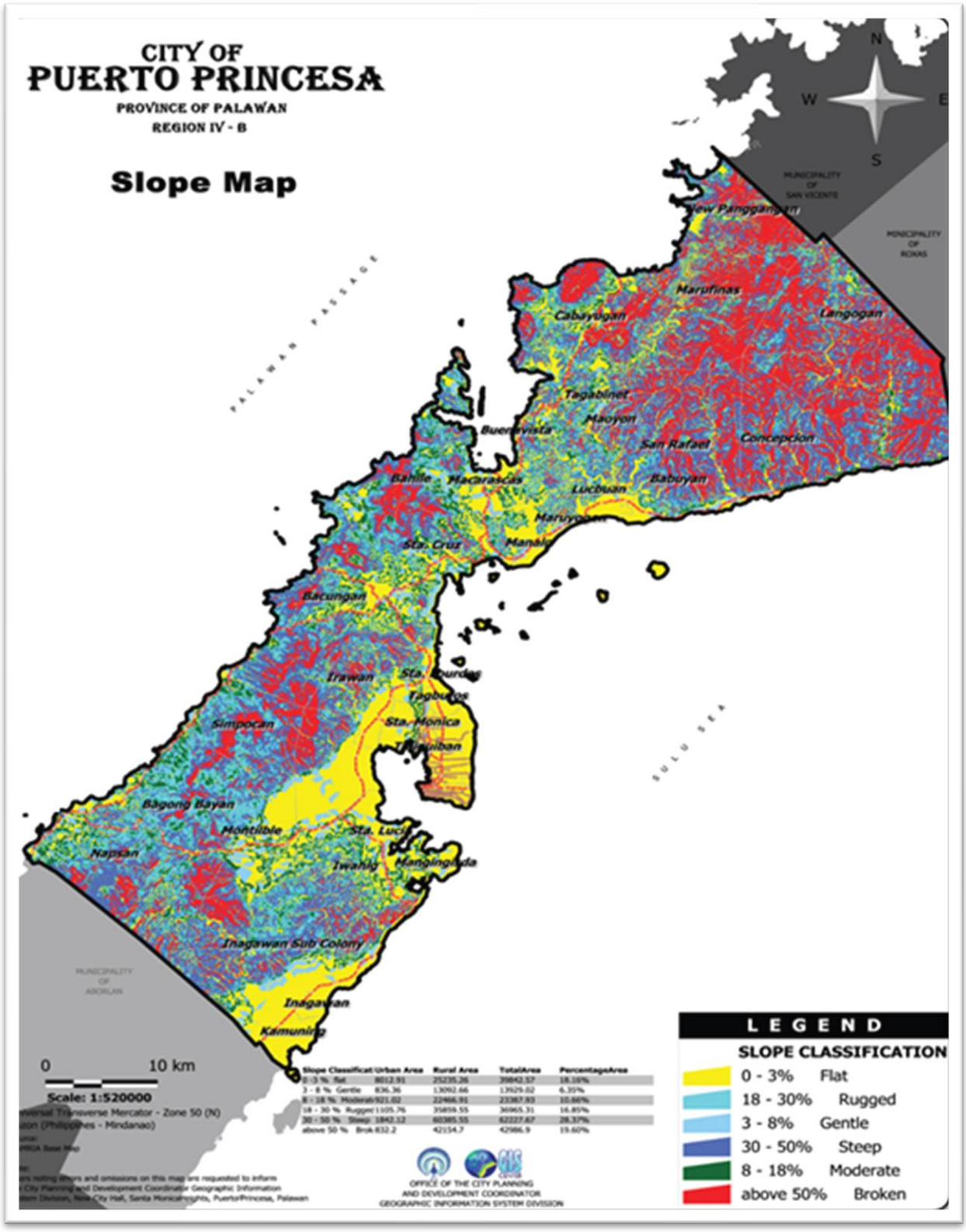


Figure 2-6: Slope Map of Puerto Princesa

2.1.3. *Geology*

The island of Palawan can be subdivided into three general areas. Northern Palawan comprises the island to the north and east of the Ulugan Bay and the Ulugan Fault Zone (10°N 118°500E). Central Palawan, to the south and west of the Ulugan Bay ranges as far south as to the municipality of Quezon (09°140N, 118°E). Finally, southern Palawan is south of Quezon and includes Balabac Island (**Figure 2-7**).

The general change in the onshore geology (**Figure 2-8**) between North Palawan on the one hand and central and south Palawan on the other hand coincides with remarkable variations in bathymetry.

The most striking bathymetric feature offshore Palawan is the Borneo–Palawan Trough. As shown by Hinz and Schlüter (1985) and pointed out by Hutchison (2010) there is no northern extension of the Borneo–Palawan Trough between the Reed Bank and the NW Palawan microcontinental block. The trough thus may be a collisional foredeep.

Central and south Palawan are considered to be emergent Middle Miocene collision between the Cagayan volcanic arc and the NW Palawan microcontinental block. The thrust belts might have originated from the Northwest Sulu Sea Basin thrusted onto the highly stretched Dangerous Grounds continental block. With the ongoing spreading of the South China Sea, an older region of oceanic crust, the Proto-South China Sea was consumed beneath NW Borneo. In Early Miocene times, the continental crust of the Dangerous Grounds entered the subduction zone, before its buoyancy blocked the system in the latest Early Miocene

Central and southern Palawan is dominated by rocks of oceanic affinity. These show similarities with the northwestern part of Borneo. The most prominent lithologic unit onshore is the ophiolitic sequence that was thrusted onto the island. The lithologies and formations onshore central and south Palawan are as follows (**Figure 2-8**).

2.1.3.1. Cretaceous Ophiolites; ‘‘Basement’’

In central and south Palawan, and on the island of Balabac, the oldest sediments associated with ophiolitic rocks and pillow basalts are of Early Cretaceous age. These remnants of the Proto-South China Sea oceanic crust are believed to be also present in Sabah and Sarawak/Borneo. Several authors suggested the ophiolites of Borneo to be the equivalents to the ophiolite complexes of south and central Palawan. Cretaceous nanoplanktons from calcareous red clays, associated with the pillow basalts in south Palawan and Balabac Island, are also obtained. The initiation of the consumption of this Proto-South China Sea oceanic basin likely took place in Middle Eocene times, around 44 Ma. Oceanic subduction evolved until collision (late Early Miocene to early Middle Miocene) when the Dangerous Grounds and NW Palawan microcontinental blocks entered the subduction zone.[1]

[1] Steuer, Stephan & Franke, Dieter & Meresse, Florian & Savva, Dimitri & Pubellier, Manuel & Auxietre, Jean-Luc & Aurelio, Mario. (2013). Time constraints on the evolution of southern Palawan Island, Philippines from onshore and offshore correlation of Miocene limestones. Journal of Asian Earth Sciences. 76. 10.1016/j.jseaes.2013.01.007.

2.1.3.2. Sedimentary cover

The successions of sedimentary rocks in central and south Palawan are comparatively young and distinctly different from North Palawan. Metamorphic rocks, which cover wide areas in North Palawan are restricted to small patches in south and central Palawan.

2.1.3.3. Puerto Princesa

The northern part of the city is comprised of ultramafic rocks. In particular, the Langogan area is characterized by metamorphic rocks consisting of quartz-feldspathic and mica schists, phyllites, slate and quartzites. The ultramafic rocks consist of unaltered serpentenized pridotite, dunite and pyrexomite. In the middle portion particularly in the Irawan area, metamorphic rocks of the Inagawan Formation can be found. The area is also partly composed of sedimentary Iwahig Formation, alluvium of unconsolidated gravel, sand, pebbles and silt. Some ultramafic rocks of the Palawan Ophiolite Complex also characterize the area. Babuyan area is made up of Irahuan Metavolcanics which resemble the quartz-hematite schist in appearance and are also friable and weather into dark reddish gray platy fragments which are usually scattered near outcrops of riverbeds. St. Paul limestone outcrops as small patches are found in the south and midwestern part of the catchment. It is comprised of a very thick, massive, marbleized limestone with very well-developed karst.

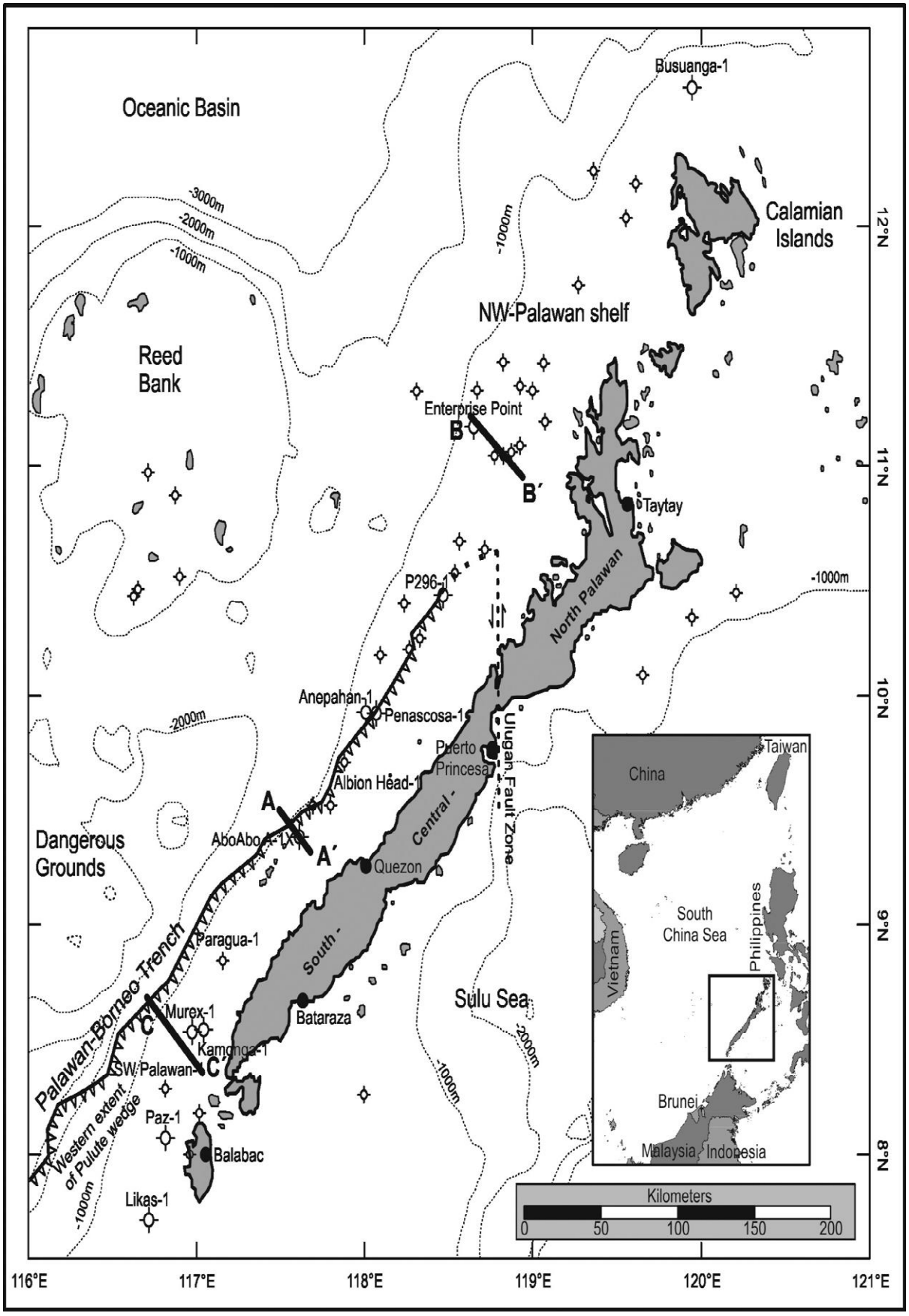


Figure 2-7 Regional map showing the locality of Palawan Island and main tectonic features, as well as the location of wells offshore Palawan. The extend of the offshore accretionary wedge is indicated. The bathymetric data is taken from the General Bathymetric Chart of the Oceans (GEBCOs).

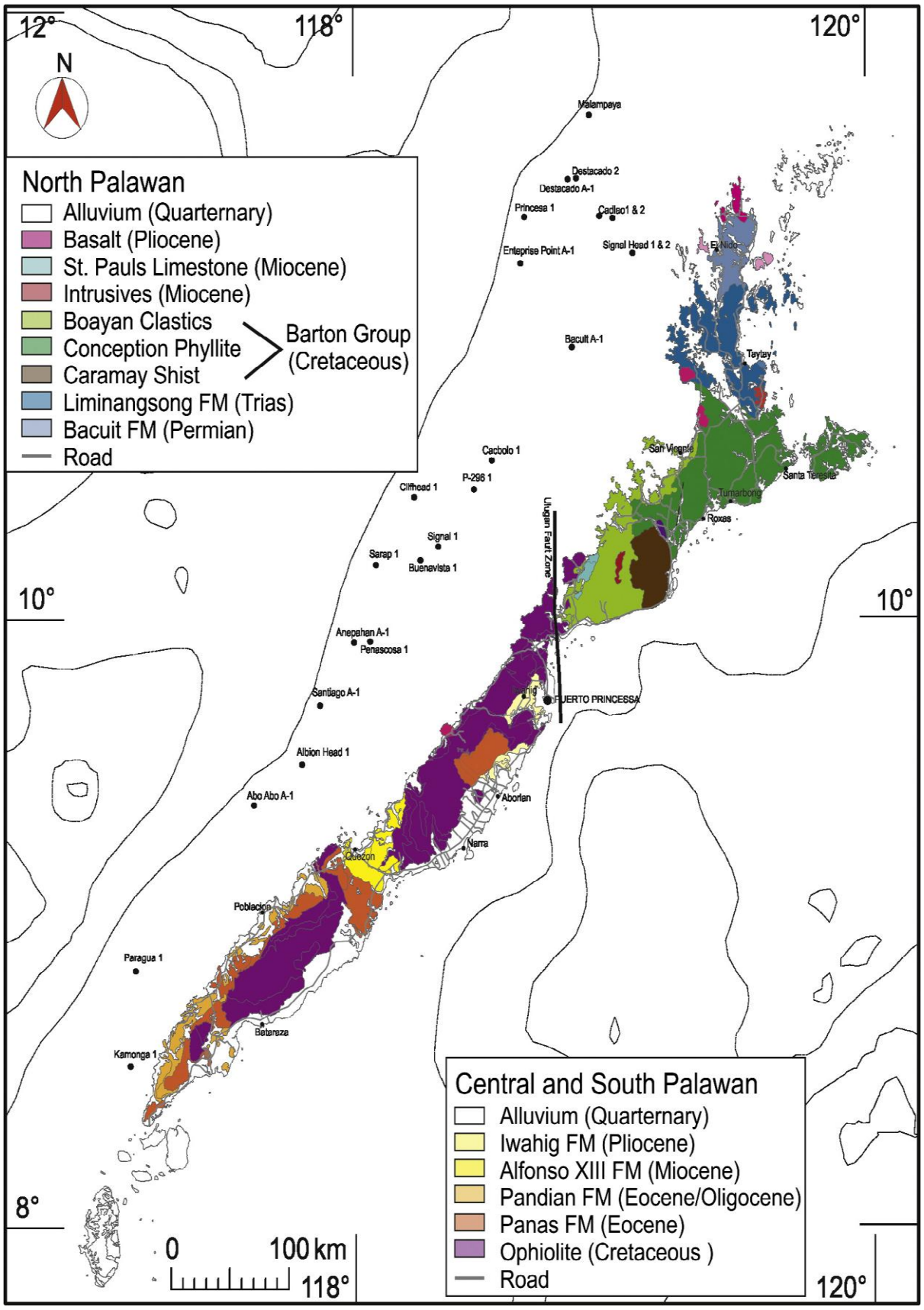


Figure 2-8 Geological map of Palawan Island adapted and modified from the JICA-MMAJ data and maps (1989). Offshore wells are indicated. The legend shows the main geological units of northern and central-south Palawan

2.1.4. *Seismology and Tectonic Setting*

The Philippines lies on seismically active Philippine Mobile Belt; on the west side of the Philippines. This Mobile Belt includes the Manila Trench, Negros Trench and the Sulu Trench. On the east side is the Philippines Trench, where the Philippine Sea Plate subducts beneath the Eurasian Plate. The relative convergence is around 84mm per year (Bird, 2003).

The Philippines Mobile Belt forms part of the "Ring of Fire" around the Pacific Ocean. There are many active volcanoes in the Philippines. Movement of the plates causes many earthquakes, some of them powerful and a few can trigger a tsunami. The geology of the area has been shaped by plate tectonics.

Figure 2-9 shows the distribution of active faults and trenches in Region IVB. The nearest active fault in Palawan is the Southern Mindoro fault. It is located in the north-east of Palawan and is about 409.9 kilometers away from Puerto Princesa City (see **Figure 2-10**).

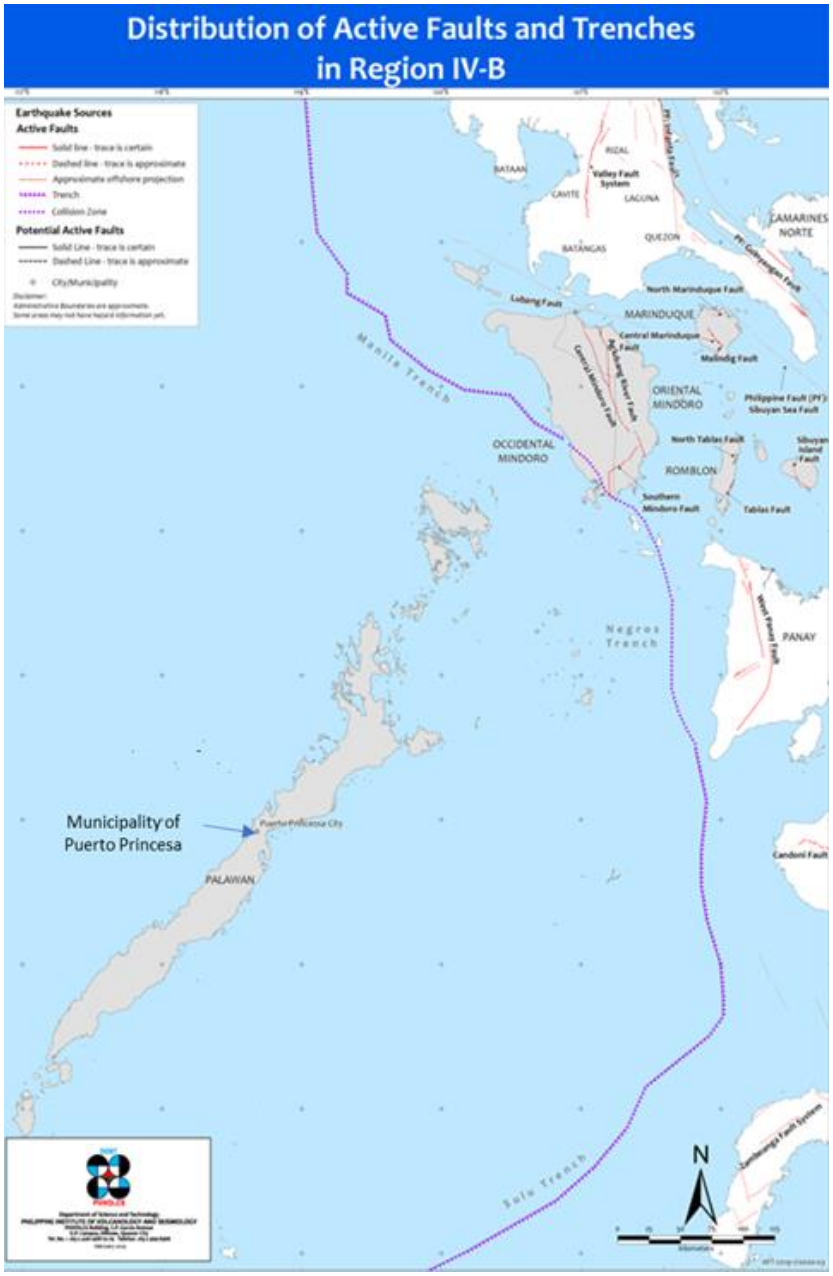


Figure 2-9: Distribution of Active Faults and Trenches in Region IVB

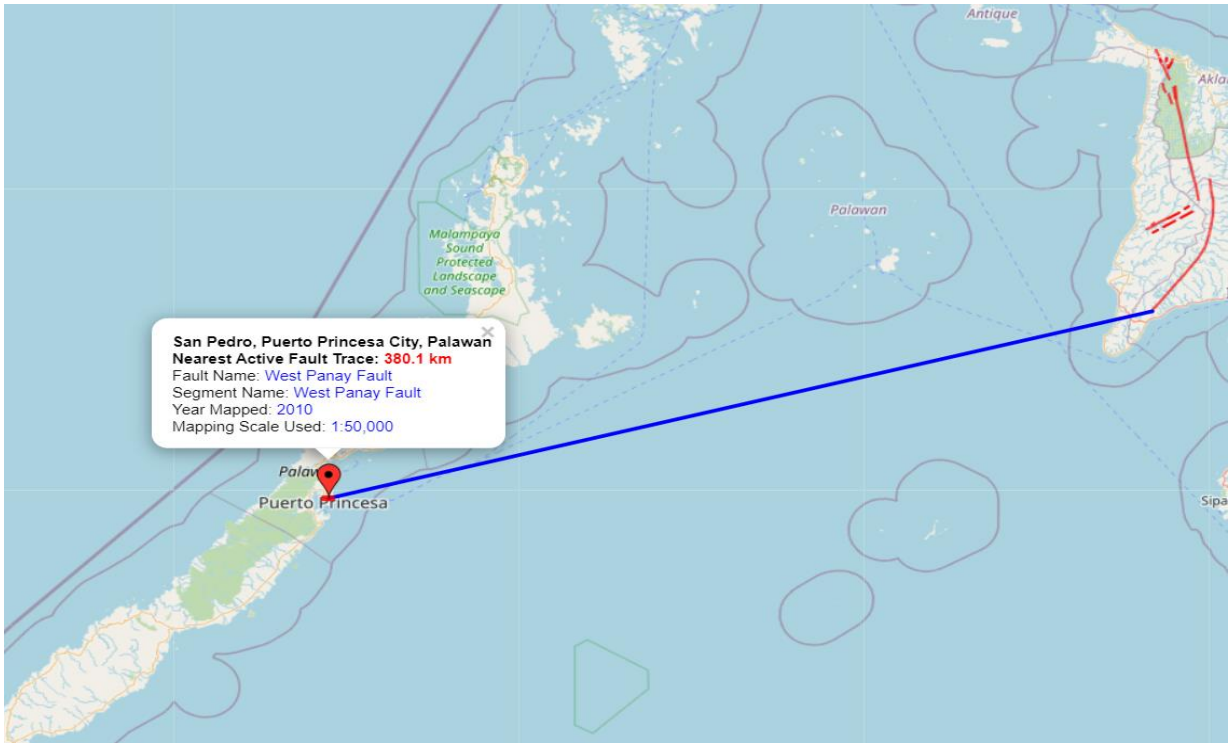


Figure 2-10: Nearest Fault Line in Puerto Princesa

2.1.5. *Geologic Hazards*

2.1.5.1. Seismic Activity

Earthquake records of magnitude M5 or above in the Philippines during the last 25 years (1994-2020) have been retrieved from the United States Geological Survey (USGS) as shown in **Figure 2-11.** There were no earthquakes in the Palawan region except in the very north along the Manila Trench. These earthquakes were shallow (orange & yellow dots) and did not cause any subsequent Tsunamis along the Palawan coastline.

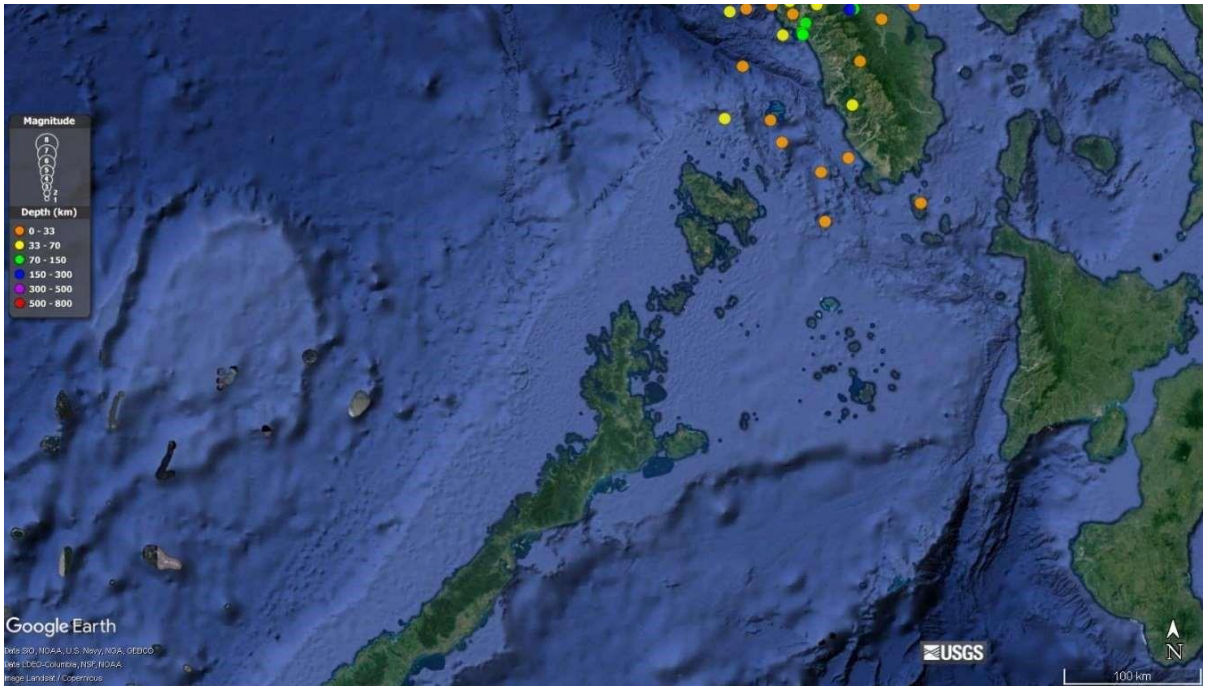


Figure 2-11: Distribution of M5+ Earthquakes 1994-2020

Figure 2-14 shows the peak ground acceleration in the vicinity of the proposed project sites. Comparable seismic risk analyses were published by Algermissen et al. (1996). **Figure 2-13** below is a copy of the relevant diagram from this study. Over 50 years, it also shows areas with 10% chance of exceeding the peak ground acceleration indicated.

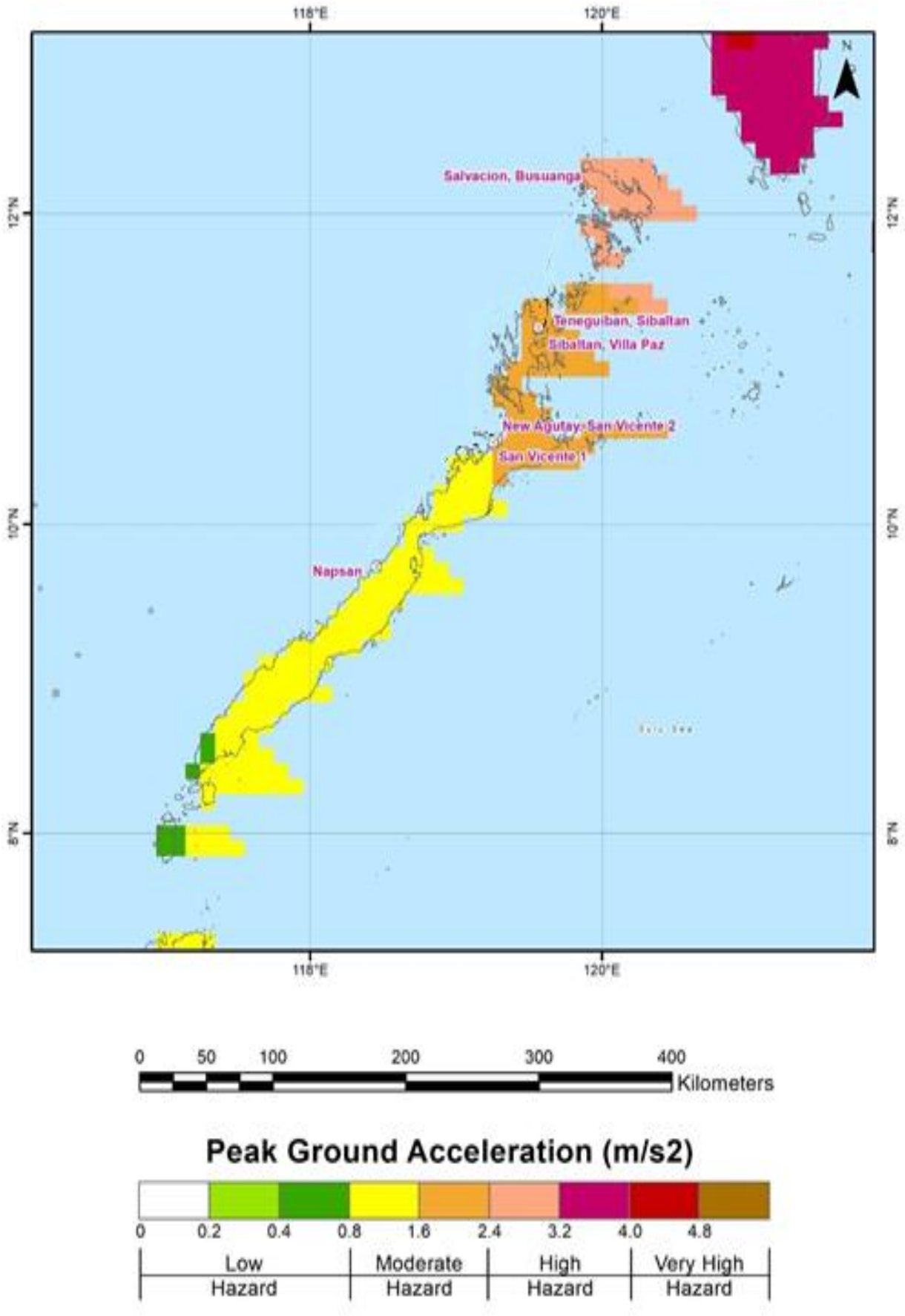


Figure 2-12: Seismic Intensity Map for the Study Area

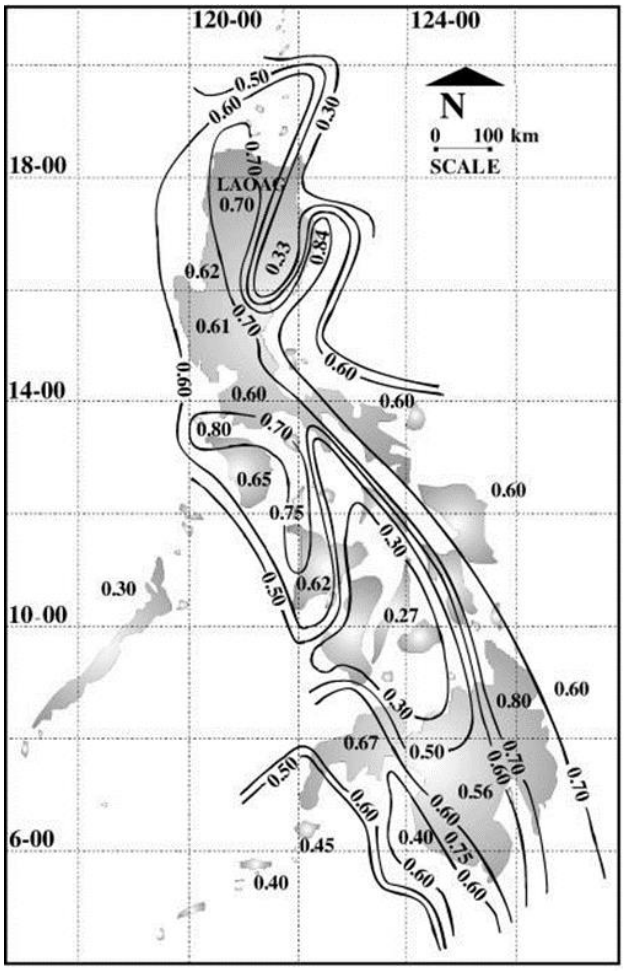


Figure 2-13 Acceleration (m/s^2) in Soft Soil: 50-Year 90% Probability of Non-Exceedance Source: Algermissen et al. (1996)

2.1.5.2. Ground Shaking

Considering the distance of the nearest fault line in the project areas in Puerto Princesa, the project areas is not prone to ground shaking during earthquake.

2.1.5.3. Earthquake-induced landslide

Based on the earthquake-induced landslide susceptibility map of Region IV-B, some of the areas in Puerto Princes have low to medium susceptible to earthquake-induced landslide (see **Figure 2-14**). However, the built-up area where the project is located has no susceptibility to earthquake induced landslide

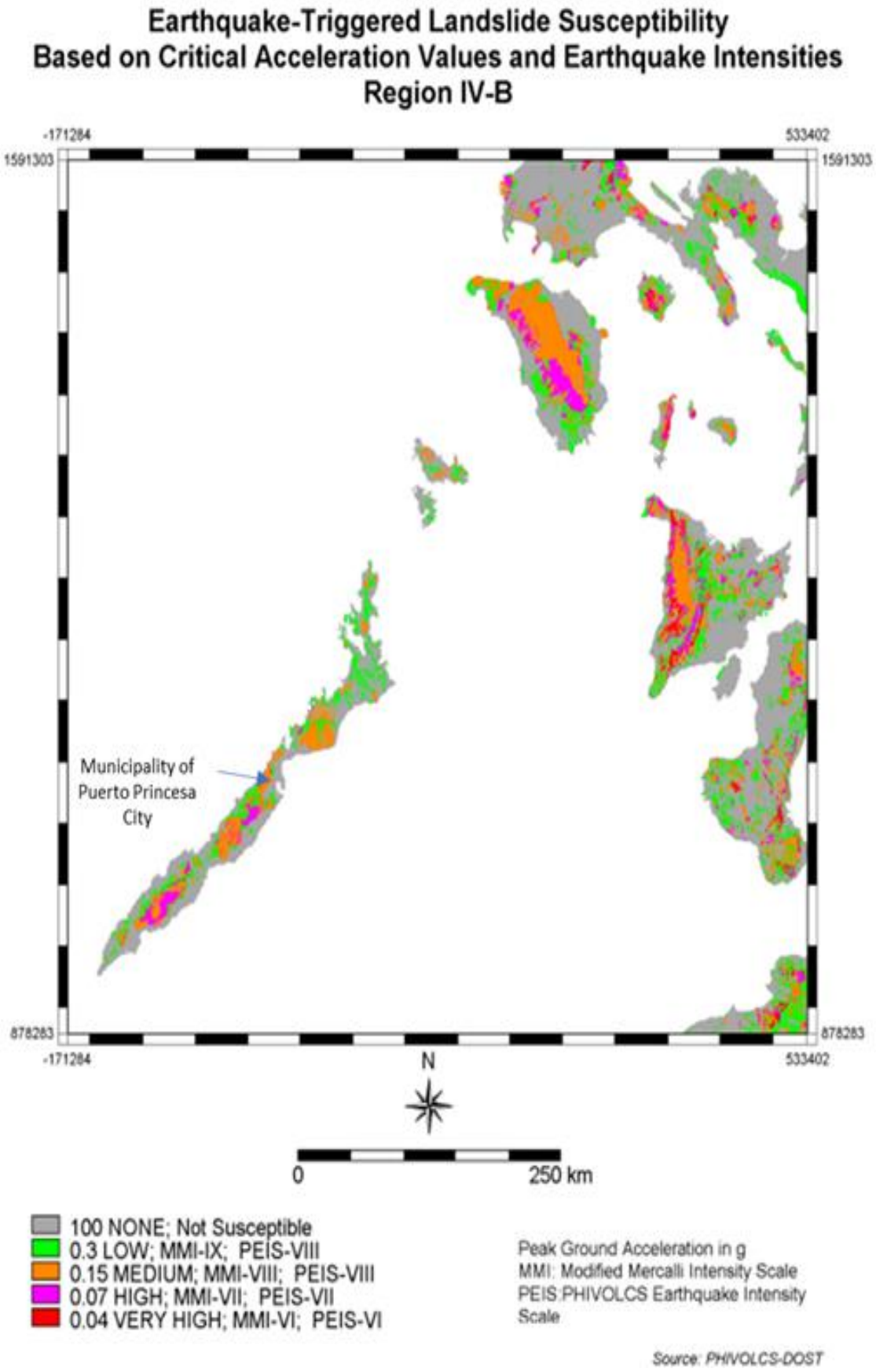


Figure 2-14: Earthquake-triggered Landslide Susceptibility Map of Region IVB

2.1.5.4. Liquefaction

Alluvial plains, pyroclastic plains and coastal plains with shallow groundwater and with loose sand and silty to sandy soils are possible areas for liquefaction. Liquefaction occurs when loose soils at or near the ground surface lose their strength due to the strong ground shaking caused by an earthquake. This means that a strong intensity earthquake can cause settling of soil.

In Puerto Princesa City, about 7.2 percent are generally susceptible to liquefaction while 92.8 percent are not susceptible. The proposed site is generally not susceptible to liquefaction (see **Figure 2-15**).

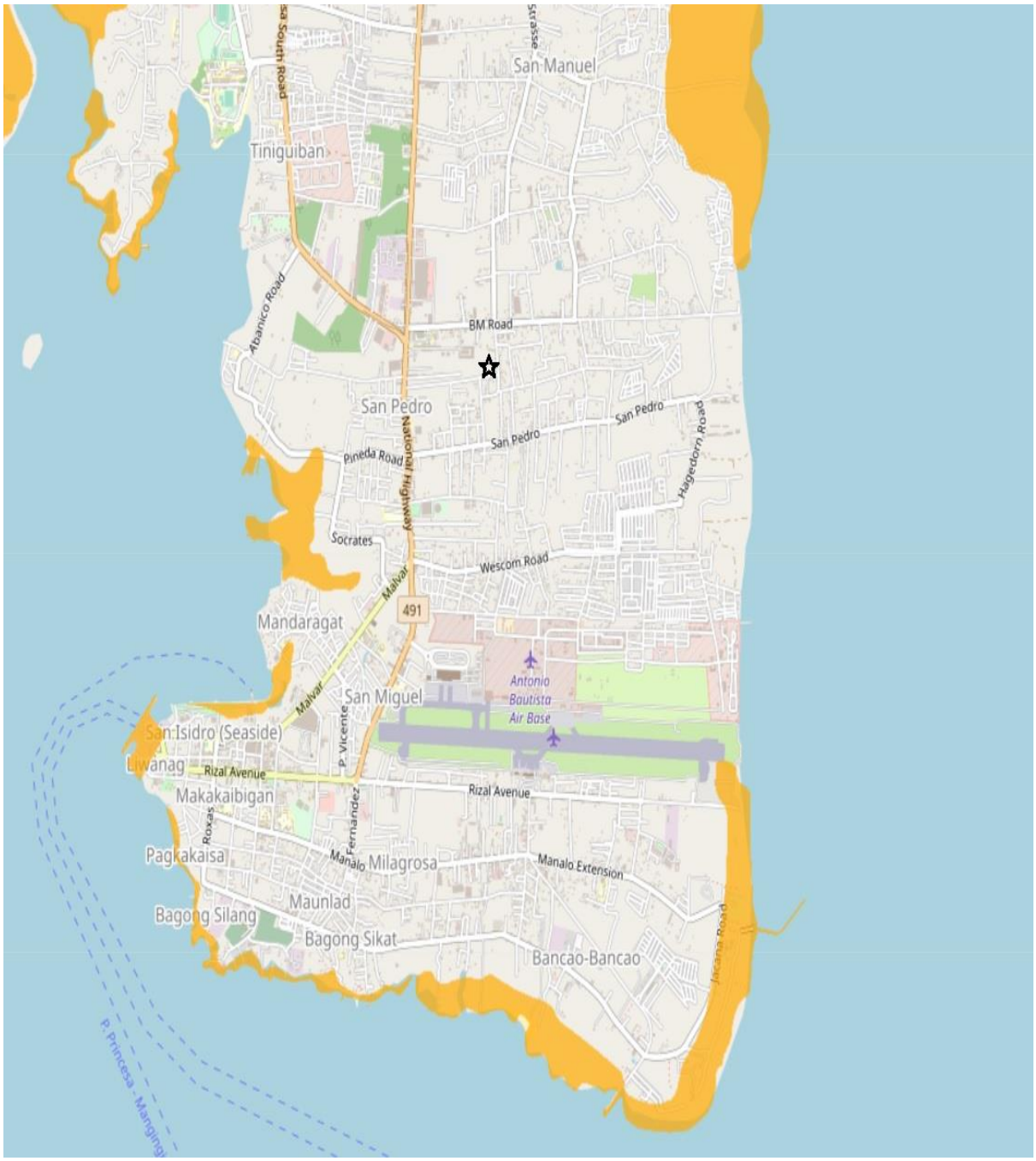


Figure 2-15: Liquefaction Susceptibility Map of Puerto Princesa City

2.1.5.5. Rain-induced Landslide

About 38.8 percent of the total land area is susceptible to rain-induced landslide. About 0.2 percent has very high susceptibility, 9.8 percent has high susceptibility, 10.6 percent has moderate susceptibility and 8.2 percent has low susceptibility.

The proposed area is only moderately susceptible to rain-induced landslide according to georisk.ph and MGB (see **Figure 2-16**).

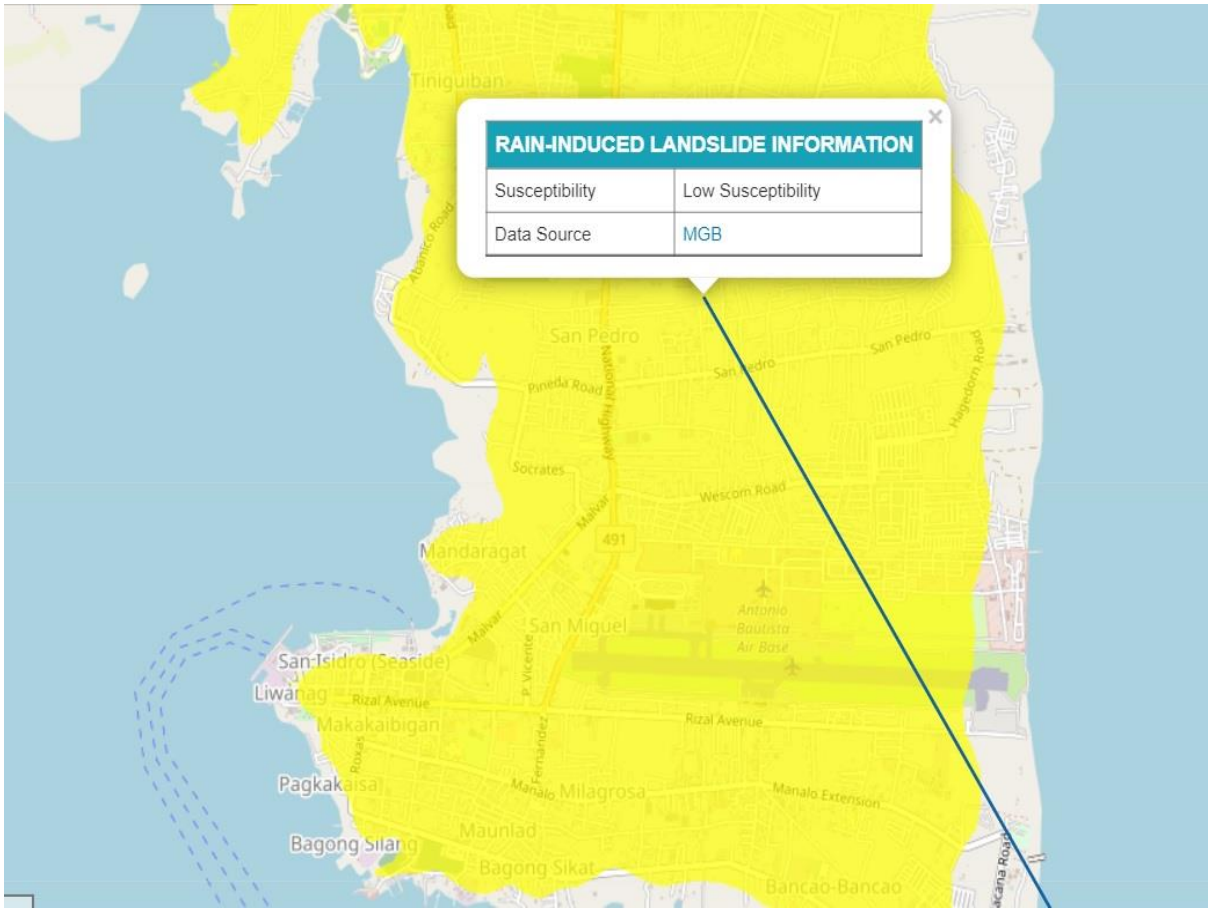


Figure 2-16: Rain-induced Landslide Susceptibility Map of Puerto Princesa

2.1.5.6. Volcanism and Hydrothermal Vents

Terrestrial volcanoes and hydrothermal vents in the study area are shown in the figure below. The selected routes are away from any volcanoes.

The nearest potentially active volcano is Tumatangas volcano which is about 482.0 kilometers away while the nearest active volcano is the Bud Dajo Volcano about 486.3 kilometers away. These are potentially too distant to have any major effects on the development.

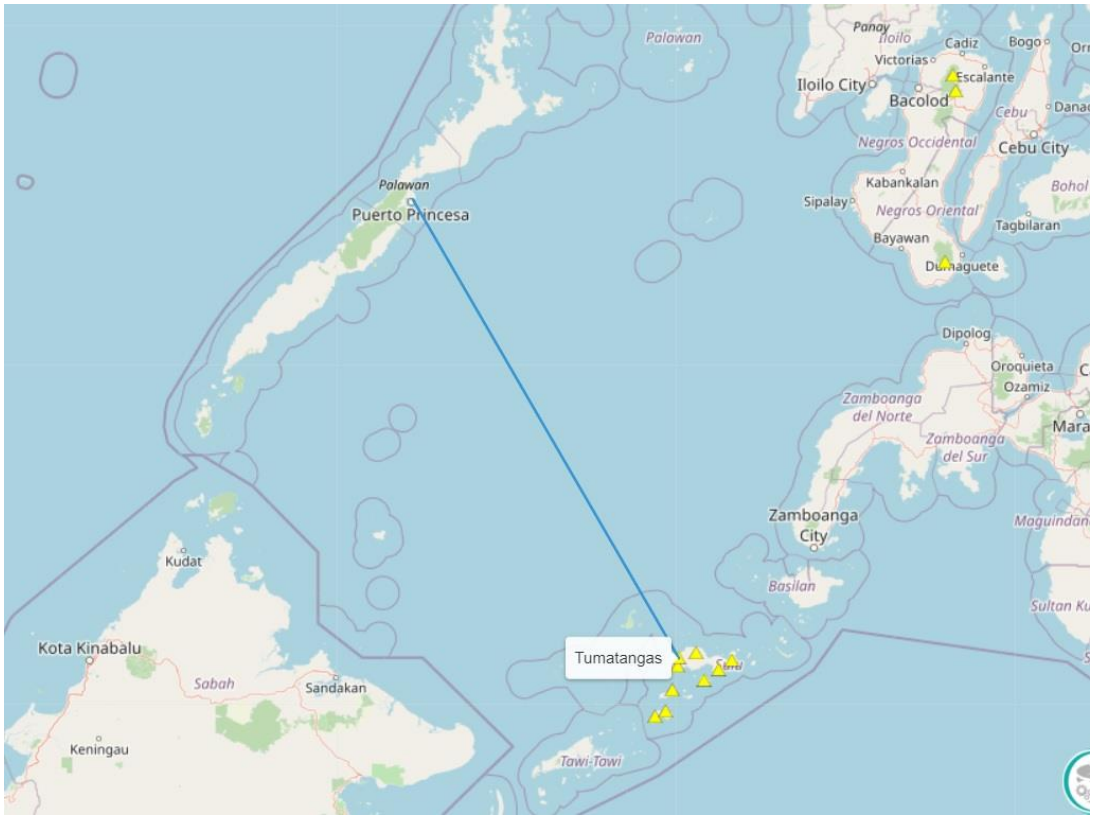


Figure 2-17 Nearest Potentially Active Volcano (georisk.ph)

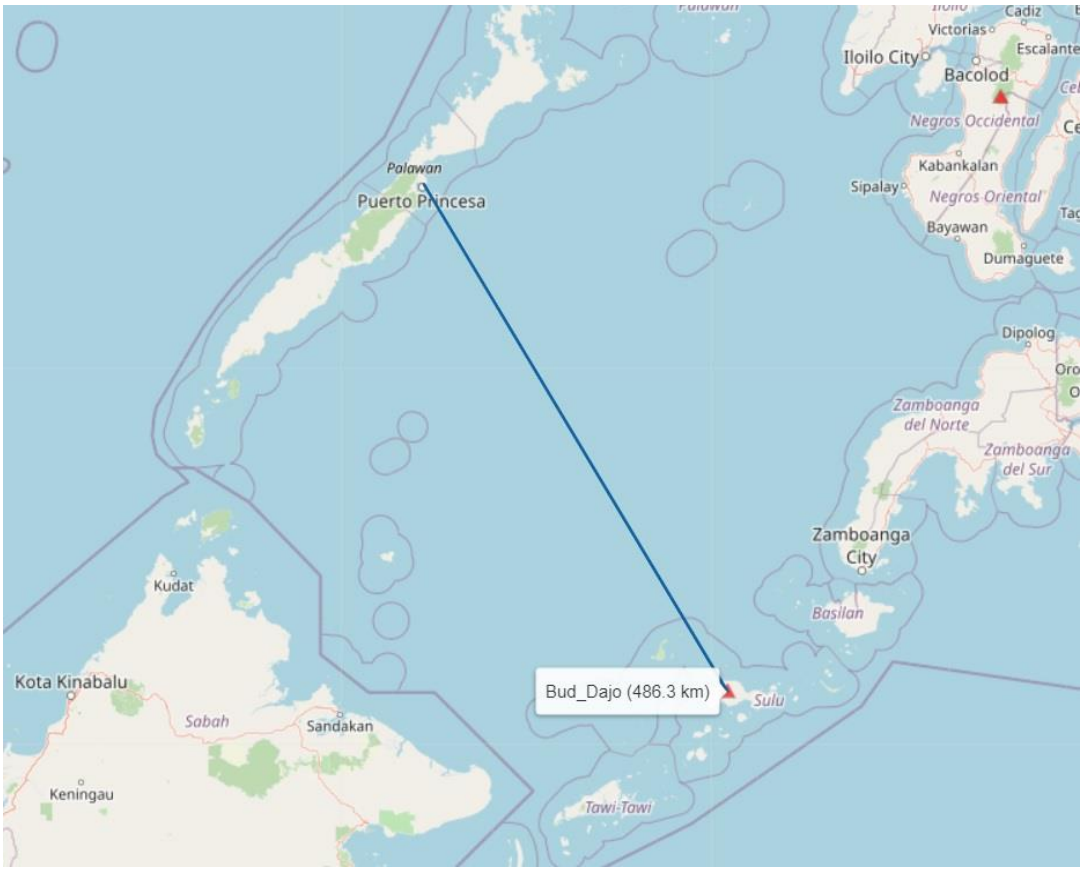


Figure 2-18 Nearest Active Volcano (geosrisk.ph)

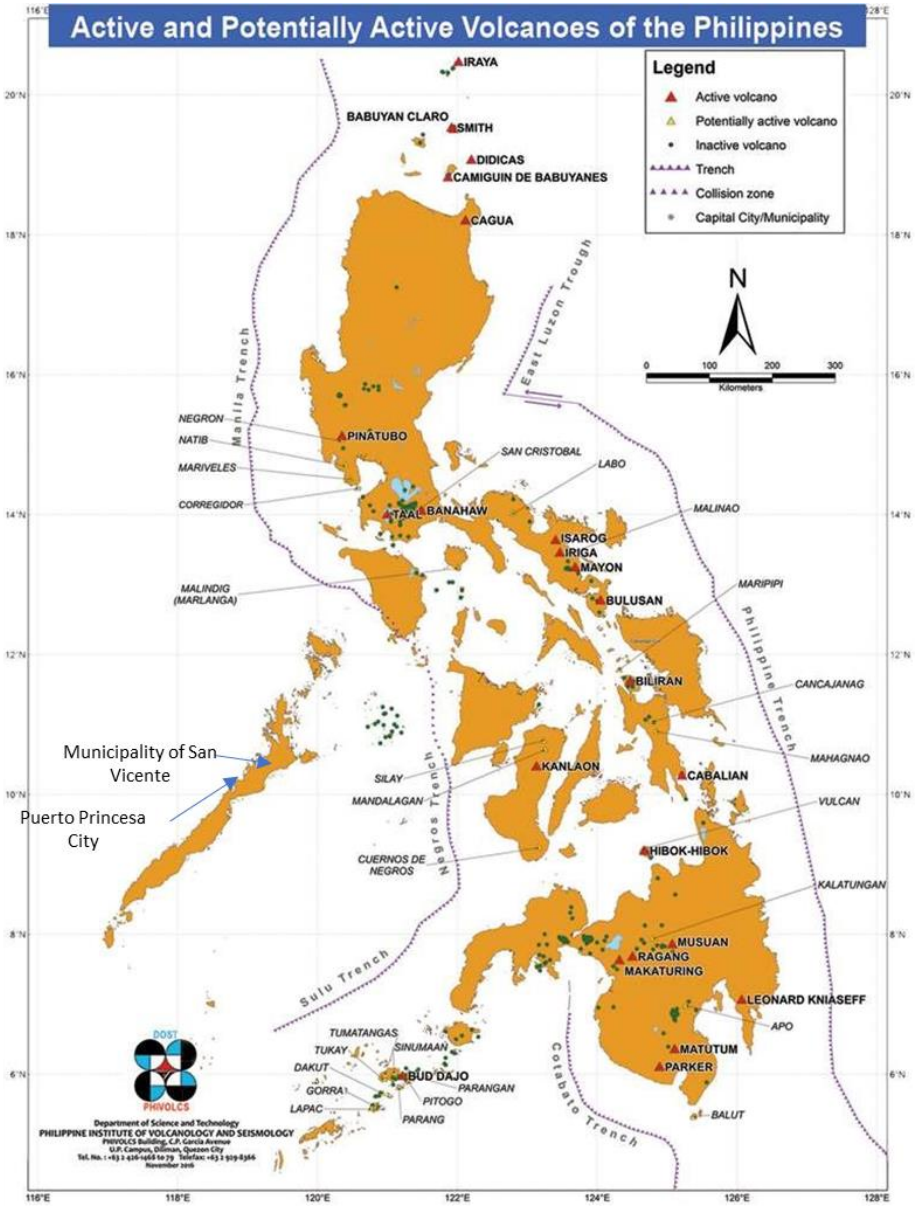


Figure 2-19: Active and Potentially Active Volcanoes in the Philippines in the Philippines

2.1.6. *Soils*

There are nine soil types found in Puerto Princesa City namely, Bolinao Clay, Tagburos Clay, Tapul Clay Loam, Guimbalaon Clay, Bay Clay Loam, Babuyan Silt Clay Loam, Babuyan Clay, Malaglag Clay, and Hydrosol. Lowland soils found in the city are mostly alluvial in formation and are usually fertile soils; hence they comprise prime agricultural lands. This type of soil formation is suitable for irrigation and has potential for good yields of rice. Upland soils are usually formed in place from underlying bedrocks. They are usually thin compared to alluvial deposits and are also prone to erosion in the absence of vegetation cover.

The site soil is a mix of Tagburos Clay and Hydrosol.

Figure 2-20 Soil Map of Puerto Princesa. The soil in the project area is known as Tagburos Clay and Hydrosol

2.1.7. *Terrestrial Ecology*

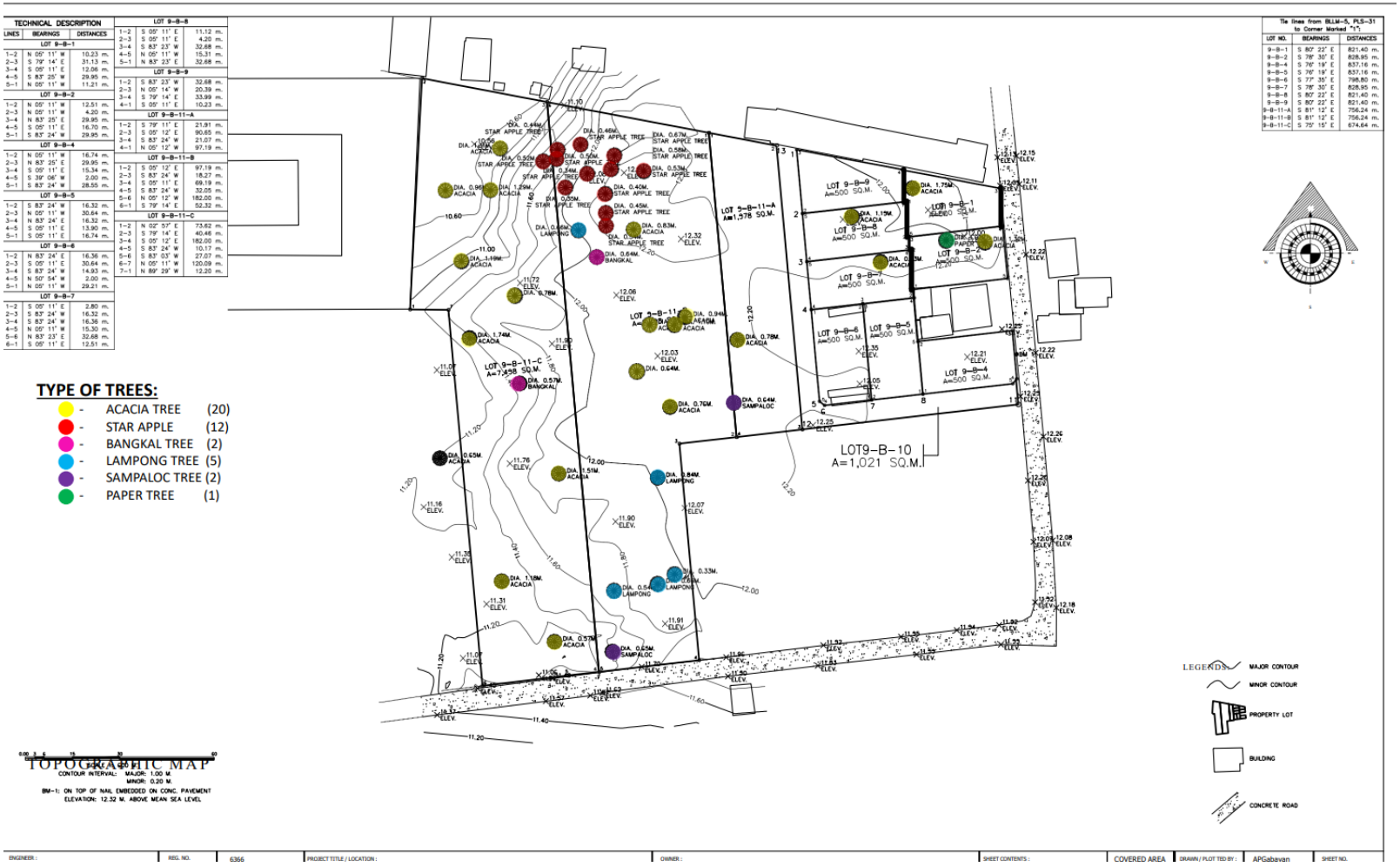


Figure 2-21 Tree Species present in the Project Area

TYPE OF TREES:

- ACACIA TREE (20)
- STAR APPLE (12)
- BANGKAL TREE (2)
- LAMPONG TREE (5)
- SAMPALOC TREE (2)
- PAPER TREE (1)

The following are a brief description of the trees found on site

- Acacia confusa is a perennial tree native to South-East Asia and grows to a height of 15 m. It is found on slopes and dry forest at low elevation. Very local; native to Zambales (Maslin et al. 2019), but widely planted elsewhere in the Philippines

- Star Apple or Chrysophyllum caimito is a cultivated tree planted primarily for its fruit. The tree was introduced from Central America to the Philippines in the Spanish colonial period

- Bangkal tree or Nauclea orientalis is chiefly found at secondary forests at low and medium elevation and is native to the Philippines. It grows to a maximum of around 30 m (98 ft) in height and has large glossy leaves. It bears spherical clusters of fragrant flowers that develop into golf ball-sized edible but bitter fruits. The yellowish to orange soft wood is also used for timber and in woodcarving and folk medicine.

- The lampong tree or Erycibe forbesii is native to Bataan, Laguna, Quezon, Rizal and Palawan

- The Sampaloc tree or Tamarindus indica is native to Africa and has been naturalized and widely cultivated in the Philippines. It is a long-lived, medium-growth tree, which attains a maximum crown height of 25 meters (80 feet).

- The paper tree or paper mulberry tree or Broussonetia papyrifera is a naturalized species of tree in the Philippines. This species is a deciduous shrub or tree usually growing 10–20 m (33–66 ft) tall, but known to reach 35 m (115 ft) at times

2.2. WATER

2.1.8. *Hydrology and Hydrogeology*

Puerto Princesa City has a total of 111,349 hectares of watershed catchment areas that is composed of eight watershed river basins. Out of the eight, five watersheds have major river basins while three have medium-sized river basins. There are no rivers or creeks at or near the project site.

River basins with the largest area include Babuyan River, Montible River, Langogan River, Inagawan River and Bacungan River. The medium watersheds in the city are the Cabayugan, Irawan and Sabang.

Figure 2-22 River Systems in Puerto Princesa

2.1.8.1. Groundwater availability

Based on the Water Supply and Sanitation Databook and Regional Road Map from the National Economic and Development Authority, the rocks in and surrounding Puerto Princesa do not have any known significant groundwater obtainable through drilled wells. In fact, the Puerto Princesa Water District sources its water from the Bonton River and there are very few or limited groundwater resources in the area. This is likewise the reason why no groundwater monitoring was done.

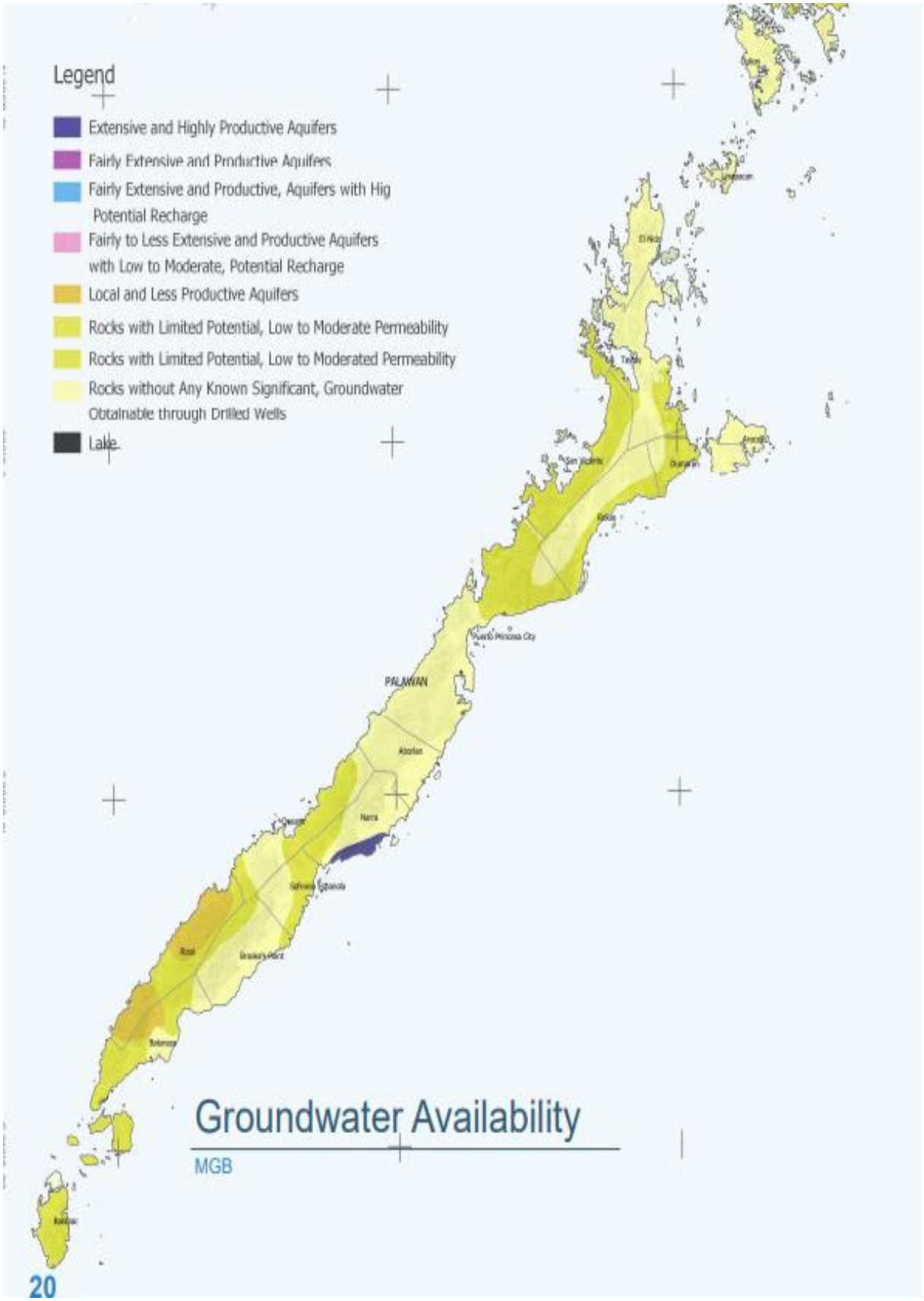


Figure 2-23 Groundwater availability of Palawan (source: NEDA)

2.1.9. *Seabed Sediments*

Away from the shorelines, much of the seabed is reported to be sand, silt and mud, as shown in the map below. Hence, the seabed at or near the Puerto Princesa Bay where the project is located may be composed of sand as shown.

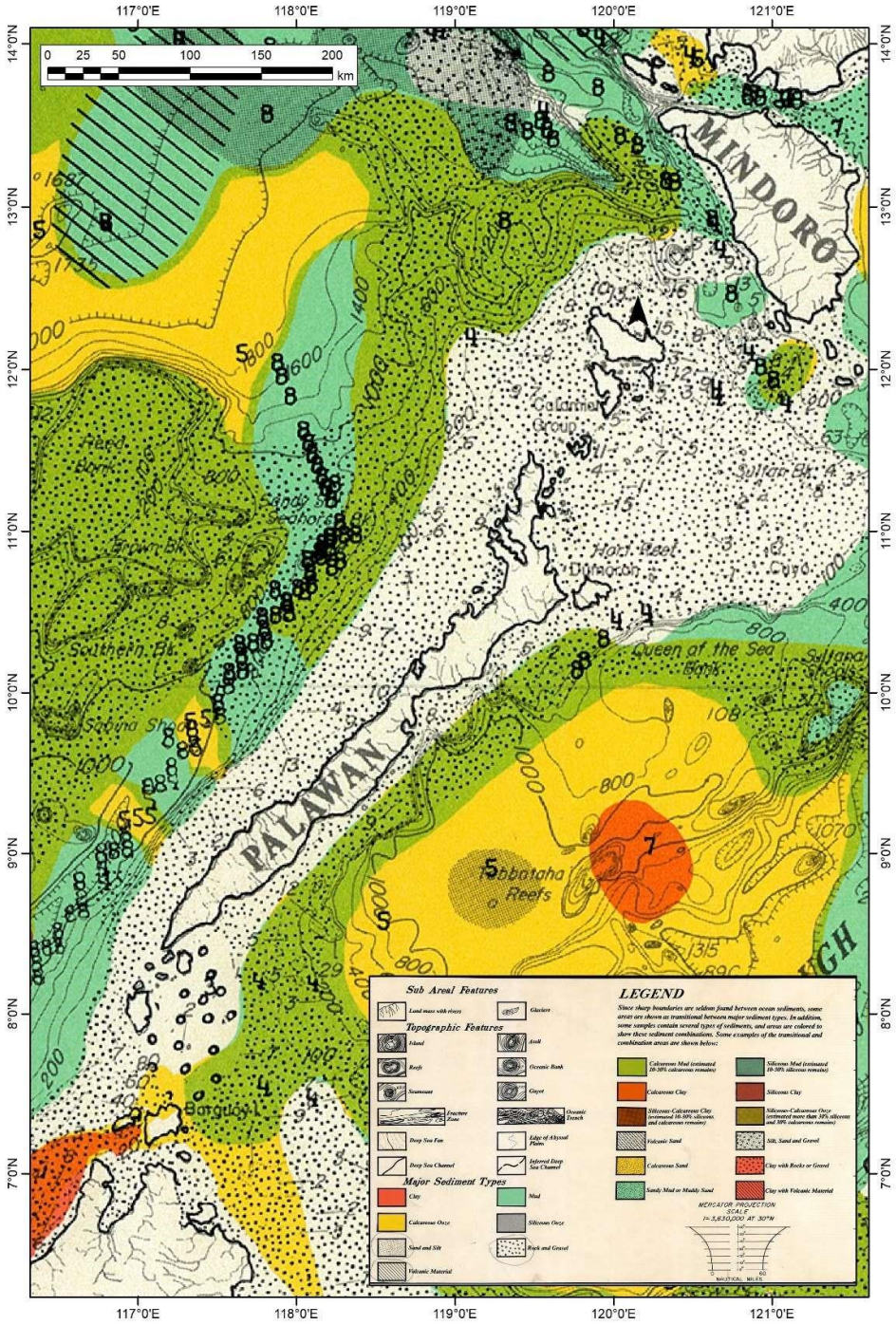


Figure 2-24:Seabed Sediments in the Study Area

2.1.10. *Oceanography*

2.2.1.1.1. Tides and Sea Levels

The general information presented in this section has been extracted from the following sources:

- Philippine Islands Pilot (NP33) & China Sea Pilot (NP31)
- Admiralty Tide Tables of the South China Sea and Indonesia (Volume 5, NP205, 2021) and www.admiralty.co.uk/publications/admiralty-digital-publications/admiralty-totaltide.
- The Philippines Tide and Current Tables published annually by NAMRIA's Hydrography Department
- Massachusetts Institute of Technology's Multidisciplinary Simulation, Estimation and Assimilation Systems (MIT MSEAS, http://mseas.mit.edu/).

Water levels in the study area have mixed tidal periods, varying from mainly diurnal to mainly semidiurnal. Each lunar day, there is one higher High-Water Mark and one lower Low Water. The semidiurnal inequality often gives an intermediate high and low water each lunar day.

The global tide wave sweeps across the Pacific Ocean towards the Philippine archipelago. The direct channels from the Pacific Ocean into the center of the Visayas Sea are constricted, slowing the tide wave as it propagates from the east. As the wave propagates along the channels between the Visayan Islands, the amplitude and phase of the tidal harmonic constituents are modified considerably. **Figure 2-25** illustrates variations in the amplitude and phase of the tide wave's four principle harmonic constituents.

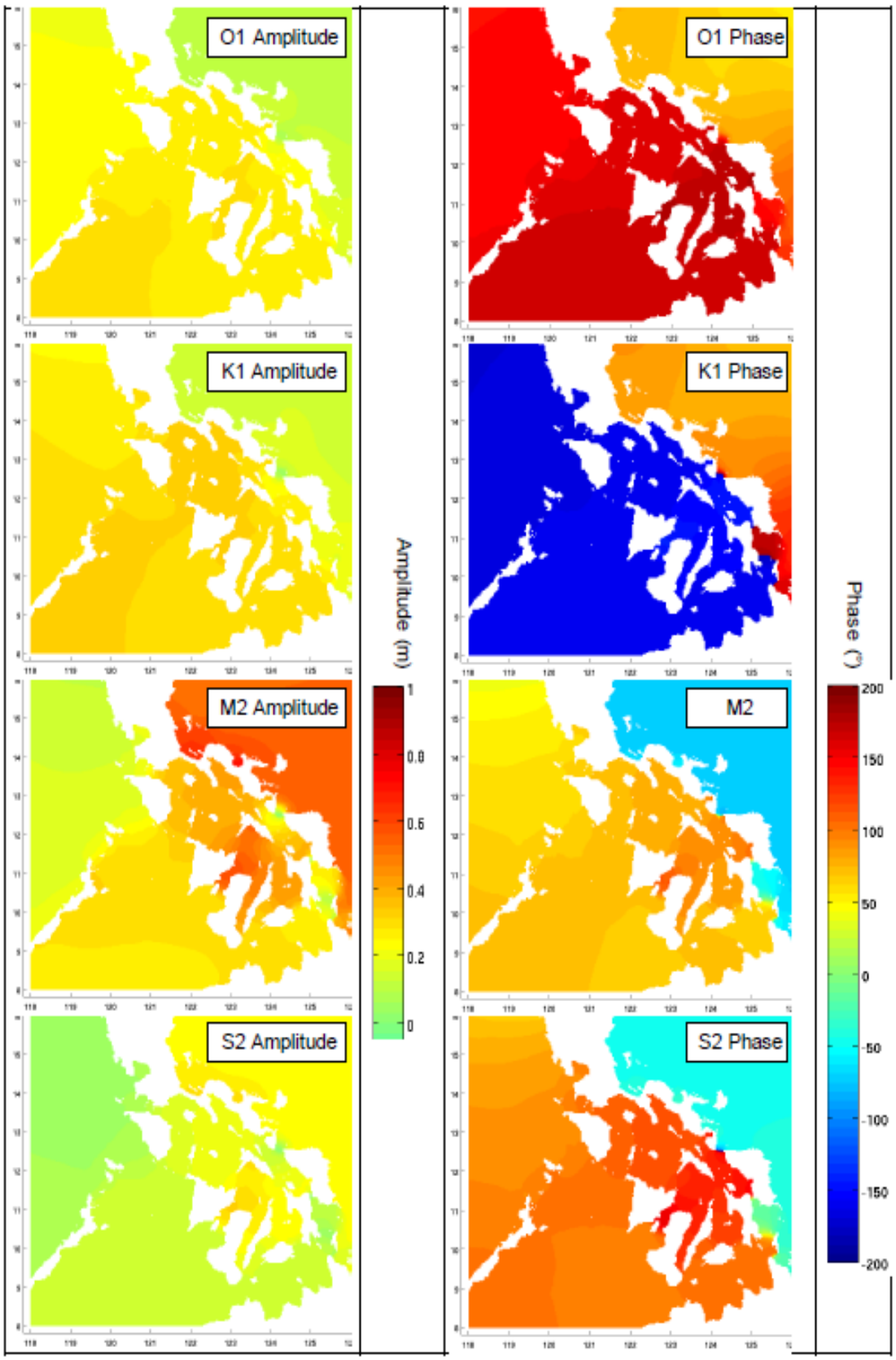


Figure 2-25:Amplitude (m) and Phase (°) of Harmonic Constituents

Seasonal variations in mean sea level that are unrelated to the tide are caused by global and regional variations in barometric pressure, such as monsoonal systems. Around the proposed route, mean levels are mostly 0.1 m lower from December to April and up to 0.1 m higher from September to December.

2.1.11. *Storm Surge*

Storm winds blowing over shallow continental shelves pile water against the coast. The increase in sea level is known as a storm surge. Several processes are involved that combine in storm surge formation:

- Waves generated by winds parallel to the coast transport water toward the coast by diffraction, causing a rise in sea level;
- Winds blowing toward the coast pushes water directly toward the coast;
- The low pressure inside a storm raises the sea level by one cm for each MPa decrease in pressure.

A surge occurring at high tide can turn a relatively weak storm surge into a much more dangerous one, since the final water level is a function of both tide and storm surge combined.

Tropical storms are usually accompanied by large waves and rising sea level that results from the combination of storm surges, wind set-up and wind waves. The wind drives the surface waters off the sea towards the coast and raises the water level. Storm surge near the center of a tropical storm can raise the level of the surface of the sea for a few hours by up to 3 m, occasionally more. The normal supply of sediment can be interrupted and, as a result, storm generated waves can cause the shoreline to recede rapidly, allowing the storm surges to penetrate further inland.

While the amount of wind damage caused by a typhoon decreases rapidly away from the center of the storm, wave damage can occur at great distance. A direct hit by a storm presents the possibility of damage to the shore-end facilities by wind, but storm surges, walls of water driven by fast moving storms, can also devastate the shore in three ways:

- Mechanical pressure;
- Buoyancy of a rapidly advancing wave face;
- Flooding.

Storm surge will be more dangerous in an enclosed bay or a high-gradient shore than in an open, gently sloping shoreline. Even without a definite storm surge, the currents set up by such water movements interacting with the bathymetry can be energetic enough to mobilize sediments or debris on the seafloor.

According to the Standing Office of the Central Committee for Flood and Storm Control Disaster Management Unit, Vietnam, during the last 30 years, half of the recorded typhoons caused a storm surge over 1m high, and 11% over 2.5m high. On some very rare occasions, typhoons have caused surges several meters high. EGS recorded storm surge currents using an Acoustic Doppler Current Profiler (ADCP) south of Hong Kong when a tropical storm passed nearby; at that time in 1990, currents over the whole water column reached around 6 knots.

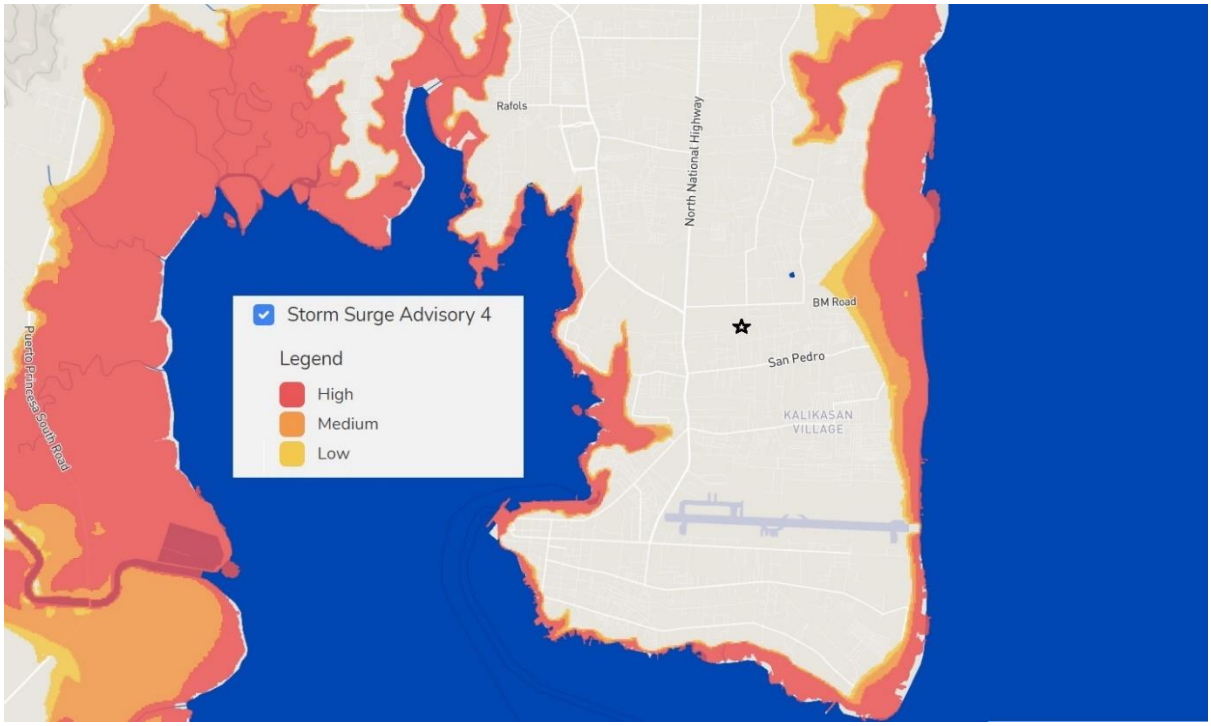


Figure 2-26:Storm surge risk due to typhoons storm surge Advisory 4)

Based on the mapping done by MGB, Philvolcs and Georisk.ph, the project is sufficiently distant enough from the shore to withstand any and all storm surges. This is for Storm Surge Advisory 1 (the weakest) to 4 (the highest and strongest)

2.1.12. *Extreme Water Levels*

Marin Water levels are the result of the combination of the tide, atmospheric pressure, wind and wave set up in shallow water (storm surge) and long period waves.

The principal concern in sub-tropical waters is the extreme water levels that can be generated by tropical storms (typhoons). Where a sufficiently long record is available (that is a record which contains many typhoon surges), the best method is to plot all the data and extrapolate to estimate the probability that the extremes will occur. Such long-term records are not available around the study area.

Extreme low waters are unlikely to have any significant effect on design of the land portions of the cable except for raising the possibility of theft of exposed cables.

The coastline of the Philippines combined with the monsoonal weather and typhoons place some areas at risk from floods and surges. Some of these areas are also at risk of inundation by tsunami. The risk is monitored by PAGASA and the Department of the Environment and Natural Resources, and times and areas at risk warned by broadcast and through their websites. Areas at risk are shown in Figure 2-27 below.

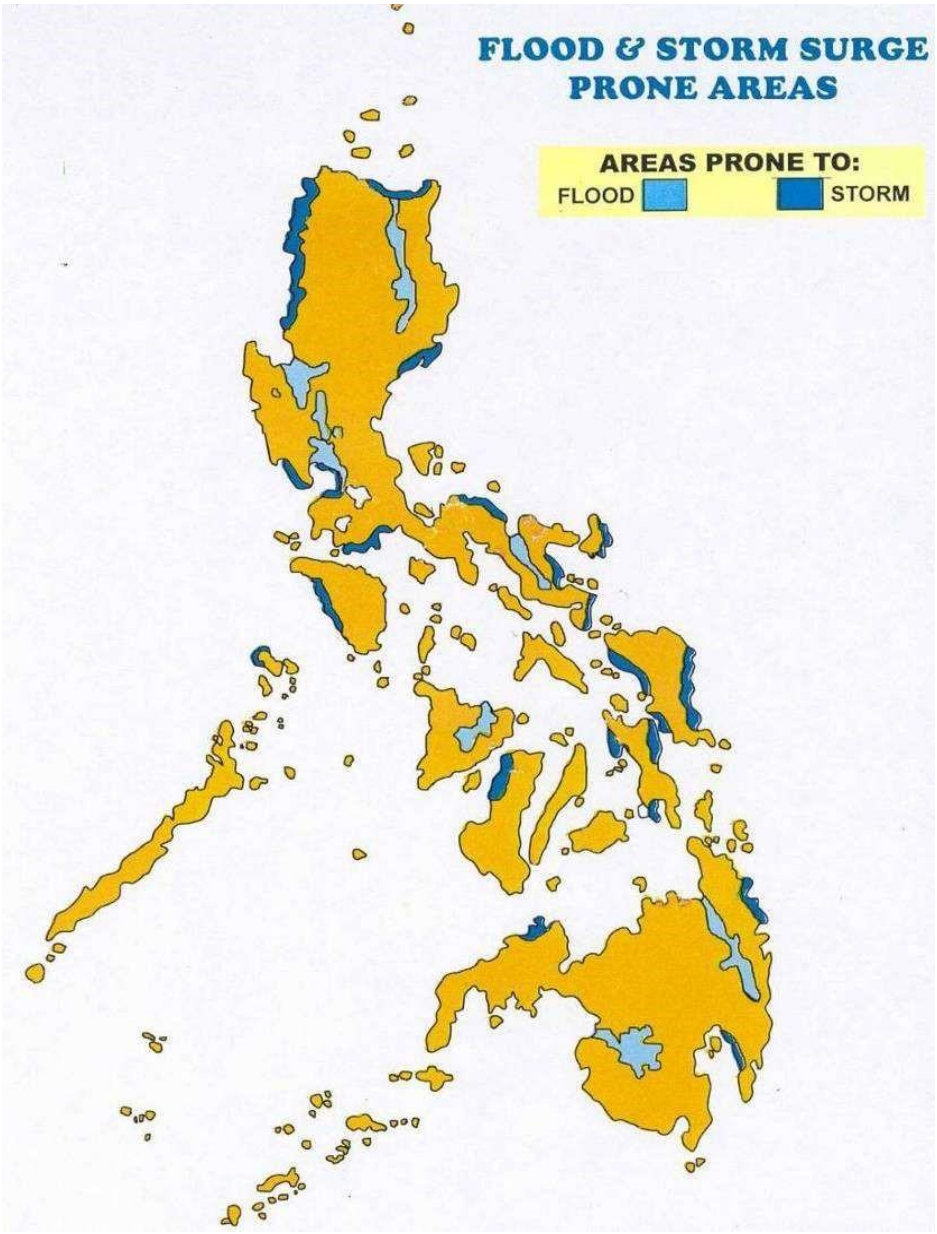


Figure 2-27: Areas at risk from flood or storm surge

In terms of flood susceptibility, about 5.3 percent of the total land area in Puerto Princesa has high susceptibility to flooding. These are located near the coastal areas. Furthermore, about 1.8 percent are moderately susceptible to flooding and about 1.1 percent have low susceptibility. Majority or about 91.8 percent of the total land area is not prone to flooding. The proposed location has no to low susceptibility to flooding (see


Tiniguiban
Solid Road
North National Highway
D. Macapagal St.
SouthWind
Cutting Board Bistro
Aziza Paradise Hotel
L. Nadayao
Lansanas Road
Palo Alto
Pineda Road
Lutong Bahay
Ligaya Street
Wescom Road
100-Year Return Period
Legend
High
Medium
Low
© Mapbo

Figure 2-28).

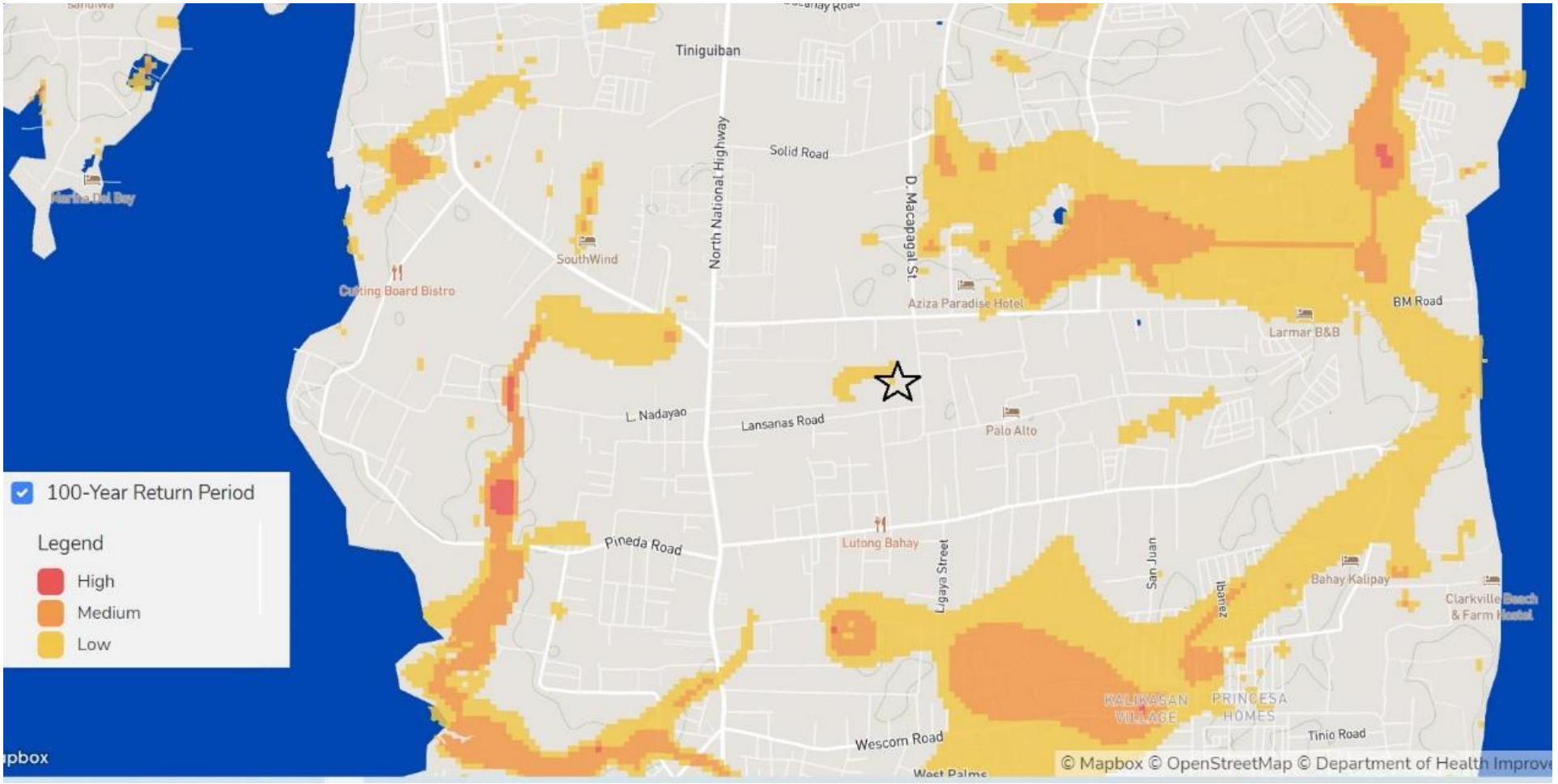


Figure 2-28: Flood Susceptibility Map of Puerto Princesa City (Georisk.ph)

2.1.13. *Tsunami*

Tsunamis are long-wavelength, long-period sea waves generated by an abrupt movement of large volumes of water, generally caused either by vertical displacement of the seabed along fault lines by earthquakes with Magnitude 7 or above, by volcanic eruption, volcanic collapse or submarine landslides. They have minimal effect on a cable in deep water but have the potential for devastating impact around landfalls.

Based on the tsunami hazard map of Puerto Princesa, the project area is not in a tsunami prone area.

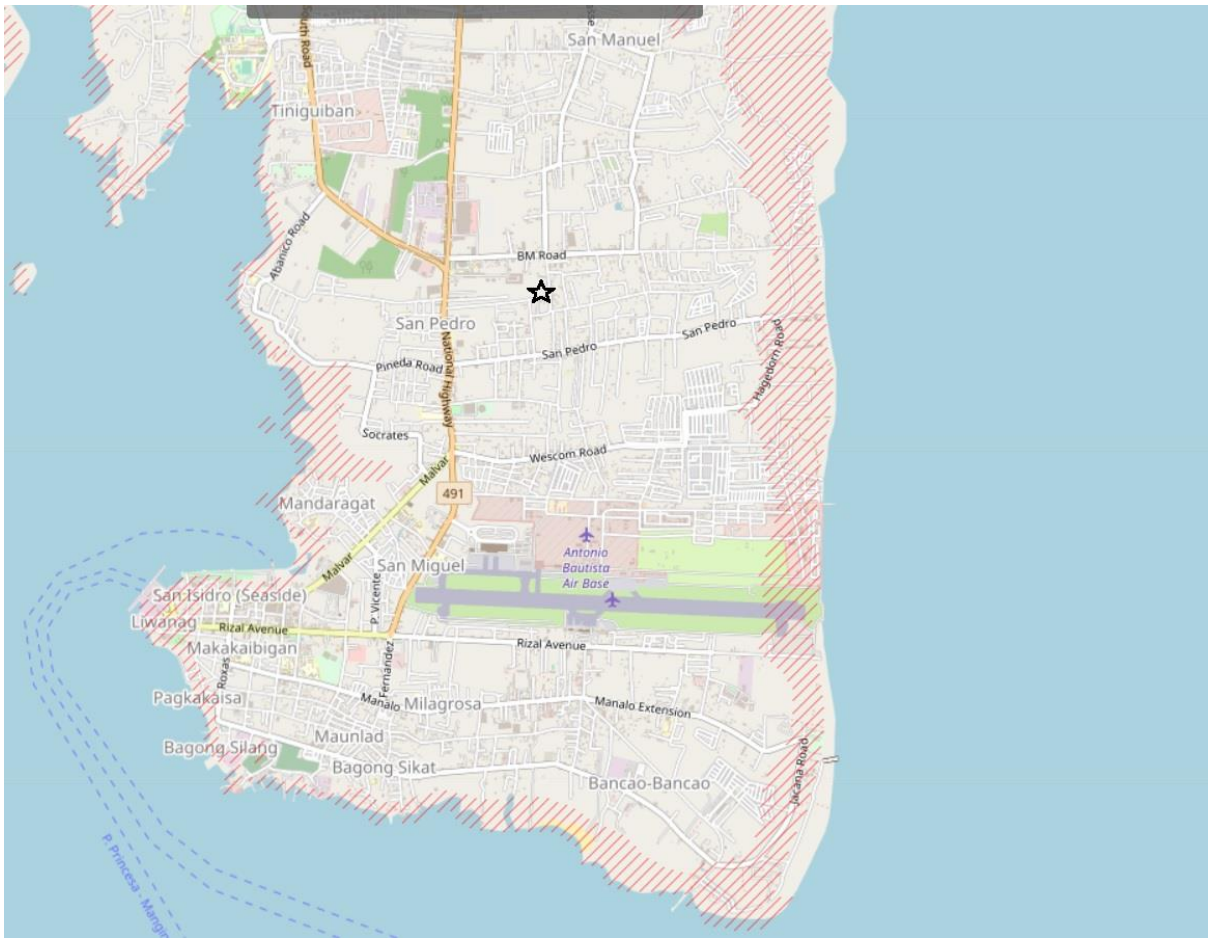


Figure 2-29: Tsunami Hazard Map of Puerto Princesa georisk.ph

2.1.14. *Temperature and Salinity*

Seawater temperature is measured in degrees Celsius (°C); salinity in practical salinity units (psu). The practical salinity unit replaces the older term “parts per thousand”, but the numerical values are the same for most practical purposes.

Water temperature and salinity are important to the proposed cable system for survey, installation and operation because:

- They determine water density, which affects speed of sound. The sound velocity profile, or variation of the speed of sound in seawater with depth, is required input for multi-beam bathymetry instruments and underwater acoustic positioning systems;
- Intense solar heating evaporates surface water leaving behind denser, more saline water. The variations in density are an important driver of seawater currents.

The properties of surface water extend downwards some depth before transitioning to cooler water. The upper homogenous surface layer is mixed by wind action and in some cases by currents and tides. The depth of discontinuity between surface water and cooler, deeper water (thermocline) varies seasonally. Below the homogenous surface layer of seawater, temperature decreases with depth while salinity increases.

2.1.15. *Water Quality*

Two stations were sampled for water quality at or near the project site to see the current state of waters in the canals and esteros in the city. The sampling points are as follows:

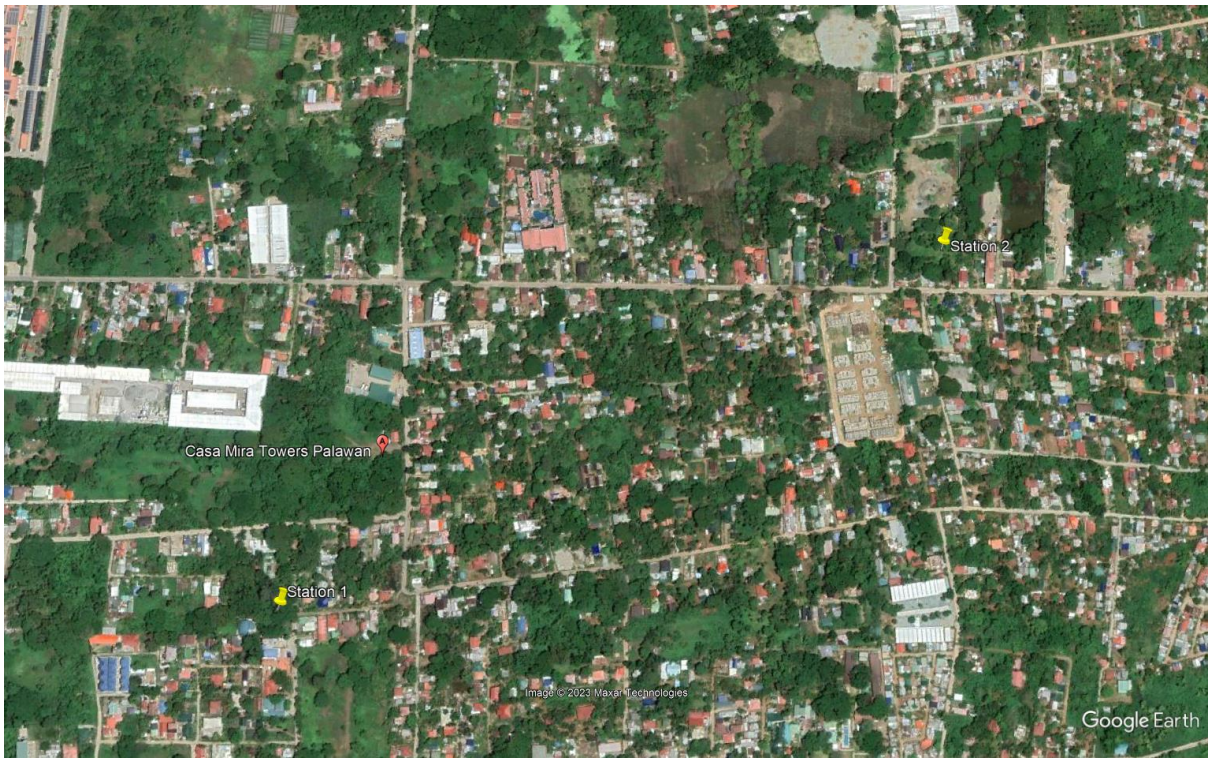


Figure 2-30: Location of sampling Points for water quality

Figure 2-31: Sampling Point 1 location

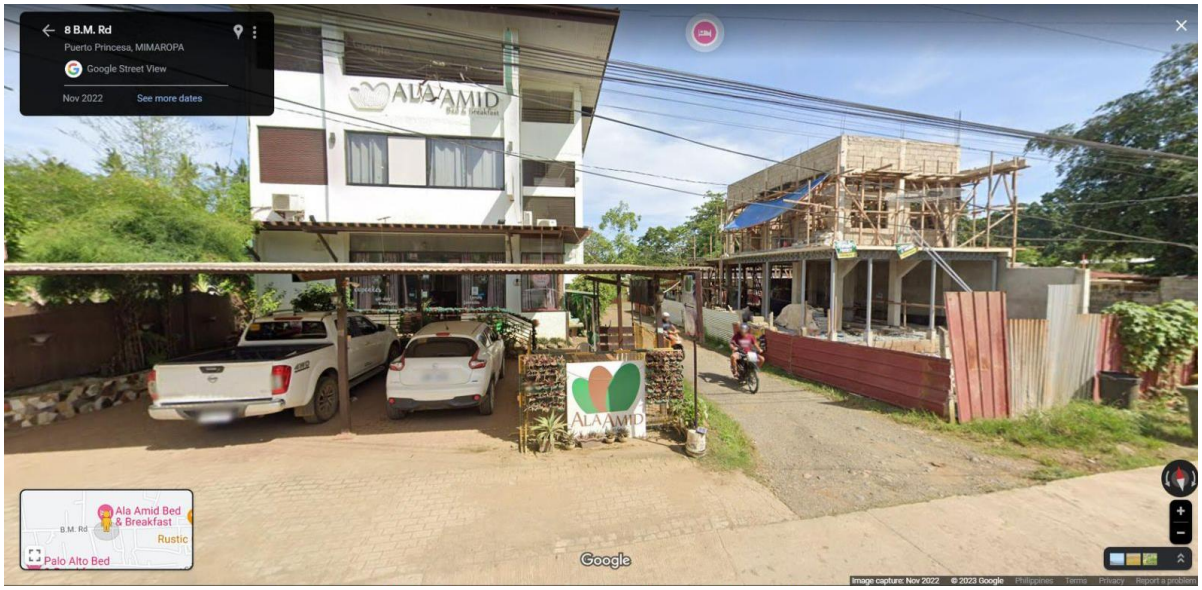


Figure 2-32: Location of sampling Point 2

Sampling point 1: Libis C. Facto Road, San Pedro.

Date of Sample: January 30, 2023

Condition at time of sampling: Sunny

Table 2-3 Water Quality at Sampling Point 1, January 30, 2023

Parameters	Unit	Results	Standard (DAO 2016-08 /2021-22 for C waters	Test Method
Biochemical Oxygen Demand	mg/L	Less than 5	50	5210 B. 5-DAY BOD Test
Chlorides	mg/L	21.6	450	4500-Cl B. Argentometric
Color		100 @ pH 7.30	150	2120B. Visual Comparison
Dissolved Oxygen (On-site)	mg/L	3.42		4500-0 C. Azide Modification
Nitrate as N03-N	mg/L	0.31	14	USEPA Method 352.1
Reactive Phosphate as P	mg/L	Less than 0.22*	4	4500 P B. C. Vanadomolybdophosphoric acid
Temperature (On-site)		26.3		2550 B. Laboratory and Field
Total Suspended Solids	mg/L	10	100	2540 D. Gravimetric
Ammonia as NH3-N	mg/L	24	4	4500 F. Phenate
Oil and Grease	mg/L	Less than 0.70*	5	5520 B. Liquid -Liquid Partition
Anionic Surfactant as MBAS	mg/L	Less than 0.05*	0.04	5540 C. Anionic Surfactants as MBAS
pH (On-site)		725 @ 27.2^{0}C	6.0-9.5	4500H+ B. Electrometric
Total Coliform	MPN per 100mL	780	10,000	Multiple Tube Fermentation Technique (9221 B-C)
Fecal Coliform	MPN per 100mL	450	400	

Sampling Point 2 – BM Road , San Pedro

Date of Sampling: January 31, 2023

Condition at Time of Sampling: Sunny

Table 2-4 Water Quality at Sampling Point 2, January 31, 2023

Parameters	Unit	Results	Standard (DAO 2016-08 /2021-22 for C waters	Test Method
Biochemical Oxygen Demand	mg/L	Less than 5	50	5210 B. 5-DAY BOD Test
Chlorides	mg/L	49	450	4500-Cl B. Argentometric
Color		35 @ pH 7.45	150	2120B. Visual Comparison
Dissolved Oxygen (On-site)	mg/L	6.33		4500-0 C. Azide Modification
Nitrate as NO2-N	mg/L	0.21	14	USEPA Method 352.1
Reactive Phosphate as P	mg/L	0.51	4	4500 P B. C. Vanadomolybdophosphoric acid
Temperature (On-site)		28		2550 B. Laboratory and Field
Total Suspended Solids	mg/L	32	100	2540 D. Gravimetric
Ammonia as NH3-N	mg/L	0.09	4	4500 F. Phenate
Oil and Grease	mg/L	0.98	5	5520 B. Liquid -Liquid Parfition
Anionic Surfactant as MBAS	mg/L	Less than 0.05*	0.04	5540 C. Anionic Surfactants as MBAS
pH (On-site)		8.07 @ 28.oc	6.0-9.5	4500H+ B. Electrometric
Total Coliform	MPN per 100 mL	23×10^2	10,000	Multiple Tube Fermentation Technique (9221 B-C)
Fecal Coliform	MPN per 100 mL	200	400	

Except for total coliform, water quality in the site is still within standards, at least for Class C waters, since these canals and waterways are still unclassified. T

2.3. AIR

2.3.1. Meteorology/Climatology

The data provided in this section are used to determine the optimum weather windows for marine operations associated with cable route surveying, installation and maintenance. General information on the marine climate is provided in 'Philippine Islands Pilot' published by the Hydrographic Office of the Navy, UK (UKHO) (Admiralty NP33). Information from this Pilot has been consulted during compilation of this text.

Equatorial oceans, in common with the adjoining continents, are subjected to intense solar heating. This results in heating of the overlying air mass, which rises to produce a band of relatively low pressure at sea level. Winds from the north and south blow towards this low-pressure region, but are diverted from straight lines by the earth's rotation (Coriolis force). In open waters north of the equator, the predominant winds are northeasterlies; southeasterlies dominate to the south of the equator. This pattern is modified by two factors:

- The oceans and land heat up and retain heat in different ways (specific heat capacity), distorting the shape of the low-pressure area;
- The seasonal change between summer and winter slowly moves the zone of maximum heating northward from May to August (northern summer/ southern winter) and southward from November to February (northern winter/ southern summer).

The diffuse line where the southerly winds meet the northerly winds is referred to as the Inter Tropical Convergence Zone (ITCZ). The average positions of the ITCZ in January and July are illustrated in the figure below.

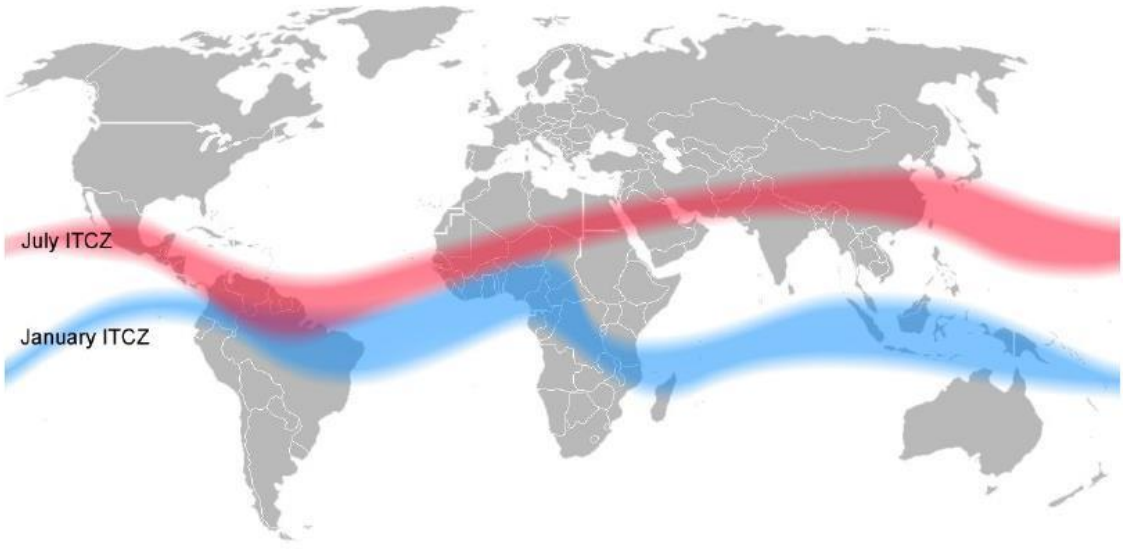


Figure 2-33: Inter-Tropical Convergence Zone, January and July

The Coriolis force diverts winds to the right in the northern hemisphere, so winds blowing from the south are diverted to the northeast when they move north of the equator. Northern Equatorial waters around the Philippines are thus subjected to two (monsoon) air streams:

- Winter: the ITCZ is **South** of the Philippines: Northeast Monsoon from December to April
- Summer: the ITCZ is **North** of the Philippines: Southwest Monsoon from June to October

The Philippine Islands are thus monsoonal with a tropical to subtropical climate. Significant departures from the mean flow of wind occur at all times of the year, particularly as vigorous depressions with their associated wind distribution move east or northeast across the area, giving strong winds and gales, discussed below. Winter gales account for more than 20% of observations in December and January. Gales are relatively infrequent between April and September.

Philippines is prone to being hit by typhoons with about 75% of typhoons occur between July and September, with 50% in the months of July, August and September alone. Unlike other Islands in the Philippines, typhoons in Palawan are significantly less common, where the most severe storms occur later in the season, typically September to early January.

Fog sometimes occurs along the coast in Spring and Summer, usually in the early morning but rarely persisting to midday.

Rainfall is abundant over the western Philippines during the summer, when it is dry in the east.

Weather forecasts and warning of typhoons and strong winds are issued by Philippines Atmospheric, Geophysical & Astronomical Services Administration (PAGASA) by broadcasts and on their website: (http://bagong.pagasa.dost.gov.ph/).

The prevailing wind direction in both the municipality and city is east during the northeast monsoon ("Amihan") from October to March and south and west during the southwest monsoon ("Habagat") from June to September with average wind speed of 2.0 meters per second.

2.3.1.1. Ambient Temperature and Humidity

Based on the monitoring station in Puerto Princesa City, the coldest month was September with mean temperature of 27.3 degrees Celsius (˚C) while the hottest month was May with mean temperature of 28.8 degrees Celsius (˚C).

2.3.1.2. Rainfall and Rainfall Intensity

Rainfall is abundant over the eastern Philippines during the winter, but this season is dry in the west. Conversely, rainfall is abundant over the western Philippines during the summer, when it is dry in the east.

The annual amount of rainfall recorded in Puerto Princesa City monitoring station is 1,527.3 mm with 146 rain days. The highest rainfall was observed in October with amount of 216.1 mm and lowest in February with 23.7 mm.

Table 2-5 Mean Historical Monthly Temperature and Rainfall Data (1981-2010)

Month	Rainfall		Temperature								Wind				No. of Days	
	Amount (mm)	No. of RD	Max ˚C	Min ˚C	Mean ˚C	Dry Bulb ˚C	Wet Bulb ˚C	Dew Point ˚C	Vapor Press (mbs)	RH (%)	MSLP (mbs)	Dir (16pt)	SPD (mps)	Cloud Amt (okta)	TSTM	LTNG
Source: Puerto Princesa Monitoring Station																
January	18.5	3	32.4	22.7	27.5	27.4	24.7	23.7	29.2	80	1010.9	E	2	5	0	0
February	14	2	32.6	22.9	27.8	27.7	24.8	23.8	29.3	79	1011	E	2	4	0	0
March	36.4	5	30.8	23.2	27	26.7	24	23	28	80	1010.9	E	3	5	1	2
April	23.7	3	31	23.1	27	26.8	24	23	27.9	79	1011.1	E	3	4	1	1
May	37.3	4	31.7	23.7	27.7	27.5	24.5	23.4	28.7	78	1010.7	E	3	4	2	3
June	54.2	7	32.7	24.5	28.6	28.4	25.3	24.2	30.1	78	1009.7	E	2	4	7	8
July	118.4	12	32.7	24.8	28.8	28.4	25.7	24.8	31.1	81	1008.9	W	2	5	15	18
August	171.1	17	31.8	24.2	28	27.5	25.3	24.5	30.7	84	1008.8	S	2	6	13	17

Month	Rainfall		Temperature								Wind				No. of Days	
	Amount (mm)	No. of RD	Max ˚C	Min ˚C	Mean ˚C	Dry Bulb ˚C	Wet Bulb ˚C	Dew Point ˚C	Vapor Press (mbs)	RH (%)	MSLP (mbs)	Dir (16pt)	SPD (mps)	Cloud Amt (okta)	TSTM	LTNG
September	153.5	18	31.4	23.8	27.6	27.1	25	24.3	30.2	84	1008.7	W	2	6	11	13
October	185.4	18	31.3	23.8	27.5	27	25	24.3	30.3	85	1008.6	S	2	6	11	12
November	170.1	17	31.5	23.7	27.6	27	24.9	24.1	30	84	1009.1	W	2	6	12	13
December	216.1	19	31.4	23.7	27.5	27	25	24.3	30.3	85	1009.2	W	2	6	13	15
Annual	211	15	31.1	23.7	27.4	27.1	25	24.3	30.2	84	1009.3	E	2	5	11	13

Table 2-6: Climatological Extremes as of 2018

Month	TEMPERATURE				GREATEST DAILY RAINFALL (mm)		STRONGEST WINDS (mps)			SEA LEVEL PRESSURES (mbs)			
	HIGH	DATE	LOW	DATE	AMOUNT	DATE	SPD	DIR	DATE	HIGH	DATE	LOW	DATE
Source: Puerto Princesa Monitoring Station													
January	34.4	1/16/88	18.3	1/20/61	88.2	01/01/2001	19	E	1/19/85	1019.4	01/09/2004	1002.2	01/01/1950
February	34.6	2/16/10	18.5	02/02/2002	140.8	2/16/12	18	E	2/26/82	1018.8	02/01/1962	1003.8	02/07/1985
March	36.4	2/17/05	19.2	3/15/67	116.3	03/05/1954	18	SE	3/21/82	1019.8	03/05/2005	989.1	3/24/49
April	36.3	04/03/1996	20.9	4/16/71	92.7	4/25/71	16	E	04/04/2005	1017.2	04/08/1969	989.8	04/04/1949
May	36	5/22/87	21.3	5/24/61	121.7	05/08/1954	15	SSE	05/12/2006	1015.8	5/16/58	1002.7	5/17/89
June	35.6	06/04/1998	16.2	6/17/88	194.1	6/29/80	18	SW	6/22/90	1015.8	06/09/1971	1001.3	6/30/64
July	35.2	7/13/75	20.6	07/11/1961	106.3	7/28/12	20	SW	07/04/2001	1014.8	07/07/1953	1001.4	07/04/2001
August	35.2	8/30/96	20.5	8/31/87	137.5	8/21/82	18	WSW	08/07/2005	1017.8	8/25/79	1000.5	8/17/90
September	34.7	09/05/2000	20.6	09/08/1967	226	9/30/83	18	ESE	09/04/1993	1015.4	9/20/65	1001.8	09/11/1996
October	36	10/16/77	20.9	10/02/1967	134.1	10/02/1949	23	W	10/06/1988	1016.4	10/27/77	999.6	10/14/70
November	34.2	11/20/04	19.2	11/19/84	202.4	11/28/55	49	NW	11/25/68	1017.5	11/24/57	989.2	11/25/68
December	34	12/04/2002	19.2	12/30/86	269.3	12/29/75	31	ENE	12/31/98	1018.3	12/12/2002	999.2	12/12/1998
Annual	36.4	3/17/05	16.2	6/17/88	269.3	12/29/75	49	NW	11/25/68	1019.8	03/05/2005	989.1	3/24/49
Period of Record	1951-2012	1951-2012	1951-2012	1951-2012	1949-2012	1949-2012	1950-2012	1950-2012	1950-2012	1949-2012	1949-2012	1949-2012	1949-2012

2.3.1.3. Climate

The climate in Puerto Princesa, the western portion of the city experience Type 1 climate while the eastern portion is under Type III climate. Areas with Type III climate do not have pronounced maximum rain period and has short dry season from January to April.

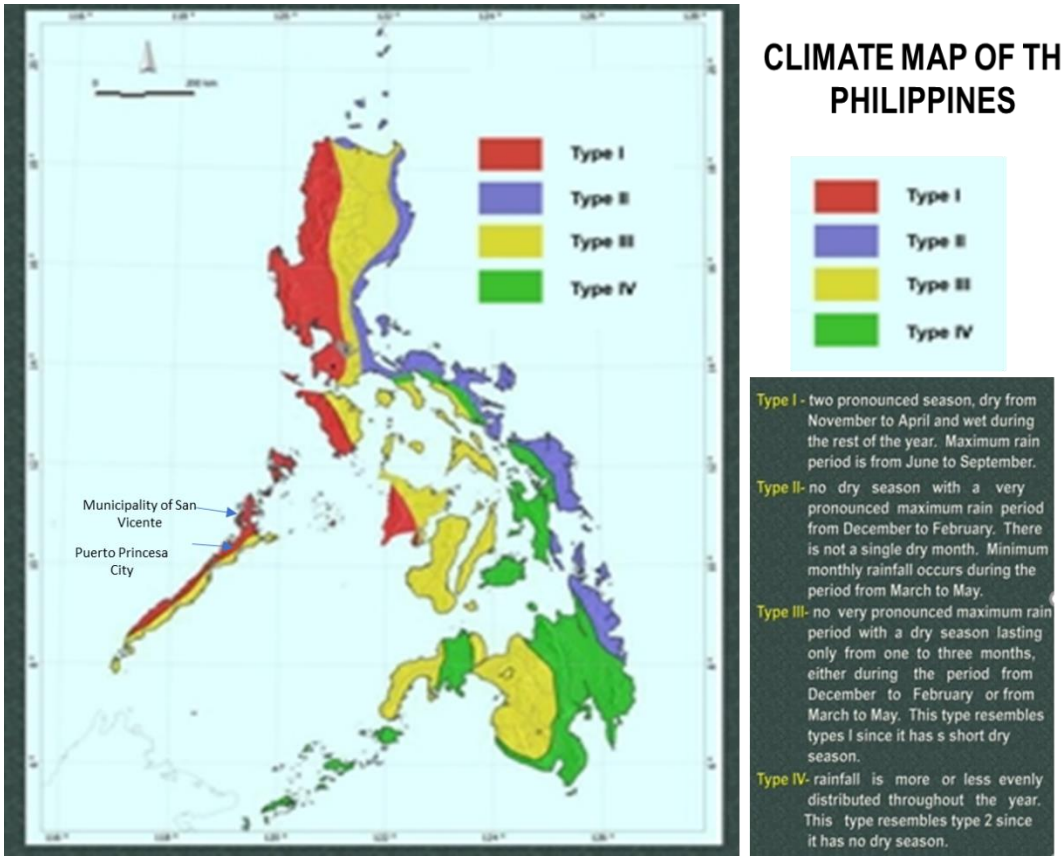


Figure 2-34: Climate Map of the Philippines

2.3.1.4. Tropical Storms

Tropical storms and typhoons (known collectively as “tropical rotating storms” or “tropical revolving storms”) are powerful weather systems in the northwestern Pacific Ocean and adjacent Seas, with winds exceeding gale force (>34 knots; >63 kph; >17m/s). Known as typhoons in this region of the world, they are the same type of weather system known as hurricanes and cyclones in other parts of the world.

Tropical rotating storms are the most destructive of seasonally recurring rapid-onset natural hazards. Between 80 and 100 tropical rotating storms occur around the world each year. Devastation by violent winds, torrential rainfall and accompanying phenomena including storm surges and floods can lead to massive community disruption. Warnings may be expected to indicate the severity of each storm, but a disturbance may intensify rapidly and so pass from one category into the next.

Tropical cyclones entering the Philippine Area of Responsibility are given a local name by the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), which also raises public storm signal warnings as deemed necessary. PAGASA’s public storm warning signals (PSWS) are:

- PSWS #1 – Tropical rotating storm winds of 30 km/h to 60 km/h (19 mph-37 mph; Beaufort Force 4-7) are expected within the next 36 hours. (Note: If a tropical storm forms very close to the area, then a shorted lead time is seen on the warning bulletin);
- PSWS #2 – Tropical rotating storm winds of 60 km/h to 100 km/h (37 mph-62 mph; Beaufort Force 8-10) are expected within the next 24 hours;
- PSWS #3 – Tropical rotating storm winds of 100 km/h to 185 km/h (62 mph-115 mph; Beaufort Force 11-12; up to Saffir Simpson scale 3) are expected within the next 18 hours;
- PSWS #4 – Tropical rotating storm winds of > 185 km/h (115 mph; Saffir-Simpson scale 4 to 5) are expected within 12 hours.

2.3.1.5. Variations in Typhoon Activity

The Philippines' Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) have adopted and Area of Responsibility for reporting tropical rotating storms, including typhoons. The extent of the area is shown in Figure 2-35 below.

Figure 2-35: Philippines Area of Responsibility

Since methodical records began in the mid-20th Century, an annual average of 19 tropical cyclones or storms has entered the Philippines' Area of Responsibility; and of these usually 6 to 9 make landfall. There is considerable variability around these averages. The most active season for tropical typhoon strikes on the island archipelago was 1993, when 19 tropical storms moved through the country. In 1958, just one tropical cyclone crossed the Philippines.

On an annual time scale, activity decreases to a minimum in February, before increasing steadily through June, and spiking from July through October. Activity falls off significantly in November. Although less frequent, the most severe events in the southern parts of the Philippines tend to occur between September until early January. The monthly distribution of tropical depressions (TD), tropical storms (TS) and typhoons (TY) are shown in the figure below.

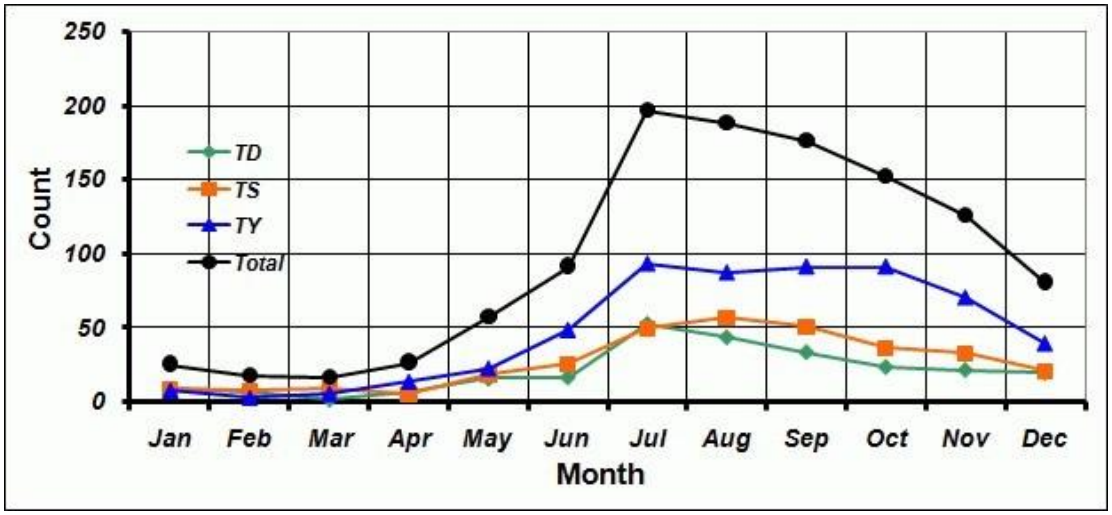


Figure 2-36: Number of Tropical Rotating Storms Crossing the Philippines, 1948-2007

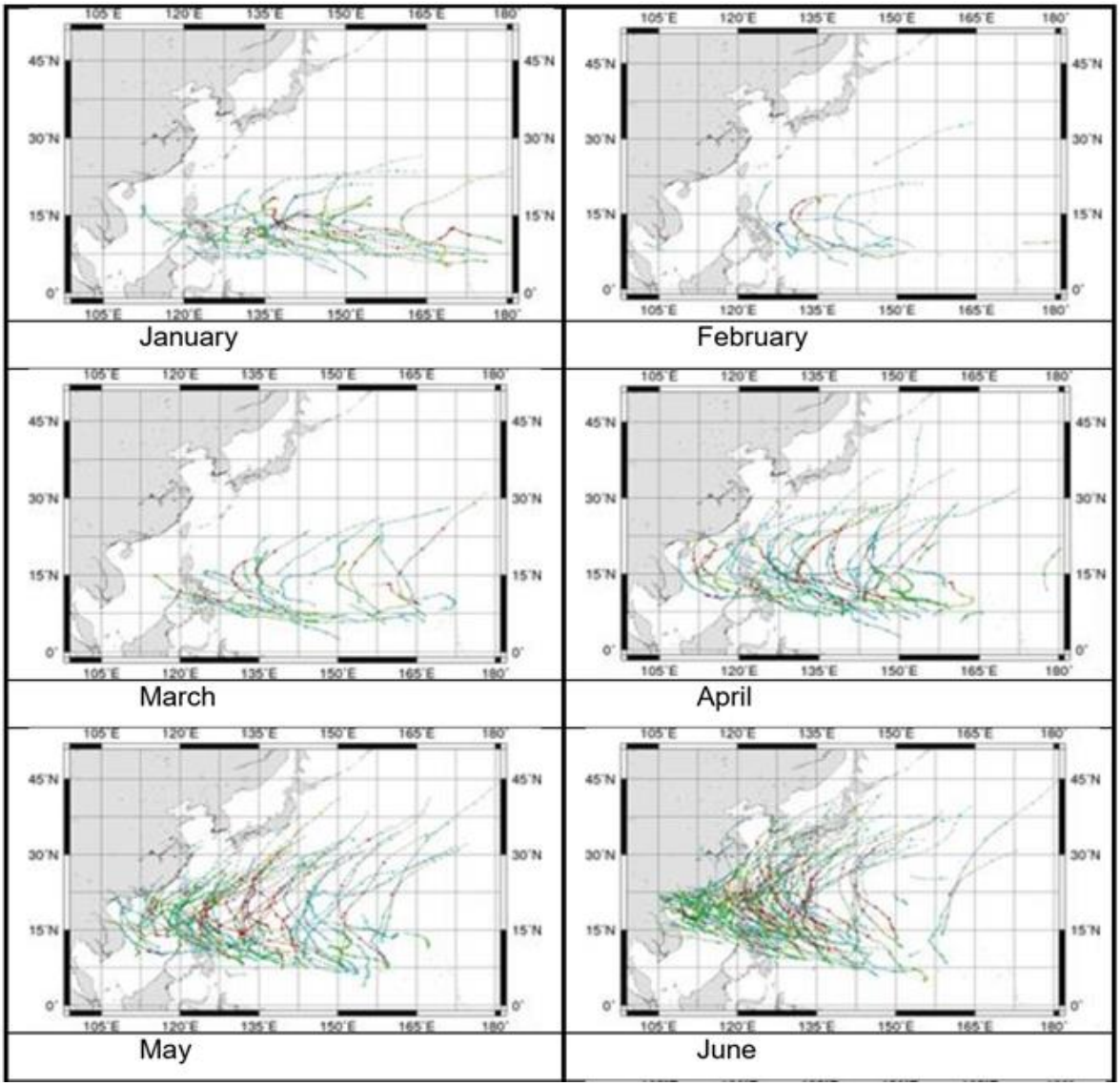
In the Philippines, the areas that are most frequently impacted by tropical rotating storms are northern Luzon and the eastern Visayas. A ten-year average of satellite-determined precipitation showed that at least 30 percent of the annual rainfall in the northern Philippines could be traced to tropical rotating storms, while Palawan and the southern islands receive less than 10 percent of their annual rainfall from tropical rotating storms.

The most rainfall known from a typhoon to impact the Philippines was the July 1911 typhoon, which dropped over 1,168 mm of rainfall within a 24-hour period in Baguio City.

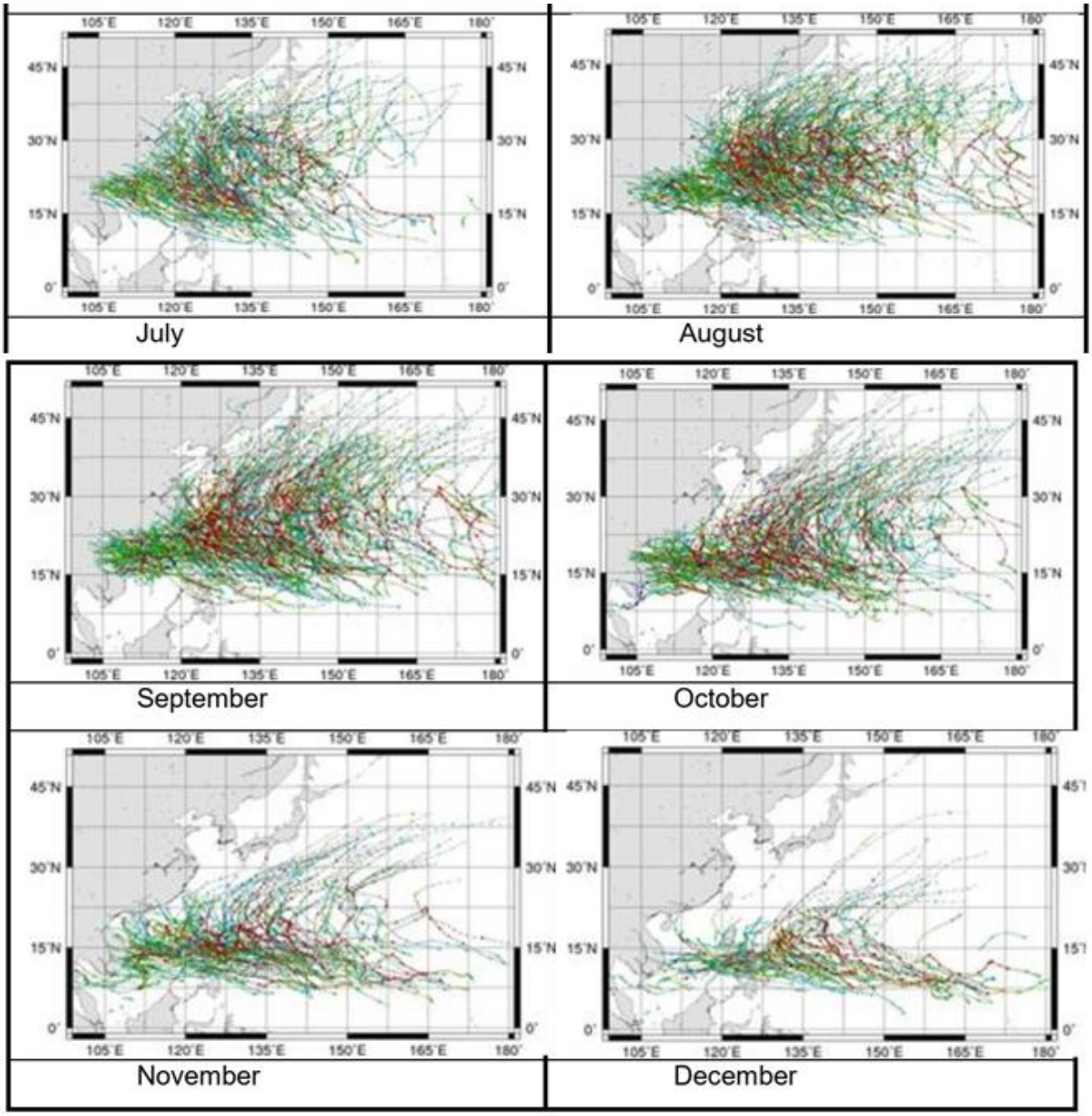
2.3.1.6. Typhoon Tracks across the Philippines

Typhoon tracks for the Philippines are shown in the figures below. The frequency with which typhoons occur varies considerably month to month, from one year to another and with latitude across the Philippines. The monthly historical typhoon tracking charts show the Typhoon tracks recorded between 1951 and 2010. Many typhoons initially move west or northwest over the Philippines, then turn north and then re-curve to the northeast, whereupon they tend to continue on a straighter path. A small number of storms take a very erratic path, making their future course difficult to predict.

Figure 2-37: Monthly Tracks of Storms, Western Pacific and South China Sea, 1951-2010[2]



[2] http://agora.ex.nii.ac.jp/digital-typhoon/reference/monthly/


July
August
September
October
November
December

2.3.2. Air Quality

Air Quality in the area is still relatively good since this is far from the main roads, but the prevalence of tricycles and jeepneys may exacerbate the air quality problems in the near future.

2.3.2.1. METHODS OF SAMPLING AND ANALYSIS

The methods used are based on the Code of Federal Regulations (CFR) of the United States Environmental Protection Agency (U.S. EPA) and the Air Quality Monitoring Manual of the Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB).

Table 2-7: Methods of Ambient Air Quality Sampling and Analysis

Parameters	Methodology	
	Sampling	Analysis
Sulfur Oxides (as SO_2)	Gas Bubbler / Liquid Absorption	Pararosaniline method
Nitrogen Oxides (as NO_2)	Gas Bubbler / Liquid Absorption	Griess Saltzman Reaction
Total Suspended Particulates (TSP)	High Volume Sampler / Filtration	Gravimetric Method
Carbon Monoxide (CO)	Collected Gases / Tedlar Bags	NDIR
Particulate Matter 10 (PM10)	High Volume Sampler / Filtration	Gravimetric Method
Particulate Matter 2.5 (PM2.5)	High Volume Sampler / Filtration	Gravimetric Method
Noise	Noise Meter / Direct Measurement	N/A

2.3.2.2. Results and Discussions

2.3.2.2.1. *Ambient Air Quality Monitoring*

As presented in ***below***, only the Total Suspended Particulates concentration measured in Station A1 **exceeds** the DENR National Ambient Air Quality Standards (NAAQS). . The laboratory analysis report is attached in the Annexes.

Station A1 - Front of TLC Palawan Integrated School is located at N9˚ 45' 45.9" E118˚ 45' 10.7". The north side of this station is Parking Area at about two meters away and on its east side is a two-lane road with multiple passing vehicles at approximately two meters away from the sampling point. This area has northeast to southwest wind direction.

Station A2 - Front of Max and Bunny Shop is located at N9˚ 45' 42.3" E118˚ 45' 8.02". The north side of this station is a Two-Lane Road with Multiple Passing Vehicles at about two meters away and on its west side is a Motorcycle Repair Shop and Saw Mill at approximately 50 meters away from the sampling point. The East side of this station is a Furniture Workshop at about 30 meters away from the sampling point. This area has northeast to southwest wind direction.

Table 2-8 Tabulated Air Quality Results

Station	TSP ug/Ncm	NOx ug/Ncm	SOx ug/Ncm	PM10 ug/Ncm	PM2.5	CO ppm
A1	445	11	Less than 11	73	26	2
A2	170	less than 1	Less than 11	73	18	2
Standard	230	150	180	150	35	30

2.3.2.2.2. Noise

As presented below, only the measured noise level at Station N2 during Morning complies with the Environmental Quality Standards for Noise in Class AA and Class A Areas (NPCC – DENR-EMB Air Quality Monitoring). The remarkable sources of noise are from the passing vehicles from the nearby road.

Table 2-9 Tabulated Noise Results

Location	Actual Time	Noise	NPCC standard Class AA
Fron of TLC Palawan Integrated School - N1	0700H	65	45
	1624H	66	50
	2134H	68	45
	2224H	64	40
Front of Max and Bunny Shop N2	0830H	42	50
	1646H	66	55
	2129H	68	50
	0458H	68	45

2.3.3. Climate Change Projection

Management Bureau (DENR-EMB) released a memorandum circular numbered 005 (MC 2011-005), which mandates the inclusion of DRR and CCA in the Philippine EIS System, to “ensure that the project is resilient and that their environmental impact do not exacerbate natural hazards or climate change’s effects on human or natural systems” (DENR-EMB, 2011). The circular aims to provide information on changes that may happen to the area based on projections made by the Philippine Atmospheric, Geophysical, and Astronomical services Administration (PAGASA). The projections include temperature increases, rainfall

change, and frequency of extreme events in 2020 and 2050 under medium range emission scenario. The PAGASA projections are shown in Table 2-10**.**

The data from PAGASA shows that the province of Palawan will experience a rise in temperature and more rainfall during wet season compared to the observed baseline. The number of days in the province with temperature greater than 35 degrees Celsius will also significantly rise. Furthermore, both sites may experience reduced number of dry days and increased number of rainfalls of greater than 200 mm.

Table 2-10 PAGASA Climate Change Projections in Region 4B

Table a: Seasonal temperature increases (in °C) in 2020 and 2050 under medium-range emission scenario in provinces in Region 4-B

PROVINCES	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
Region 4-B												
OCCIDENTAL MINDORO	26.5	28.3	27.3	27.1	0.9	1.1	0.9	1.0	1.9	2.1	1.8	1.9
ORIENTAL MINDORO	26.4	28.3	27.6	27.3	0.8	1.0	1.1	0.9	1.8	2.0	2.2	1.9
ROMBLON	26.3	28.5	28.1	27.7	0.8	1.1	0.9	0.8	1.8	2.2	1.9	1.7
PALAWAN	26.9	28.1	27.3	27.4	0.9	1.1	1.0	0.9	1.8	2.1	2.0	1.8

Table b: Seasonal rainfall change (in %) in 2020 and 2050 under medium-range emission scenario in provinces in Region 4-B

PROVINCES	OBSERVED BASELINE (1971-2000) mm				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Region 4-B												
OCCIDENTAL MINDORO	159.5	265.9	1091.2	762.6	-14.3	-15.6	13.6	3.2	15.8	-23.8	26.7	-2.4
ORIENTAL MINDORO	260.3	269.3	894.3	791.2	-3.2	-15.1	0.5	6.2	21.6	-11.5	5.3	2.9
ROMBLON	357.0	224.0	652.9	778.0	9.0	0.2	27.6	22.6	32.6	26.3	66.2	37.9
PALAWAN	101.8	189.3	781.7	640.6	15.7	-7.2	-2.6	19.6	7.3	-9.0	1.0	6.9

Table c: Frequency of extreme events in 2020 and 2050 under medium-range emission scenario in provinces in Region 4-B

Provinces	Stations	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
OCCIDENTAL MINDORO	San Jose	1075	1773	3410	5437	7010	7128	8	5	14
ORIENTAL MINDORO	Calapan	80	440	1469	7604	7057	6902	3	11	22
PALAWAN	Puerto Princesa	29	23	297	8348	6457	6455	2	7	7
	Coron	242	739	1988	7726	5542	5561	4	4	3
	Cuyo	59	195	791	7447	5382	5406	5	5	2
ROMBLON	Romblon	59	235	756	7628	6125	5663	4	11	20

2.4. People

2.4.1. Population

In 2020, the recorded total population in Puerto Princesa City is 307,079, The average annual population growth rate from 2015 to 2020 is 3.98 percent for Puerto Princesa. **Table 2-11** present the barangay population in Puerto Princesa in 2020.

Table 2-11: Barangay Population in Puerto Princesa City (2020)

Barangay	Population
Babuyan	2,927
Bacungan	5,969
Bagong Bayan	788
Bagong Pag-asa (Pob.)	730
Bagong Sikat (Pob.)	7,035
Bagong Silang (Pob.)	4,223
Bahile	2,667
Bancao-bancao	15,781
Binduyan	1,519
Buenavista	1,496
Cabayugan	3,754
Concepcion	1,755
Inagawan	1,758
Irawan	8,784
Iwahig (Pob.)	5,422
Kalipay (Pob.)	500
Kamuning	2,067
Langogan	2,616
Liwanag (Pob.)	1,273
Lucbuan	1,774
Mabuhay (Pob.)	254
Macarascas	1,715
Magkakaibigan (Pob.)	301
Maligaya (Pob.)	272
Manalo	2,792
Manggahan (Pob.)	569
Maningning (Pob.)	892
Maoyon	1,444
Marufinas	737
Maruyogon	1,868

Barangay	Population
Masigla (Pob.)	585
Masikap (Pob.)	968
Masipag (Pob.)	2,154
Matahimik (Pob.)	1,233
Matiyaga (Pob.)	424
Maunlad (Pob.)	4,369
Milagrosa (Pob.)	3,100
Model (Pob.)	347
Montible (Pob.)	655
Napsan	3,064
New Panggangan	710
Pagkakaisa (Pob.)	1,178
Princesa (Pob.)	1,003
Salvacion	1,506
San Jose	23,804
San Miguel	21,157
San Pedro	25,909
San Rafael	2,065
Santa Cruz	1,091
Santa Lourdes	8,186
Santa Lucia (Pob.)	422
Santa Monica	21,174
Seaside (Pob.)	348
Sicsican	22,625
Simpocan	1,247
Tagabinit	1,630
Tagburos	9,824
Tagumpay (Pob.)	782
Tanabag	771
Tanglaw (Pob.)	1,941
Barangay ng mga Mangingisda	7,988
Inagawan Sub-Colony	5,179
Luzviminda	3,636
Mandaragat	10,248
San Manuel	18,509
Tiniguiban	13,565
Total	**307,079**

The population growth rate per barangay is presented in the following table. It shows that Barangay San Pedro has the highest population among the barangays in Puerto Princesa.

Table 2-12: Population Growth Rate (2020)

Barangay	Population percentage (2020)	Population (2020)	Population (2015)	Change (2015-2020)	Annual Population Growth Rate (2015-2020)
Babuyan	0.95%	2,927	2,472	18.41%	3.62%
Bacungan	1.94%	5,969	4,555	31.04%	5.86%
Bagong Bayan	0.26%	788	827	-4.72%	-1.01%
Bagong Pag-asa	0.24%	730	750	-2.67%	-0.57%
Bagong Sikat	2.29%	7,035	7,497	-6.16%	-1.33%
Bagong Silang	1.38%	4,223	5,296	-20.26%	-4.65%
Bahile	0.87%	2,667	2,339	14.02%	2.80%
Bancao-bancao	5.14%	15,781	13,612	15.93%	3.16%
Barangay ng mga Mangingisda	2.60%	7,988	5,350	49.31%	8.80%
Binduyan	0.49%	1,519	1,293	17.48%	3.45%
Buenavista	0.49%	1,496	1,212	23.43%	4.53%
Cabayugan	1.22%	3,754	3,368	11.46%	2.31%
Concepcion	0.57%	1,755	1,418	23.77%	4.59%
Inagawan	0.57%	1,758	1,623	8.32%	1.70%
Inagawan Sub-Colony	1.69%	5,179	4,052	27.81%	5.30%
Irawan	2.86%	8,784	6,142	43.02%	7.82%
Iwahig	1.77%	5,422	4,527	19.77%	3.87%
Kalipay	0.16%	500	725	-31.03%	-7.52%
Kamuning	0.67%	2,067	1,978	4.50%	0.93%
Langogan	0.85%	2,616	2,067	26.56%	5.08%
Liwanag	0.41%	1,273	1,202	5.91%	1.22%
Lucbuan	0.58%	1,774	1,401	26.62%	5.09%
Luzviminda	1.18%	3,636	3,473	4.69%	0.97%
Mabuhay	0.08%	254	206	23.30%	4.51%
Macarascas	0.56%	1,715	1,609	6.59%	1.35%
Magkakaibigan	0.10%	301	375	-19.73%	-4.52%
Maligaya	0.09%	272	311	-12.54%	-2.78%
Manalo	0.91%	2,792	2,143	30.28%	5.73%
Mandaragat	3.34%	10,248	9,210	11.27%	2.27%
Manggahan	0.19%	569	644	-11.65%	-2.57%
Maningning	0.29%	892	791	12.77%	2.56%
Maoyon	0.47%	1,444	1,281	12.72%	2.55%
Marufinas	0.24%	737	609	21.02%	4.10%
Maruyogon	0.61%	1,868	1,450	28.83%	5.48%

Barangay	Population percentage (2020)	Population (2020)	Population (2015)	Change (2015-2020)	Annual Population Growth Rate (2015-2020)
Masigla	0.19%	585	609	-3.94%	-0.84%
Masikap	0.32%	968	958	1.04%	0.22%
Masipag	0.70%	2,154	1,971	9.28%	1.89%
Matahimik	0.40%	1,233	1,228	0.41%	0.09%
Matiyaga	0.14%	424	413	2.66%	0.55%
Maunlad	1.42%	4,369	3,865	13.04%	2.61%
Milagrosa	1.01%	3,100	3,100	0.00%	0.00%
Model	0.11%	347	327	6.12%	1.26%
Montible	0.21%	655	362	80.94%	13.29%
Napsan	1.00%	3,064	1,797	70.51%	11.89%
New Panggangan	0.23%	710	629	12.88%	2.58%
Pagkakaisa	0.38%	1,178	1,131	4.16%	0.86%
Princesa	0.33%	1,003	1,015	-1.18%	-0.25%
Salvacion	0.49%	1,506	1,197	25.81%	4.95%
San Jose	7.75%	23,804	17,521	35.86%	6.66%
San Manuel	6.03%	18,509	12,510	47.95%	8.59%
San Miguel	6.89%	21,157	19,649	7.67%	1.57%
San Pedro	*8.44%*	*25,909*	*22,089*	*17.29%*	*3.41%*
San Rafael	0.67%	2,065	1,836	12.47%	2.50%
Santa Cruz	0.36%	1,091	840	29.88%	5.66%
Santa Lourdes	2.67%	8,186	5,171	58.31%	10.15%
Santa Lucia	0.14%	422	147	187.07%	24.85%
Santa Monica	6.90%	21,174	20,094	5.37%	1.11%
Seaside	0.11%	348	312	11.54%	2.33%
Sicsican	7.37%	22,625	15,861	42.65%	7.76%
Simpocan	0.41%	1,247	1,272	-1.97%	-0.42%
Tagabinit	0.53%	1,630	1,170	39.32%	7.23%
Tagburos	3.20%	9,824	7,045	39.45%	7.25%
Tagumpay	0.25%	782	465	68.17%	11.56%
Tanabag	0.25%	771	700	10.14%	2.05%
Tanglaw	0.63%	1,941	1,739	11.62%	2.34%
Tiniguiban	4.42%	13,565	12,285	10.42%	2.11%
Puerto Princesa Total		**307,079**	**255,116**	**20.37%**	**3.98%**

The average household size for Puerto Princesa has been declining since 1990 and is at 4.1 as of the last census for housholds (2015)

Table 2-13: Average Household Size 1990-2015

Census date	Household population	Number of households	Average household size
1990 May 1	89,808	17,616	5.1
1995 Sep 1	126,658	25,542	4.96
2000 May 1	159,322	33,306	4.78
2007 Aug 1	205,825	46,245	4.45
2010 May 1	216,910	50,669	4.28
2015 Aug 1	250,175	62,247	4.02

2.4.2. Indigenous People

There are no known Ancestral Domain Claim (CADC) nor Ancestral Domain Title (CADT) covering the project areas as presented in Figure 2-39 and Figure 2-38.

As shown in Table 2-14, there are four approved CADC applications and five are still pending application in Puerto Princesa City. None are within the project site..

Table 2-14: Ancestral Domain Claims in Puerto Princesa City

Status	Location	Areas (has)
Approved CADC Application	Maoyon-Babuyan-San Rafael	1,443.96
	Irawan	4,460.42
	Cabayungan	5,091.75
	Sitio Kayasan	7,530
Pending CADC Application	Irawan	4,460
	Napsan-Simpocan	18,531
	Sta. Lourdes	6,281
	Maoyon-Tanabag-Concepcion-Langogan	22,500
	San Rafael	28,000
	Total	98,298.13

Table 2-15: Indigenous People Claimants in Palawan

CADT No.	Municipality	Barangay	Area (has)	Claimant
R04-COR-0204-022	Coron	Banuang Daan and Cabugao	24,520	Tagbanua
R04-BUS-0308-062	Busuanga	Buluang	55,539	Tagbanua
R04-ABO-0709-128	Narra	Dumaguena	13,080.37	Tagbanua
	Aborlan	Cabigaan		
R04-RIZ-0709-120	Jose P. Rizal	Sampaloc, Santa Ines, Tinukam, Latud Canipaan and Culasian	24,667	Dumagat/Remotando
R04-QUE-0709-131	Quezon	Berong, Aramaywan	31,409	Tagbanua
	Narra	Isidro		
	Aborlan	Culandanum		
R04-QUE-0110-149	Quezon	Sowangan	9,518	Pala'wan
R04-COR-0110-150	Coron	Buenavista,Tara, Malawig	78,187	Tagbanua
R04-PUE-0913-161	Puerto Princesa	Napsan, Bagong Bayan, Simpucan, portion of Bacungan and portion of Snake Island	49,386	Tagbanua
R04-ABO-0116-204	Aborlan	Barake	2,795	Tagbanua
R04-BUS-1217-220	Busuanga	Panlaitan and San Isidro	18,114	Tagbanua Calamianen

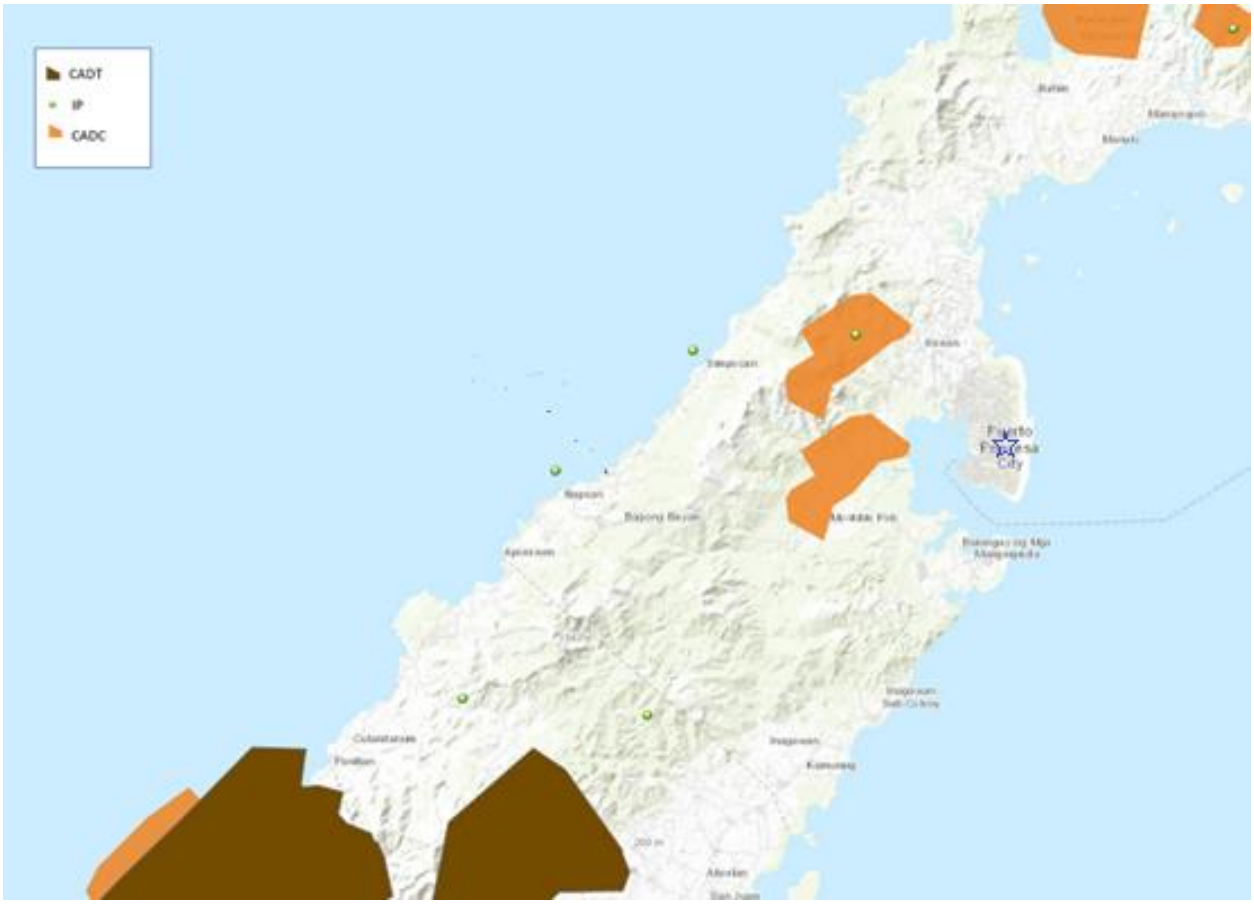


Figure 2-38: IP Areas with CADT and CADC in Puerto Princesa (source: geodata. Ph)

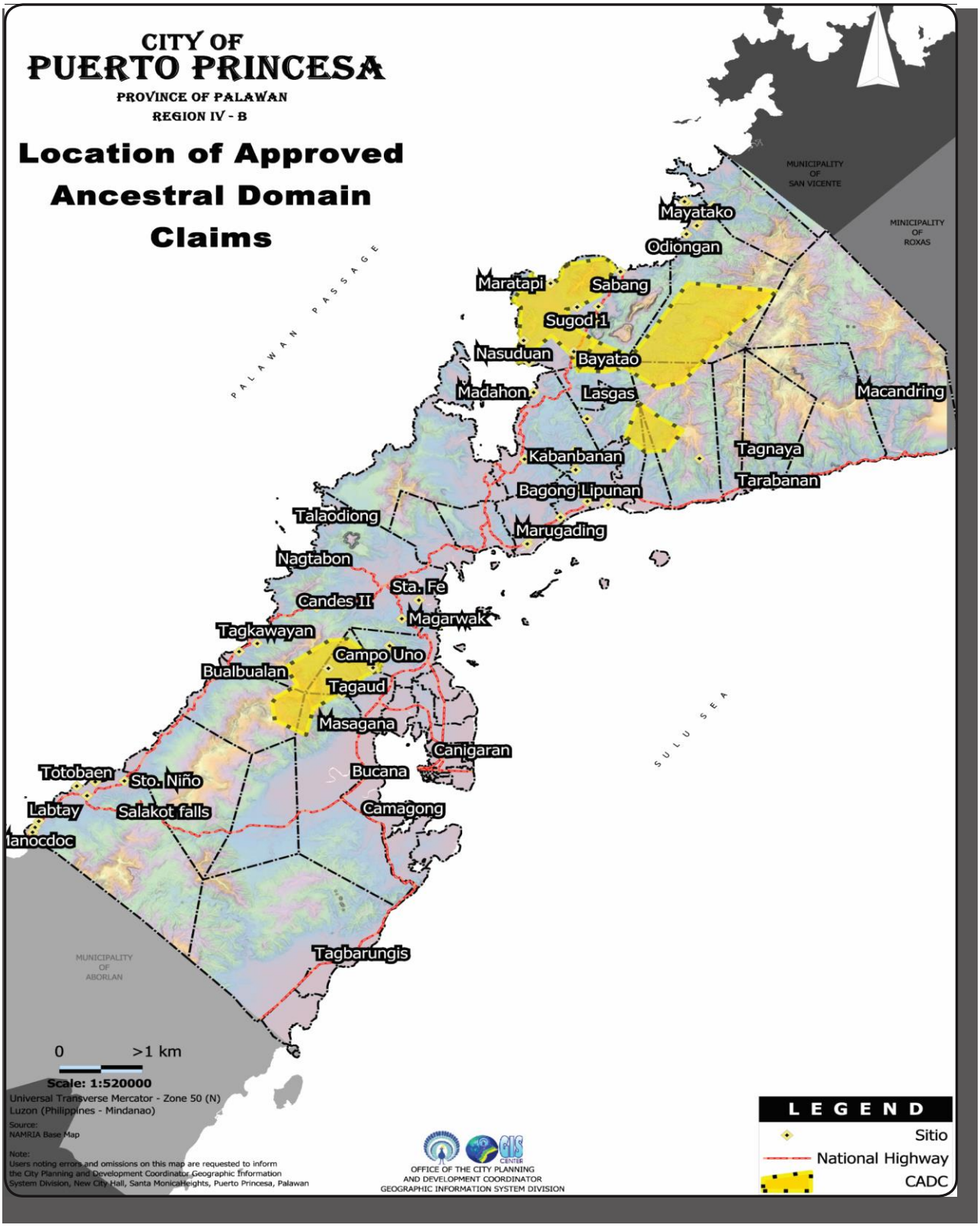


Figure 2-39 CADT areas according to the Puerto Princesa CLUP

2.4.3. Literacy Rate/Profile of Educational Attainment

The City of Puerto Princesa has a literacy rate of 99.5 percent, as shown below.

Table 2-16: Puerto Princesa City literacy rate

Age group	Household population 10 years old and over			Literate		
	Both sexes	Male	Female	Both sexes	Male	Female
Total	198,663	98,885	99,778	197,584	98,306	99,278
10 - 14	24,909	12,826	12,083	24,807	12,770	12,037
15 - 19	30,404	14,812	15,592	30,287	14,745	15,542
20 - 24	27,543	13,344	14,199	27,429	13,275	14,154
25 - 29	21,751	10,911	10,840	21,649	10,851	10,798
30 - 34	18,738	9,349	9,389	18,663	9,304	9,359
35 - 39	16,562	8,428	8,134	16,476	8,381	8,095
40 - 44	13,637	6,850	6,787	13,553	6,807	6,746
45 - 49	11,979	6,004	5,975	11,912	5,965	5,947
50 - 54	10,217	5,200	5,017	10,151	5,168	4,983
55 - 59	8,093	4,095	3,998	8,052	4,069	3,983
60 - 64	5,991	3,013	2,978	5,941	2,991	2,950
65 years old and over	8,839	4,053	4,786	8,664	3,980	4,684

About 70.7 % of the population in Puerto Princesa City that are in schooling age (5 to 24 years old) were attending school while. Least is observed on people ages 20-24 years which may be related to employment opportunities offered to these age bracket. As observed, starting at the age of 15 years old, which is the age of employment, persons who are attending school started to decline.

Table 2-17: Population of schooling age vs actually attending school in Puerto Princesa (PSA 2015)

Age Group	Household Population 5 to 24 Years Old			Household Population 5 to 24 Years Old Who Were Currently Attending School		
	Both Sexes	Male	Female	Both Sexes	Male	Female
Total	108,666	54,380	54,286	76,845	38,780	38,065
5 - 9	25,810	13,398	12,412	24,799	12,842	11,957
10 - 14	24,909	12,826	12,083	24,189	12,372	11,817
15 - 19	30,404	14,812	15,592	21,645	10,344	11,301
20 - 24	27,543	13,344	14,199	6,212	3,222	2,990

2.4.4. Employment

In 2015, Puerto Princesa has 101,222. gainful workers who are 15 years old and above. Gainful workers in Puerto Princesa were Service and Sales Workers and were engaged to elementary occupations.

Table 2-18: Gainful Workers 15 Years Old and Over in by Major Occupation Group, Age Group, and Sex (PSA 2015)

Sex and major occupation group	Total gainful workers 15 years old and over
	Puerto Princesa
Both Sexes	101,222
Managers	10,764
Professionals	6,485
Technicians and Associate Professionals	6,603
Clerical Support Workers	6,891
Service and Sales Workers	20,435
Skilled Agricultural Forestry and Fishery Workers	14,286
Craft and Related Trades Workers	9,048
Plant and Machine Operators and Assemblers	10,929
Elementary Occupations	14,647
Armed Forces Occupations	1,027
Other Occupation Not Elsewhere Classified	-
Not Reported	107

2.4.5. Economy and Industry

The major economic activities in Puerto Princesa City include agricultural activities such as crop, livestock and poultry production. Since majority of the barangays are located within the coastal area of the city. Many of the households are engaged to fishing activities. Also, being included in the New Seven Wonders of Nature, the city has become a destination for tourists.

2.4.6. Fishing Activities

Low artisanal fishing activity was observed during the inshore survey period. This was usually in small boats (sizes vary from 4-8 meters), close to the shore and powered by a paddle or small motorboat engines. Fishing nets and cages were occasionally observed along the shore end owned by the local fishermen.

Figure 2-40: Example of fishing equipment observed in Puerto Princesa

2.4.7. Displacement of Settlers

No settlers will be displaced by the development since the entire property has been bought by Cebu Landmasters, Inc.

2.4.8. Perception Survey

2.4.8.1. Methodology

In line with the EMB Memorandum Circular No. 2020-30 which provides for the Interim Guidelines on Public Participation in the Implementation of the Philippine Environmental Impact Statement (PD1586)

During the State of National Public Health Emergency, a Perception Survey has been conducted for the proposed residential infrastructure project in Barangay San Padro, Puerto Prinsesa City, Palawan.

The aim of the activity was to take a snapshot of the community sentiments towards the proposed development which has been administered through the help of the Barangay San Pedro Health Workers.

A formal letter of request was shared to the honorable barangay chairman, Mr. Francisco R. Gabuco dated 24 June 2022 and the activity was then included in the agenda of the barangay meeting held last 13 July 2022. It was during this meeting where the requirements along with schedule of the activities for the conduct of the perception survey has been discussed.

An orientation for the 42 Barangay Health Workers which shall be the surveyors was conducted last 3 August 2022 to kick start the survey activities. The surveyors were then provided with an overview of the proposed development, and the goals and the survey questionnaire was broken down for them. The survey kits for the targeted 350 survey participants was also distributed.

The actual house-to-house survey commenced last 5 August 2022 and 341 accomplished survey forms have been delivered last 11 August 2022.

Based on about 3000 families within the impact zone (air, water, land, and people), for perception survey for a 5% margin of error and a 95% confidence level, the number of respondents is calculated to be 340 families.

2.4.8.2. Tabulation of Results

A full two thirds of respondents already know about the project within the barangay San Pedro. This will probably rise in the near future

Table 2-19: Project Perception

Question	Answer	*Number*	*%*
DO YOU HAVE ANY IDEA ABOUT THE PROPOSE RESIDENTIAL DEVALOPMENT IN YOUR BARANGAY?	YES:	*230*	*66%*
	NO:	*94*	*27%*
	NO ANSWER	*26*	*7%*

Two Thirds of the respondents also approve of the project, with some 15% still undecided. The project benefits and the perceived negative impacts are also provided in the table below. Wastes and flooding seems to be the most important and most prevalent negative perception of the project, which have been addressed in the project design.

Table 2-20: Project Approval

Question	Answer	*Number*	*%*
DO YOU APPROVE of THIS PROJECT AND WHY?	YES:	*233*	67%
	NO:	*63*	18%

	NO ANSWER/Undecided	*54*	15%

Table 2-21: Benefits to the Community

Question	Answer	*Number*	%
WHAT DO YOU THINK ARE BENEFITS TO YOUR COMMUNITY?	MALAKING TULONG ITO PARA SA MGA TAO AT SA KOMUNIDAD	*129*	37%
	NO ANSWER	*66*	19%
	TRABAHO	*41*	12%
	MAGKAKAROON NG SARILING BAHAY	*38*	11%
	MAAYOS NA HANAPBUHAY	*26*	7%
	DAGDAG INCOME	*17*	5%
	MAYBE THEY PROVIDE GOOD BENEFITS	*15*	4%
	MAGANDANG KAPALIGIRAN	*11*	3%
	MAGIGING MAAYOS NA PAKIKITUNGO SA BAWAT ISA	*6*	2%
	KNOWLEDGE AND AWARENESS	*1*	0%

Table 2-22: Possible Negative Impacts of the Development

Question	Answer	Number	*%*
WHAT DO YOU THINK ARE NEGATIVE IMPACTS OF THIS DEVELOPMENTS?	NO ANSWER	69	*20%*
	PAGBAHA	39	*11%*
	IT WILL BRING MORE PEOPLE IN THE COMMUNITY	38	*11%*
	PAGBARA PAG WALANG DRAINAGE	36	*10%*
	GARBAGE	29	*8%*
	IT GIVE A NICE COMMUNITY	27	*8%*
	TRAFFIC	21	*6%*
	PAGKAKAROON NG BAHA	19	*5%*
	PALAKASAN SYSTEM	18	*5%*
	LACK OF INFORMATION AND AWARENESS	17	*5%*
	PAGUNLAD	13	*4%*
	WASTE SEGREGATION	9	*3%*

Question	Answer	Number	%
	BARANGAY IMPROVEMENT	7	2%
	SANA MABIGYANG PANSIN	3	1%
	ENVIRONMENTAL IMPACT	2	1%
	WALANG TRABAHO	2	1%
	CROWDED	1	0%
Question	**Answer**	***Number***	**%**
HOW DO YOU WANT THE NEGATIVE IMPACTS SOLVED?	BIGYAN NG TRABAHO	58	17%
	NO ANSWER	49	14%
	WASTE SEGREGATION	47	13%
	EDUCATE THE PEOPLE THE GOOD AND THE BAD SIDE OF THE PROJECT	41	12%
	PAGARALAN MUNA BAGO ITAYO ANG PROYEKTO	38	11%
	AYUSIN ANG DRAINAGE	27	8%
	SURIING MABUTI AT ILAGAY NG TAMA	25	7%
	FLOODING	21	6%
	MONITORING	21	6%
	MALINIS NA PALIGID	14	4%
	PAG AYOS NG KALSADA	6	2%
	PARKING SPACE	3	1%

Table 2-23: Personal Benefits of the Project

Question	Answer	*Number*	%
FOR YOUR SELF ALONE, CAN YOU THINK OF BENEFITS IT CAN GIVE YOU AND YOUR FAMILY?	GOOD ENVIRONMENT	89	25%
	NO ANSWER	69	20%
	LIBRENG TIRAHAN	43	12%
	MORE INCOME FOR LIVELIHOOD PROGRAMS	36	10%
	MABUTI ITO PARA SA LAHAT	36	10%
	DAGDAG TRABAHO	27	8%
	MAKATULONG SA MGA MAMAMAYAN	19	5%
	DAPAT ANG MGA TRABAHO AY DITO KUKUHA	12	3%
	MALINIS NA PALIGID	11	3%
	IT WILL GIVE US OPPORTUNITY FOR WORK	5	1%
	MAKAKATULONG ITO SA MGA TURISTA NA DADAYO SA ATING LUGAR	3	1%

Table 2-24 Suggestions and Recommendations about the project

Question	Answer	*Number*	%
WHAT ARE YOUR SUGGESTIONS AND RECOMMENDATIONS ABOUT THE PROJECT	MAGKAROON NG TRABAHO	*123*	35%
	NO ANSWER	*49*	14%
	DRAINAGE	*47*	13%
	SA AKING OPINION MAGANDA ANG MUNGKAHING ITO	*41*	12%
	SANA MATUPAD	*25*	7%
	YOU SHOULD PROVIDE FOR PAYERS FOR PROPER INFORMATION DESSIMINATION ABOUT THE PROPOSE PROJECT, PROVIDE THE PROS AND CONS OF THE SAID PROJECT	*21*	6%
	AYUSIN ANG MGA KANAL AT MAGKAROON NG PROPER	*21*	6%
	JUST KEEP IT MANAGEABLE FOR THE PEOPLE	*14*	4%
	MAGING MAAYOS ANG PAMAMAHALA NG GOBYERNO DI LAMANG IISA KUNDI PARA SA LAHAT.	*6*	2%
	GAWING MAAYOS	*3*	1%

SECTION 3.0 ENVIRONMENTAL RISK ASSESSMENT

3.1. Scope and Coverage

Originally, the Environmental Risk Assessment module in the EIS was meant to assesses and mitigate the potential hazard related to handling, storage, disposal of hazardous materials and wastes. Because of the nature of this project, which does not include the processing of hazardous materials, this ERA report discusses all the hazard that may be brought about by the proposed project to humans, properties and to the environment, including those that may be brought about by accidents and natural disasters. As such, this section will discuss whether the proposed project poses a significant risk to its surrounding environment and, determine if such environment presents substantial threats to the project.

3.2. Methodology

The guidelines and outline for an ERA preparation are prescribed in Annex 2-7e of DAO 2003-03 which focuses on the risks and hazards posed by activities and/or manufacturing methods involving chemical storage, processing, and use. While some aspects mentioned are appropriate to the proposed project, this shall only form part of the overall ERA. Major environmental risks such as natural hazards were identified and assessed for the proposed project.

By virtue of DENR-EMB Memorandum Circular 2011 – 005, Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) are streamlined to the Philippine EIS System (PEISS) as provided for in DENR MC 2010-14 with the following objectives:

- To provide enhanced standards for the preparation of EIA Reports that are customized for specific industry types as required under the PEISS; and
- To provide guidance for project proponents in integrating DRR and CCA concerns in the project planning stage through the EIA Process in order to facilitate review and implementation of projects by incorporating international best practices.

3.3. Hazard Analysis

3.3.1. Geologic Hazards

Earthquakes result to damages through the following hazards: ground shaking, liquefaction, landslide, surface rupturing, and tsunami. Ground shaking, liquefaction and surface rupture are hazards that are directly related to actual ground movements while landslides and tsunami are mainly due to the indirect effects of the earthquake shocks.

Earthquakes result from the sudden shifting of the earth's crust below or at the surface, causing ground vibrations and shocks. There are two main kinds of earthquakes experienced in the Philippines, tectonic and volcanic. A tectonic earthquake is a sudden shift of the earth's crust along active faults, A volcanic

earthquake on the other hand happens near volcanoes when hot rocks or magma moves from deep within the earth.

As found in the baseline survey, the site is vulnerable to very few, if any geologic hazards.

3.3.1.1. Foundation Hazards

Ground subsidence and collapse are among the geologic hazards related to area underlain by limestone with solution opening or cavity. Subsidence is a slow lowering of the land surface, while collapse is the relatively fast opening of the land surface and movement of surface materials into cavities below. The ground underlain by limestone rocks is naturally susceptible to dissolution by water that with time could slowly lead to the formation of dissolution cavities. The ground surface above these features may gradually experience local subsidence that in time may eventually affect the integrity of the structures especially high-rise buildings constructed above this ground. The ground collapse that produces a sinkhole can happen suddenly and with little warning, thus, can cause major property damage. Sinkholes are dramatic because the land usually stays intact for a while until the underground spaces just get too big, then a sudden collapse occurs. Sinkholes can be small (cover collapse or cover subsidence) and have little impact on people, or they can be huge and can occur where a house, road, or other structure is on top.

3.3.1.2. Ground Shaking

Most of the damages incurred during earthquakes mainly result from strong ground vibrations that are caused by the passage of seismic waves from the earthquake source to the ground surface. The intensity of ground shaking depends on the magnitude of the earthquake, distance of the site from the earthquake generator, and the modifying effects of subsoil conditions (i.e., loose unconsolidated sediment is subject to more intense shaking than solid bedrock). The site is sufficiently far from active faults and siesmic activity in the area is generally rare. There remains some possibility of groundshaking but these instances are very remote

3.3.1.3. Ground Rupture

Ground rupturing occurs along the fault zone that moves during the earthquake. Damage can be severe for structures directly straddling and located within a narrow zone of the active fault traces. The site is not near any of the known active or inactive faults. There are likewiseno active faults that bisect the site.

3.3.1.4. Liquefaction

Liquefaction is a phenomenon wherein the strength and stiffness of a soil is reduced by earthquake shaking or other rapid loading. Essentially, liquefaction occurs in saturated soils or soils which the space between individual particles is completely filled with water. Such water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together. Without movement such an earthquake, the water pressure is relatively low but when shaking or earthquake occurs, the water

pressure may increase to the point where the soil particles can readily move with respect to each other. As provided in the baseline survey, the area is not prone to liquefaction.

3.3.1.5. Tsunami

Tsunami or giant sea waves are produced as a result of faulting under submarine conditions at shallow depths. Tsunami can also be triggered by submarine landslides, volcanic eruptions and movements along subduction zones. Only the coastal area in Puerto Princesa is prone to tsunami

3.3.1.6. Volcanic Eruption

There are about 18 actives out of 37 volcanoes in the Philippines. From the listings in the baseline study, only the Mahigugmaon landfall lie in close proximity to two volcanic systems each, indicating they are potentially active. However, it should be duly noted that because of their inherent unpredictability, all of these volcanoes should be considered when designing landfall facilities.

3.3.2. Hydrologic Hazards

3.3.2.1. Typhoon

Typhoons are violent cyclone that occurs in the Northwest Pacific Ocean. They feature heavy rains and winds that maintain speeds equal to or greater than 74 miles (119 kilometers) per hour. Similar storms that occur in other parts of the world are called cyclones or hurricanes. The province of Palawan is generally not within the typical tropical storm or typhoon path but as of the writing of this EIS, Typhoon Odette passed through the island (December 2021).

3.3.2.2. Flooding

Flooding is usually caused by heavy rains accompanying typhoons or the southwest monsoons. Now a chronic problem, flooding has been affecting a number of areas, especially those low-lying areas. Furthermore, coastal area flooding is also on the rise. Common nuisance or tidal flooding occurs during extremely high tides, causing seawater to spill onto land and inundate low-lying areas until the tide recedes, there are also moderate and major floods that can be caused by heavy rains, storm surges, and high waves that occur during coastal storms. Incidentally, due to climate change, sea level rise aggregates such flooding more than ever.

Based on the above data, the area is not considered as a flood prone area and no rivers or creeks pass through the site.

3.3.2.3. Storm Surges

Storm surges refers to the temporary increase at a particular locality in the height of sea due to extreme meteorological conditions that may be low atmospheric pressure and/or strong winds. Storm surges is

caused primarily by strong winds pushing on the ocean's surface causing the water to pile up higher than the ordinary sea level.

Based on the baseline study, the area is not prone to storm surges.

3.4. Emergency Response Policy and Guidelines

3.4.1. Emergency Response Policy

To ensure the viability of the project, the proponent is ensuring the health, safety and security of its personnel, resources and the adjacent environment through the prevention of accidents by eliminating potential threats/hazards and anticipating other probably causes. The project shall observe the primary approach to emergency response, which is to prevent any circumstance that can create emergency situations.

Table 3-1 Emergency Scenarios for the Project

Type of Emergency Situation	Possible Causes	Potential effects
Occupational Safety Accidents	Improper training and supervision of personnel Equipment/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 equipment/facility Injuries or fatalities to personnel and communities
Tsunami	Movement/rupture of nearby fault lines Volcanic eruption Intense earth movement	Failure of equipment/facility Injuries or fatalities to personnel and communities
Flooding	Typhoon-prone area Flood-prone/ topography of area Complex weather systems	Destruction of project equipment/facility Injuries or fatalities to personnel and communities
Storm Surge	Typhoon-prone area	Destruction of project equipment/facility

	Complex weather systems Intense rainfall, wind and high tides	Injuries or fatalities to personnel and communities

A safety officer shall be designated by the proponent who will regularly conduct safety briefings as well as periodic emergency response drills. The safety officer will also supervise the daily safety performance of operations and maintenance procedures. He will inspect the work and crew situation and ensure maintenance of and compliance to safety guidelines. Aside from the occupational safety accidents, the project area is also exposed to a number of geologic hazards such as ground shaking, liquefaction, and storm surges.

The potential incidents and emergency situations that may be encountered in the future operation of the proposed project are detailed in Table 3-1. Furthermore, depicted in Figure 3-1 is a schematic diagram for the emergency response procedure and the roles and responsibilities of necessary personnel enumerated in Table 3-2.

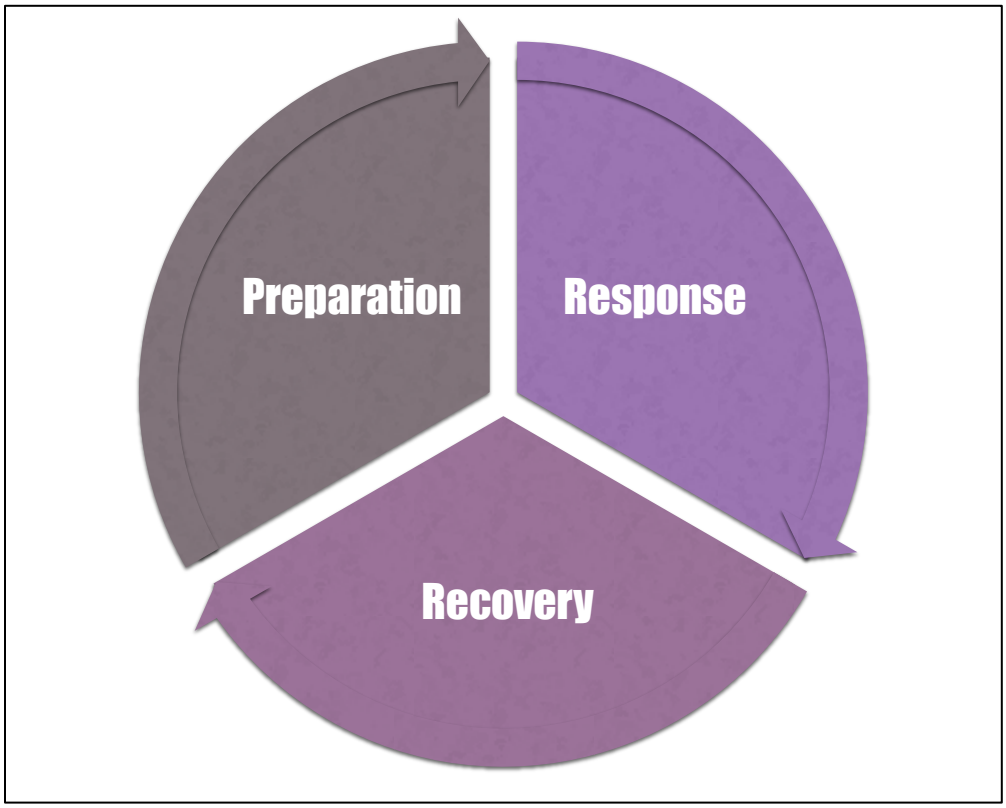


Figure 3-1 Emergency Response Procedure

The emergency response procedure begins with PREPARATION wherein actual plans are developed should an emergency occur as such, eliminating and avoiding hazards from happening. However, in the even that such emergency occurs, there is a need to conduct RESPONSE by executing the prepared plans and procedures. After which, there must be a retrieval of important assets and restoration of the site/project to its original state or prior to the emergency, this refers to RECOVERY.

The list of key personnel for emergency response operation may be reduced or increased depending on the size of the project or scope of the emergency. Additionally, the use of Incident Command System (ICS) as provided by the national Disaster Risk Reduction and Management Council (NDRRMC) Memorandum Circular No. 04-2012 may also be recommended given that the proponent aspire to adapt a framework of an appropriate and suitable model for on-scene disaster response and management system.

Table 3-2 Key Personnel for Emergency Response Operations

Emergency Response Personnel	Roles and Responsibilities
Leadman (Incident Commander)	Overall in-charge of operations during an emergency Provides direction and orders to the response team in managing an emergency Informs supervisor/project manager about the incident
Supervisor/ Project Manager	Assists at the site when necessary Know the condition of the people involved in the emergency, assesses the situation, and give instruction to the First Aid Team as needed Inform the family/ies concerned, and provide information of hospital location and other necessary details
Safety Officer	Supervises daily safety performance of operations and maintenance procedures including emergency response procedures Conduct DOLE-required compliances on Occupational Health and Safety (OSH)
Liaison Officer	Secure necessary permits and training certification for all personnel
First Aid Team	Conduct the actual response, rescue and retrieval of personnel and equipment during emergency Calls for ambulance or needed specialists to immediately assist case when necessary
Logistics Team	Provides the necessary supplies and equipment for the First Aid Team

	Provides additional support/assistance as may be necessary to emergency response

3.3.1.1. Muster points for Evacuation

The muster points that will be developed during the operations stage would be placed in open area and will be as follows. This will be where evacuation points where the people will converge during emergencies when staying in the building will be difficult.

Figure 3-2 Muster points for emergencies

3.5. Guidelines for the Prevention, Alleviation or Response to Emergency Situations

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

3.5.1.1. Occupational Health and Safety

3.5.1.1.1. Company Safety and Health Policy

The proponent shall ensure that its contractor(s) will implement Company safety Policy which serves as the guiding principle in the implementation of safety and health programs onsite. The policy includes the contractors' policies on occupational safety, worker's welfare and health, and environment. The Safety Policy includes the commitment that the contractor(s) will comply with the Department of Labor and Employment (DOLE) minimum safety requirements, reporting requirements of the Occupational Health and Safety Standards (OSHS), and other relevant DOLE issuances:

- Registration (Rule 1020 and D.O. 18-02)
- Report of Safety Committee Organization (Rule 1040)
- Notification of Accidents and Occupational Illnesses (Rule 1050)
- Annual Work Accident/Illness Exposure Data Report (Rule 1050)
- Annual Medical Report (Rule 1960)

3.5.1.1.2. Overall Safety Guidelines for Construction and Operation

- All operations to be undertaken shall be carried out in accordance with international legislations and approved procedures. Reference should be made to the 'Project HS&E Plan' and the Risk Assessment and Tool Box Talk Procedure within the QHSE Manual.

- The lifting of equipment is always an occasion when the potential for accidents is particularly high, personnel are therefore reminded of the need for extra vigilance and safety awareness to avoid any accidents or injuries. Prior to the conduct of any lifting operation, reference should be made to the Project specific Risk Assessments for any identified risk related to lifting operation.

- All Personnel working in Construction or operation will as a priority undertake the Company 'Safety Briefing' before being allowed to undertake any work in the site
  - The appointed 'Safety Officer' (2nd Engineer) will be available for consultation regarding any safety issues during any operational phase of the project.

  - The consumption of Alcohol during construction will be prohibited and during operations will be as per the Company Drug & Alcohol Policy.

  - The Company operates a 'Permit to Work' under its Management System. All work by contractors will require a completed permit before work can commence.

- The Company operates a Personal Protective Clothing & Equipment system. The system defines the minimum standards of protective clothing to be worn when any person is undertaking work in connection with the various operations within the construction and operation phase. The system is depicted in tabulated form in various locations around the site.

- The Company is required to assess the risks to health and safety arising out of its normal work activities. A Risk Assessment (RA) is the process of hazard identification, consideration of any existing controls and then estimation of the resultant risk. Prior to any procedure being undertaken the Project Risk Assessment should be referenced and actioned accordingly.

- Toolbox Talks will be conducted during shift handovers, between supervisors and all personnel under their supervision. This should include crane drivers, cable engine drivers and any third-party personnel likely to be involved in the activities ongoing.

3.5.1.1.3. Safety and Health Personnel

The following are the requirements for the different personnel relating to the Occupational Health and Safety Program (OSHSP):

- First-aid personnel: should be certified by the Philippine National Red Cross with a valid PNRC ID Card.
- Safety Officers: must complete the 40-hour BWC prescribed safety and health course as required by Rule 1030 of the OSHS, as amended by DO. 16. All full-time safety personnel shall be accredited by the BWC pursuant to DO. 16.
- Physicians and nurses: must complete the BWC prescribed course on occupational safety and health course, pursuant to Rule 1960 of the OSHS.

3.5.1.1.4. Specific Duties and Responsibilities of the Safety Officer

Specific duties and responsibilities of the safety Officer are outlined in Rule 1047 of the Occupational Safety and Health Standards (OSHS).

3.5.1.1.5. Applicable Safety and Health Promotion and Continuing Information Dissemination

- Information dissemination or advisories to the new employees prior to on-site assignment, e.g., conduct of safety orientation, company's health and safety policies, hazards related to the job, safety measures, safe work procedures.
- Programs on continuing education such as trainings and seminars, if any, that shall be given to employees, e.g., refresher course, first aid training, refresher course toolbox meeting, construction safety training for site safety officers.
- Arrangements for conveying information on safety and health IEC materials, e.g., Posters/comics/flyers, safety signage, handbooks/manuals, bulletin boards
- Arrangements for setting up sub-committees on safety and health, if necessary.
- Schedule of safety related activities, e.g., toolbox meeting, health and safety committee meeting.

3.5.1.1.6. Accident and Incident Investigation, Recording, and Reporting

- Investigation and recording of all accidents or incidences.
- Notification of the appropriate DOLE Regional Office within 24 hours in case of fatal accidents.

3.5.1.1.7. Environmental Control (Rule 1070 of the OSHS)

- Monitoring and control of hazardous noise, vibration and air-borne contaminants such as gases, fumes, mists and vapors
- Provisions to comply with minimum requirements for lighting, ventilation and air movement.

3.5.1.1.8. Guarding of Hazardous Machinery (Rule 1200 of the Standards)

- Provisions for installation/design of built-in machine guards
- Provisions for built-in safety in case of machine failure
- Provisions for guarding of exposed walkways, access-ways, working platforms

3.5.1.1.9. Provisions for and use of Personal Protective Equipment (PPE) (Rule 1080 of the OSHS)

- Appropriate type and duly tested PPEs to be issued to workers after the required training on their use
- Provisions for maintenance, inspection and replacement of PPEs

3.5.1.1.10. General Materials Handling and Storage Procedures (Rule 1150 of the Standards)

- Safe use of mechanical materials handling equipment
- Secured and safe storage facilities
- Regular housekeeping
- Clearly marked clearance limits
- Proper area guarding of storage facilities

3.5.1.1.11. Testing and Inspection of Electrical and Mechanical Facilities and Equipment

- OSHS Rule 1210 – Electrical Safety
- OSHS Rule 1220 – Elevators and Related equipment
- OSHS Rule 1410 – Construction Safety
- OSHS Rule 14150.10 – Training and Examination of Lifting Appliance

3.5.1.1.12. Workers Skills and Certification

- Provisions to ensure that workers are qualified to perform the work safely
- Provisions to ensure that only qualified operators are authorized to use and operate electrical and mechanical equipment

3.5.1.1.13. Provisions for Emergency Transportation Facilities for Workers

- OSHS Rule 1963.02 – Emergency Medical and Dental Services applies

3.5.1.1.14. Fire Protection Facilities and Equipment

- Fire protection facilities and equipment as required under Rule 1940 of the OSHS
- Proposed structure and membership of fire brigade
- Provision for training on emergency preparedness

3.5.1.1.15. First-Aid and Health Care Medicines, Equipment and Facilities

- Identification of the proposed first aid and health care facilities that the contractor will provide to meet the minimum requirements of OSHS.
- Identification of the medical and health supplies, such as medicines and equipment to be provided.
- Mandatory provision of first aid medicines and emergency treatment.
- In the absence of the required onsite health care facility, the contractor should attach a copy of a written contract with a recognized emergency health provider as required under the OSHS.

3.5.1.1.16. Workers Welfare Facilities

- Provision for toilet and sanitary facilities
- Provision for bathing and washing facilities
- Provision for supplying food and meals
- Provision for potable water for drinking and washing
- Provision for locker rooms, storing, and changing of clothes for workers

3.5.1.1.17. Proposed Hours of Work and Rest and Rest Breaks

- Work schedules, working hours, shifting schedules should be specified
- Frequency and length of meals and breaks
- Schedule of rest periods

3.5.1.1.18. Waste Disposal

- Method of waste management as per Republic Act 9003 otherwise known as the Ecological Solid Waste Management Act of 2000

3.5.1.1.19. Disaster and Emergency Preparedness Contingency

- Guidelines in responding to bomb threats
- Guidelines in emergency preparedness and response on vehicular/road accidents and ship accidents
- Preparedness and response for severe weather conditions
- Preparedness and response for fires and explosion

- Preparedness and response for earthquake
- Preparedness and response for accidents in workplace

3.5.1.1.20. Compliance to COVID-19 Inter-agency Task Force for the Management of Emerging Infectious Diseases Resolutions

Inter-Agency Task Force for the Management of Emerging Infectious Diseases (IATF) was established by the Philippine government to facilitate inter-sectoral collaboration to reinforce preparedness and ensure efficient government response to assess, monitor, contain, control, and prevent the spread of any potential epidemic in the Philippines.

The IATF issues these amended Omnibus Guidelines to harmonize and codify existing guidelines of the IATF and member-agencies pertaining to community quarantine, which shall be applied to all regions, provinces, cities, municipalities and barangays placed under community quarantine.

Hence, the project shall meet the minimum public health standards respective to the quarantine classification and stipulated LGU rules and regulations on interzonal and intrazonal movement.

- Strictly implement the required public health standards prescribed for offices/workplaces under the latest issued DOH Administrative Order/s and the DTI-DOLE Joint Interim Guidelines on Workplace Prevention and Control of COVID-19
- Notify public health authorities of employees and/or staff who show signs or symptoms of COVID-19; and
- Implement contact tracing in coordination with the DOH and the local government unit concerned in case their employees and/or staff have been exposed to COVID-19.
- Meet the prescribed interventions in various settings, such as offices/workplaces, depending on the risk severity grading of the Inter-Agency Task Force on Emerging Infectious Diseases (IATF-EID). For each prescribed intervention, concrete examples are such engineering control, administrative control, and PPEs.
- Secure equipment or vehicle entering the hub operational area that must go through a disinfection process.
- Maintain social distancing
- Commence alternative working arrangements, such as working-hour shifts, work from home (WFH), where feasible, and rotation may be implemented.

3.5.1.1.21. Safety Program

Provision for standard work procedures for the following activities:

- Excavation
- Use of power tools and equipment
- Gas and electric welding and cutting operations
- Use of hand tools
- Use of mechanized lifting appliances for movement of materials
- Use of construction heavy equipment

3.5.1.2. Fire and Explosion

Fire and explosion may result due to refueling and/or machine failure of the cable installation ships and may cause damages to nearby infrastructures and surrounding environment. It may also cause possible personnel injury and/or fatality and incur economic losses to the proponent. Below are some guidelines in avoiding and/or mitigating fires and explosion:

- Ensure good housekeeping, good work habits
- Conduct regular employee training and workplace inspection
- Conduct regular preventive maintenance and frequent inspection and testing of equipment and electrical systems
- Observe appropriate refueling standard operating procedures
- For all hazards, there must be a motorized ambulance or transportation with first aid facilities, stretcher, breathing equipment, capable wireless communication equipment and trained first aid personnel nearby the site as long as there is an on-going work.

If fire and explosion occur, below are the procedures to be undertaken:

- Any person or employee who will see the fire or explosion incident must take an urgent effort to notify its Safety Officer.
- The personnel/employee or the safety officer must activate the “fire alarm” and announce the situation.
- If the fire and/or explosion may not require escalated response, personnel must use fire extinguisher or other related fire suppression equipment present. Evacuation procedures must be undertaken regardless of the fire and/or explosion case.
- All injured personnel (if any) must be evacuated to a safe distance away from the scene. The safe distance shall depend on the gravity of the situation and purely discretionary based on trainings or existing guidelines.
- If the gravity of the incident is beyond the capacity of the key personnel, the liaison officer, or officer in charge must communicate with the local authorities (e.g., PCG, BFP, Local DRRMO) for appropriate immediate response

3.5.1.3. Oil Spill

As with most Installation activities, particularly hydraulic Installation, generating an overspill of fine solid material as a consequence of the activity. To avoid or minimize such incidences, the following important procedures will be followed:

- Ensure good housekeeping, good work habits
- Conduct regular employee training and workplace inspection
- Conduct regular preventive maintenance and frequent inspection
- Ensure regular motor vehicle pump maintenance – replace cracked or worn hydraulic lines and fittings before any operations
- Placement of oil tray or drip pan on engines.
- Avoid overflows while refueling

- Use/place absorbent pad or fuel collar to catch drips

If oil spill occur, below are the procedures to be undertaken:

- Ensure the availability and familiarity of personnel on oil spill preparedness program
- Depending on the gravity of oil spill, personnel must report incident to local authorities (e.g., DENR, LGU)
- If the spill can be controlled, particularly those that are less than 5 liters or less than 1 meter in diameter, personnel will control the spill using absorbent pads to prevent escape to water or further disperse in the water. For larger spills, cushion, where available, will be used instead of pads.

3.5.1.4. Storm, Typhoon, Tropical Depression, and Storm Surges

Since storms, typhoons and tropical depression cannot be avoided, the proponent through its contractor/s will ensure compliance to the updates readily available and provided by PAGASA. Advisories released by the Philippine Coast Guard shall be strictly followed. No ship shall sail if authorities declared as such.

Additionally, the following procedures shall be undertaken:

- Upon receiving advisories from authorities, key personnel will advise management and its workforce on the disturbance and possible cancellation of operation
- In the event hydrological signal (e.g., Typhoon, Storm) 1, if permitted to operate, faithful monitoring shall be exercised particularly if advisories will be elevated. Key personnel must also consider any additional advisories on possible storm surges.
- If signal further escalated, key personnel must communicate with the management for the proper operations shutdown until further notice.
- After any major weather disturbances, key personnel must determine the extent of damage if any, and make necessary arrangement for the repair of the damaged equipment/structure
- A thorough checking of all equipment specially those damaged by the typhoon shall be conducted for appropriate maintenance so that the ship and its equipment can be operated safely.

3.5.1.5. Earthquakes and Tsunamis

Another natural hazard that cannot be controlled nor anticipated are Earthquakes and Tsunamis. In the event of an earthquake, regardless of its intensity or how strong it is, key personnel need assessment whether to continue land-based activities if they are ongoing.

In the event of shaking, personnel will exercise the following procedure:

- STOP: all work must be secured and stopped as an initial response.
- DUCK/DROP: stay low, move and stay alert for possible falling debris, parts or any equipment
- COVER: cover head with helmet or any light but hard object for a cover such as under a table and under a column or vertical beam

- INSPECT: after shaking/tremor, inspect the place for any further danger. If there is a possibility of Tsunami, ensure that the ship can brace impact and equipment stowed for the highest possible mitigation of damage.

Additionally, the following procedures shall be undertaken:

- Provide first aid to injured personnel.
- In the event that injuries are life threatening or personnel require immediate advance medical attention or further emergency response, call for assistance from local authorities
- If other disaster such as fire/explosion, oil spill, etc. occur, refer to previous procedures
- After the event and no further advisories received, a comprehensive inspection must be scheduled on the structures and equipment to avoid further risks

SECTION 4.0 ENVIRONMENTAL MANAGEMENT PLAN

This chapter discusses the key environmental impacts and proposed management measures in relation to the Condominium construction and operations. The environmental management plans are identified per EIS module based on each phase of project development.

This chapter also outlines the Social Development Program, Environmental Monitoring Plan and the Institutional Plan to address and manage these impacts.

4.1. IMPACTS

4.1.1. The Land

4.1.1.1. Pre-Construction Phase

There are few adverse environmental impacts associated with the pre-construction phase as this is the stage for the construction preparation which includes the hiring of construction contractor, construction supervisors, suppliers, and permitting requirements. However, because activities with regards to social preparation, the impacts during pre-construction are mostly socio-economic impacts.

4.1.1.2. Construction Phase

During this period, the construction of the condominium buildings is not expected to change the landform of the site, while there is a need to stabilize the soil subsurface by pile driving. The proposed project will have minimal impact on the vegetation as the whole project site/area is paved. The key impacts of the project are the following:

- Soil disturbance and erosion, and
- Generation of solid wastes.
- Impacts due to Quarrying and Excavation of Construction Materials

Soil Erosion

During the site preparation and construction stage, the site will be cleared/grubbed, filled and leveled and the exposed soil will be subjected to wind and rain erosion. In case construction starts during the rainy season, soil erosion may be exacerbated in the absence of erosion control measures since finer soil materials are carried easily by surface runoff leading to drainage canals.

This impact will be short term, avoidable and relatively significant but reversible since the continued development of the project site will limit the exposed area to wind and rain erosion, and towards the end of construction period erosion will be minimized.

Generation of Solid Wastes

Generation of solid wastes is one of the most significant impacts during the construction phase. The solid wastes generated would generally include domestic waste from the accommodation quarters of the construction workers. The solid wastes if not properly disposed would impact on the sanitation of the

area and the surrounding community. This impact is short term, avoidable and reversible if proper waste segregation, handling and disposal are observed.

Likewise construction wastes shall be subject to a special solid waste management system and disposal. This shall be taken care of by the contractor as a contract responsibility.

Quarrying and Excavation of Materials

The Project requires significant amount of construction materials, coarse aggregates and fine aggregates.

The impacts of excavation of construction materials such as sand, gravel and rock for construction of this project on environment depend on the excavation process, hydrological conditions, rock types, climate, size and type of operations and topography.

Physical changes in soil, water and air associated with excavation activity affect biological environment directly and indirectly. The major impacts would be due to excavation and degradation of land around the quarry and the biotic life on it.

The following measures will be implemented to mitigate the impacts brought about by quarrying and excavation activities:

- The extraction of materials should be done only from the identified borrow and quarry sites.
- If new borrow and quarry sites are required, prior permission has to be taken from the owner.
- The quarry and borrow areas should be reclaimed back. The pits should be backfilled by construction waste and the sites should be stabilized.
- The topsoil from all should be preserved in stockpiles. Such stockpiles shall be utilized for redevelopment of borrow and quarry areas.
- Grasses and shrub species should be planted

4.1.1.3. Operations Phase

The impacts to the land during the operations phase are mainly due to solid waste generation. The condominium is expected to generate approximately 5,000 kg of solid waste per day, estimated at 0.50 kg per person from 10,200 residents and support staff. The condominium will implement a mandatory segregation policy in order to facilitate the collection of solid waste from the municipality.

4.1.2. The Water

The nearest bodies of water are the salt water / sea water areas at either side of the peninsula. These are the Puerto Princesa bay to the west and the Sulu sea to the east.

4.1.2.1. Construction Phase

During the construction phase, the identified impact on water resources is increase in surface run-off,

Increase in Surface Run-off

The subsequent filling up of construction site with soil to attain the desired (final) elevation grade will somehow expose a portion of the area to wind and rain erosion. It is important to note that the present ground condition, that is, paved/cemented will somehow induce flow to low lying section within and around the property limits.

The absence of any vegetation cover will therefore result in increased surface runoff that could contribute to soil erosion and siltation of natural and man-made drainage waterways. The silt-laden canals/waterways will eventually drain towards the sea which may contribute to the sedimentation of the receiving water body.

Aside from loose soil particles, surface run off can carry solid wastes that may be littering the construction area, unless disposed properly, as well as fuel residues that are leaked to the ground. This impact is short term and avoidable.

4.1.2.2. Operations Phase

Based on estimates, approximately 1136 to 1854 cubic meters of water will be used and about 800 cubic meters of wastewater will be generated daily during operation of the condominium complex. This, unless treated properly, will contribute to water quality degradation of the eventual receiving water body. Oil and grease contamination due to leaks from vehicles and from the Condominium equipment/facilities (gensets and other mechanical equipment) can happen if storm water drainage is not properly managed and waste materials are improperly contained.

The increase in organic loading may result in an unpleasant smell that can disturb the other residents and business owners in the area. The condominium complex is near a school (San Pedro Elementary), a hospital (Palawan Adventist) and several residential areas and the smell from any disturbance in the wastewater operations will affect these receptors.

Figure 4-1 Nearby establishments and residential areas

This impact will be long term, avoidable and reversible, especially because a sewage treatment plant (STP) will be installed to treat wastewater from the Condominium operations and comply with the DENR standards for any wastewater discharge.

4.1.3. The Air

4.1.3.1. Construction Phase

During the construction phase, the impacts on air environment are the following:

- Dust generation, and
- Noise.

Dust Generation

During the course of construction, the expected impact will be the generation of dust brought about by the various site activities. Sources of dust particles will be from earthmoving activities and from more frequent vehicular movement at the construction site. Fugitive dusts can be lessened if not contained by fencing the construction site/property limits and covering it with tarpaulin.

Noise Generation

The various construction activities are expected to generate noise. This is particularly significant, although the project site is located right across several subdivisions and establishments. Ambient noise will increase

temporarily and intermittently in the close vicinity of active construction fronts. These activities are expected to produce noise levels in the range of 97 - 105 dB(A) at a distance of about five (5) m from the source.

For the construction workers, the standards for noise were set by the Department of Labor and Employment (DOLE) based on the Occupational Safety and Health Standards. The 8-hour exposure limit set by the DOLE is provided for in Rule 1074:02 – Permissible Noise Exposure (Table4.1). Shorter exposure limits maybe allowed if hearing protection is worn, e.g., ear muffs or ear plugs. Noise impact will be short term and unavoidable.

Table 4-1 Permissible Noise Exposure.

Exposure Duration (Hours)	dBA
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
0.25	115*
0.125	Ceiling value - no exposure in excess of 115 dBA is allowed

4.1.4. The People

The following may be considered the positive socio-economic impacts of the project:

1. Development of an erstwhile empty/vacant lot into a Condominium establishment thereby generates higher real estate tax for the city.
2. Employment generation. During construction stage alone, an initial 200 workers will be required which will increase to 400 to 600 workers during the peak of construction stage.

During condominium operations, about 200 to 600 jobs from permanent, contractual to seasonal job placements may be expected for the residents

3. Indirect employment will be in the transport sector – tricycles, jeepneys and taxis; among the suppliers of aggregates; and among the informal sector like vendors opposite or near the Condominium.
4. During construction, vending (of food and other items) will likely occur as this happens in most construction projects.

Inherently, the operation of the Condominium will also have negative impacts or disadvantages:

1. Traffic generation – as more people will come to become residents of the area
2. Noise during construction.
3. Solid and liquid waste generation.

4.2. IMPACT MANAGEMENT PLAN

From the assessment of the key environmental impacts during the construction and operations phase of the project, the proposed mitigation measures were identified, and the summary of the Environmental Management Plan (EMP) is shown in Table ---- The impacts identified and the proposed management measures during the construction and operations phase are the following:

4.2.1. The Land

Hazards Management

Based on the hazards assessment of the project site, earthquakes and flooding due brought about by typhoon are some hazards that may be experienced in the project site.

Earthquakes can induce liquefaction on ground surface. The proponent will conduct soil investigation to determine the underlying rock layers and determine the appropriate engineering measures to protect the integrity of the facilities.

In case earthquakes occur, commotion among customers can happen which can cause injuries. The condominium shall be equipped with adequate and properly designed exits to allow rapid evacuation of residents. Safety signs shall be provided along prominent points to orient customers on safety procedures. The Public Address system shall be regularly checked to provide timely advisory and announcement to residents and visitors.

Soil Erosion

To prevent soil erosion during the construction phase, the project site should be enclosed during construction. Surface run off should be diverted towards the periphery of the construction area and directed towards a temporary impounding pond to decant silt. In the absence of natural low-lying area to

serve as silt ponds, sand bags shall be placed along the edges of construction site to serve as temporary siltation ponds.

Only areas needed for the construction will be opened/cleared to minimize exposure of the soil to natural elements. Construction should start during the drier months. Likewise, storage for construction materials should be provided with adequate drainage.

Generation of Solid Wastes

Area for temporary waste disposal and materials recovery will be designated in the project construction area. All workers shall be oriented on waste segregation and proper waste disposal. All used materials in the construction will be sorted as to reusable and recyclable and will be sold to recyclers.

Temporary sanitary facilities will be provided for the construction workers on-site.

After construction, the Condominium management shall implement a solid waste disposal program. Non-compliance of the procedures and conditions of waste management plan of the residents may be subjected to fines. Waste segregation shall be strictly implemented particularly food wastes and non-food waste for separate disposal. Further, an area shall be allocated where the solid wastes from the Condominium will be collected and stored prior to hauling for disposal.

The volume of solid wastes including the hazardous wastes such as busted bulbs, oil contaminated materials shall be accounted for and reported in the Self-Monitoring Report and submitted to the DENR.

4.2.2. The Water

Hazards

Unsuitable soil materials shall be disposed of off-site and far from any waterways to prevent blockage of existing drainage and cause temporary flooding that can damage property, cause injuries or traffic congestion. The drainage canals and natural waterways should be regularly de-clogged to prevent soil erosion during periods of heavy rainfall.

Increase in Surface Runoff

It is important to start site clearing and excavation activities during the drier months. Prior to site clearing and earthworks, sediment control measures shall be put in place, such as silt traps/ponds, and sand bags within and around the area where there are on-going activities.

Surface runoff coming from other areas shall be diverted from the construction site to decrease volume of runoff by installing diversion canals. All water draining from the construction site should first pass through the silt traps and ponds.

Loose soil materials including construction materials shall be stockpiled in areas away from waterways. Sand bags shall be installed to contain soil erosion. Mud-laden tires of delivery trucks and other vehicles shall be washed prior to leaving the construction site to prevent soil materials from contaminating the

surrounding areas, especially along the road. All wash water shall be directed towards a temporary impounding facility to decant silt prior to discharge to drain canals.

Deterioration of Surface Water Quality

Excessive siltation due to earth movement in the project site during construction will cause an increase in the concentration of suspended materials in runoff water even if located at a distance from the project site. Measures that will prevent soil erosion and siltation include construction of silt traps along waterways within and as needed in the construction site.

The workers accommodation including the sanitary facility shall be provided with at least 2-chambered septic tanks. The water draining from the septic tanks may be diverted to flow through a constructed settling pond to further help filter wastewater.

Vehicles/equipment shall be parked in a designated parking area. Drainage from this parking facility shall be engineered to prevent runoff. Should there be leaks, contaminated soil should be removed and stored to prevent surface runoff from carrying the spilled materials.

During Condominium operations, each building will be equipped with its own SBR sewage Treatment Plant shall be installed and operated. The STP will utilize the Sequencing Batch Reactor (SBR) type of treatment which ensures that wastewater is treated prior to release towards the city's sewer line. Regular maintenance of the STP shall be done to ensure that it is able to function efficiently and fully. Sludge shall be collected and disposed of appropriately.

Grease traps shall be installed to kitchen sinks in the Condominium to prevent oil and grease mixing up with other wastewater in the treatment system. Likewise, an oil interceptor shall be installed in the engine and equipment room to contain any spillage of oil contaminated materials and the like.

4.2.3. The Air

Air Pollutant Emissions

Minimal equipment/machinery will be used in construction. The generation of air pollutants can be mitigated by regular maintenance of the equipment/machinery. The use of low sulfur fuel is also encouraged for the contractors.

Dust Generation

Dust generation will occur during land clearing. This is an unavoidable impact but can be addressed. Dust pollution can be mitigated by selective clearing to minimize the exposure of soil to wind erosion. The construction site should also be enclosed in order to limit and somehow arrest dust movement within the construction site.

Regular watering of exposed soil shall be done to further prevent dust generation. All vehicles leaving the construction site, particularly the tires, shall be washed to prevent loose soil materials from dirtying the access roads.

Vegetation surrounding the construction site will be maintained to provide barrier to dust and to slow down wind speed.

Noise Generation

Noise generation will be a result of operating construction equipment and from movement of workers and materials in the job site. The construction noise will disturb the residents and communities nearby. To manage the noise from equipment/machinery, the use of mufflers and other noise reduction devices is recommended.

Whenever possible, construction will be limited during daytime hours.

4.2.4. The People

To maximize the benefits from the positive impacts and to address the expected negative impacts, the following are the recommended measures:

1. The Condominium management should give priority in hiring to qualified and willing residents of Puerto Princesa especially the nearby barangays of San Pedro, San Miguel, and San Manuel.
2. Implement a solid waste management program.
3. Implement "safety in the Condominium" program through information dissemination and drills (fire and earthquake).
4. In coordination with the City Traffic Management Office implement a traffic management plan.
5. Coordinate with the barangay on matters pertaining to peace and order.
6. Tighten security in the Condominium and its facilities including in the parking lots. Provide adequate lighting in open areas and parking spaces.
7. To minimize power demand during Condominium operations, more efficient lighting system will be used.
8. Solar energy may be considered to power other equipment.
9. Re-use of treated water for watering plants, cleaning and others can be done.
10. Regular check-up of distribution pipes and toilet facilities shall be done to ensure that leakages are minimized.

Traffic Management Plan

Current traffic within the roads of the site is not heavy considering that the area is mostly residential and most of the traffic occurs at the Puerto Princesa North Road to the east of the proposed development. Most of the logistical requirements for the construction will pass by Lansanas road as provided below

Figure 4-2 Roads around the site. Lansanas road to the south of Cas Mira

The movement of materials will be along Lansanas road only and there will be no parking spaces to be utilized along the road since there is ample parking spaces within the property since the open spaces to be landscaped later is large. There is anticipated to be very little effect to traffic as most of the material movement will be done at night or will be coordinated with the City Development Office to determine when the least traffic will occur

Figure 4-3 Map showing traffic movement in the site

Table 4-2 Summary of Environmental Management Plan

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
Construction Phase						
The Land						
Clearing and grubbing	Aesthetics and Visual Effects	Change in the aesthetic character of the area	Proper stockpiling of excavated material.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
Cut and fill		Modification of land forms	Provision of erosion control measures such as riprap, retaining walls	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
Stockpiling of temporary construction spoils		Soil erosion/Sedimentation	Provision of erosion control measures such as riprap, retaining walls, and reforestation of the watershed	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Change in physical and chemical properties of soil	Can be minimized by proper disposal of waste that may contain harmful chemicals to the soil	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
			In line with the rain reforestation program of the Government, native or indigenous species would be used in the replacement/reforestation activities, as much as possible. Re-introduction of dipterocarps would be pursued			

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
The Water						
Stockpiling of temporary construction spoils		Sedimentation in downstream and upstream of creeks and rivers	Provision of sediment control structures.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Increase in surface runoff	Provision of diversion structures that will prevent the siltation of drainage canals	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Need of water supply for construction workers	Can be supplied by local water district (Puerto Princesa Water District)		Part of construction cost	part of construction budget / allocated through contract with contractor
The Air						
Clearing and grubbing	Climate and Air Quality	Dust generation/Increase of suspended particulates during construction	Can be minimized by keeping the construction area with enough moisture. Placing of dust netting will also be done	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Contribution to GHG emissions	GHG emissions of the project are not that significant, it is recommended, however, to implement reduction and adaptation programs related to GHG emissions	Reduce carbon footprint during project construction by a) implementing vehicle fleet management, b) use heavy equipment and trucks that are fuel efficient, and c) reduce vehicle trips as necessary.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
			Offset GHG emissions by implementing a reforestation program for the project.		Part of construction cost	part of construction budget / allocated through contract with contractor
Operation of heavy equipment		Increase in concentration of gas pollutants (gaseous emissions from vehicles)	Keep vehicles' engines in good running condition. Implement a periodic maintenance scheme	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Noise/Vibration	Increase in noise level due to vehicles and to noise/vibration producing equipment	Select routes that will avoid populated areas. Provide silencer for mufflers of vehicles.		Part of construction cost	part of construction budget / allocated through contract with contractor
The People						
Employment of workers	Population	Increase in population due to in-migration of people could trigger social conflicts between residents and construction workers	Give priority to the people of the project area in hiring construction workers.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Labor and Employment	Generation of employment and other economic services	The hiring of construction workers will open up employment in the project area.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Health and Sanitation	Spread of communicable diseases from migrant workers	Make routine medical check-up on workers. Disinfection of waterlogged areas.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
		Increase in solid and liquid waste	Provision of waste disposal facilities in campsites.		Part of construction cost	part of construction budget / allocated through contract with contractor
		Generation of noise and health pollutants	Select routes that will avoid populated areas. Provide silencer for mufflers of vehicles.		Part of construction cost	part of construction budget / allocated through contract with contractor
	Waste Management					
		Solid waste generation and problems of storage/disposal	Use excavated materials as filling materials as much as possible.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
		Wastewater generation	Provision of drainage facilities.	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
	Operation and maintenance of heavy equipment	Oil and gasoline	Locate proper sites for garage and for maintenance of vehicles	*CLI*	Part of construction cost	part of construction budget / allocated through contract with contractor
Operational/Maintenance Phase						
The Land						
Operation and maintenance of facilities	Aesthetics and Visual Effects	Change in (improved) visual quality	The visual quality will improve with further industrial activity			

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
	Ground stability	Decrease of ground stability due to runoff and erosion	Provision of erosion control measures such as riprap, retaining walls, etc. whenever necessary.			
The Water						
		Contamination and depletion of surface and groundwater	Ensure the proper operation of the wastewater treatment system such that wastewater will be minimized.			
The Air						
	Climate	Change in micro-climate of area affected. Decrease in heat sink due to the development of built-up areas	This impact is due mostly to the effects of climate change and urbanization which increases temperature within the city			
	Air quality	Dust generation due to increase in traffic volume	Can be minimized by observing speed limits.			
		Increase in GHG gases due to operation of generators and cooking devices				
The People						
	Population	Increase in population due to migration of workers	Limit the hiring of additional workers from outside of the area.			
	Labor and Employment	Generation of employment and other economic services	Additional employment required for operation	Qualified workers in the area		

Project Phase/Environmental Aspect	Environmental Component Likely to be Affected	Potential Impacts	Options for Prevention or Mitigation* or Enhancement	Responsible Entity	Cost	Guarantee / Financial Arrangements
	Livelihood and Income	Change in revenue generation of the community	Revenue generation is expected to increase with the increase in income	Entrepreneurs in the area		
Abandonment Phase						
The Land						
Removal of Structures	Community Safety	Spills of hazardous substances	Undertake Environmental Site Assessment of the property before reuse	CLI	Part of abandonment cost	part of construction budget / allocated through contract with contractor

4.3. Social Development Framework

CONCERN	Responsible Community Member/Beneficiary	Government Agency/Non-Government Agency and Services	PROPONENT	Indicative Timeline	Source of Fund
Advocacy campaign on health, nutrition, and environmental sanitation	Barangay Chairman Barangay health worker Barangay nutrition worker	LGU/Municipal Health Office	CLI	Before project construction	LGU fund & Project fund
	Barangays covered by the project		CLI	During project construction	
				After project construction	
Livelihood/Employment /Credit Facilities	Association officers	LGU/Municipal Planning	LGU/Municipal Planning	During project construction	LGU fund DSWD
Health & Safety: provision of training on emergency response	Chairman on Health Barangay Tanod	LGU/Municipal Health Office	LGU/Municipal Health Office	During project Construction	LGU Fund
	Barangays covered by the project	PNP		After project construction	
Education: provision of scholarship	Chairman on Education	Department of Education	CLI	After project construction	Project fund
Environment & Sanitation	Chairman on Environment / Sanitation and Health	LGU/Municipal Health Office	LGU/Municipal Health office	After Project Construction	LGU Fund & Project fund
Tree planting	Barangays covered by the project	ENRO			
Waste management		PNP			
		CLI			

CONCERN	Responsible Community Member/Beneficiary	Government Agency/Non-Government Agency and Services	PROPONENT	Indicative Timeline	Source of Fund
Peace and Order	Chairman for Peace and Order	LGU PNP	LGU	Before project construction	LGU Fund
	Irrigators association officers			During project construction	
	Barangays covered by the project			After project construction	

4.3.1. IEC Framework

Information, Education and Communication (IEC) Program will guide the management of CLI to effectively disseminate crucial information to advise the communities and concerned stakeholders about its plans for environmental protection and the health and safety of its homeowners/condominium owners and other residents in the area. The IEC program will focus on the environmental management and monitoring plans, Social Development Plan and other project deliverables to benefit the communities. This will serve as the blueprint on how and when the participating entities would get the correct and educated information about the project and how they can contribute to the realization of the identified environmental plans and programs.

The IEC calls for transparency on the part of the company in dealing with the stakeholders on environmental issues which affect them. Community relations will be proactive and social development activities will be institutionalized.

Table 4-3 IEC Plan

Target sector for IEC	**Major Topics**	**IEC strategy/Method**	**Information medium**	**Indicative timeline/frequency**	**Indicative cost**
Barangays near the site / City of Puerto Princesa / PCSD / Palawan provincial	• EIS report • ECC • ECC compliance reports	meetings	Compliance/ monitoring reports Consultation meetings	Pre-Installation and Installation Phase	P25,000 initially then P10,000 per quarter
Barangay officials, RHUs, commercial establishments, business owners	How to enhance the e-commerce opportunities brought by the project	Focus group discussions Seminars/ workshops	consultation meetings Focus group discussions	Pre-Installation and Installation Phase	P10.000/ meeting

4.4. Emergency Response Policy and Generic Guidelines

Emergency Response Plans for the irrigation facilities have to be fully coordinated and complementary to the disaster risk preparedness plans of the local community. This includes such disasters as floods and earthquakes, both of which may be the result of damage to structures of the condominium. While no rupture of the complex is expected, even with strong earthquakes, the public and the LGU have to be prepared for such emergency response planning.

4.4.1. Philippine Emergency Response Planning

In 2009, the Congress enacted the Climate Change Act of 2009 and in 2010, RA 10121 or the Philippine Disaster Risk Reduction and Management (PDRRM) Act. These twin laws on DRRM have common goals and objectives: 1) to increase the resilience of vulnerable communities and the country against natural disasters and 2) to reduce damage and loss of lives and properties due to disasters. In particular, RA 10121 provides for the development of policies and plans and the implementation of actions and measures pertaining to all aspects of DRRM, including good governance, risk assessment and early warning, knowledge building and awareness raising, reducing underlying risk factors, and preparedness for effective response and early recovery. The law acknowledges that there is a need to "adopt a disaster risk reduction and management approach that is holistic, comprehensive, integrated, and proactive in lessening the socioeconomic and environmental impacts of disasters including climate change, and promote the involvement and participation of all sectors and all stakeholders concerned, at all levels, especially the local community.

The National Disaster Risk Reduction and Management Council (NDRRMC) is a body empowered to perform policy-making, coordination, integration and supervisory functions, as well as monitor the preparation, implementation and evaluation of the National DRRM Plan (NDRRMP) to ensure the protection and welfare of the people in times of disaster.

RA 10121 or the PDRRM Act of 2010 has expanded the membership of the previous NDCC from 19 to 44 members. The former NDCC, as chaired by the Secretary of National Defense, was composed of Cabinet Secretaries and Heads of Agencies with major contributions to disaster response. The new law transformed the NDCC to the NDRRMC, which is still headed by the Department of National Defense (DND) but with four Vice-Chairpersons, namely: the Secretary of the Department of Science and Technology (DOST) for disaster prevention and mitigation; the Secretary of the Department of the Interior and Local Government (DILG) for disaster preparedness; the Secretary of the Department of Social Welfare and Development (DSWD) for disaster response; and the Director General of the National Economic and Development Authority (NEDA) for disaster rehabilitation and recovery.

Aside from government agencies, the Council's membership now includes financial institutions, local government leagues, the private sector and civil society organizations (CSOs) which reflects the "Whole of Society" approach on disaster risk reduction.

The NDRRMC is supported by the DRRM Council (DRRMC) Networks (Fig. 8-1).

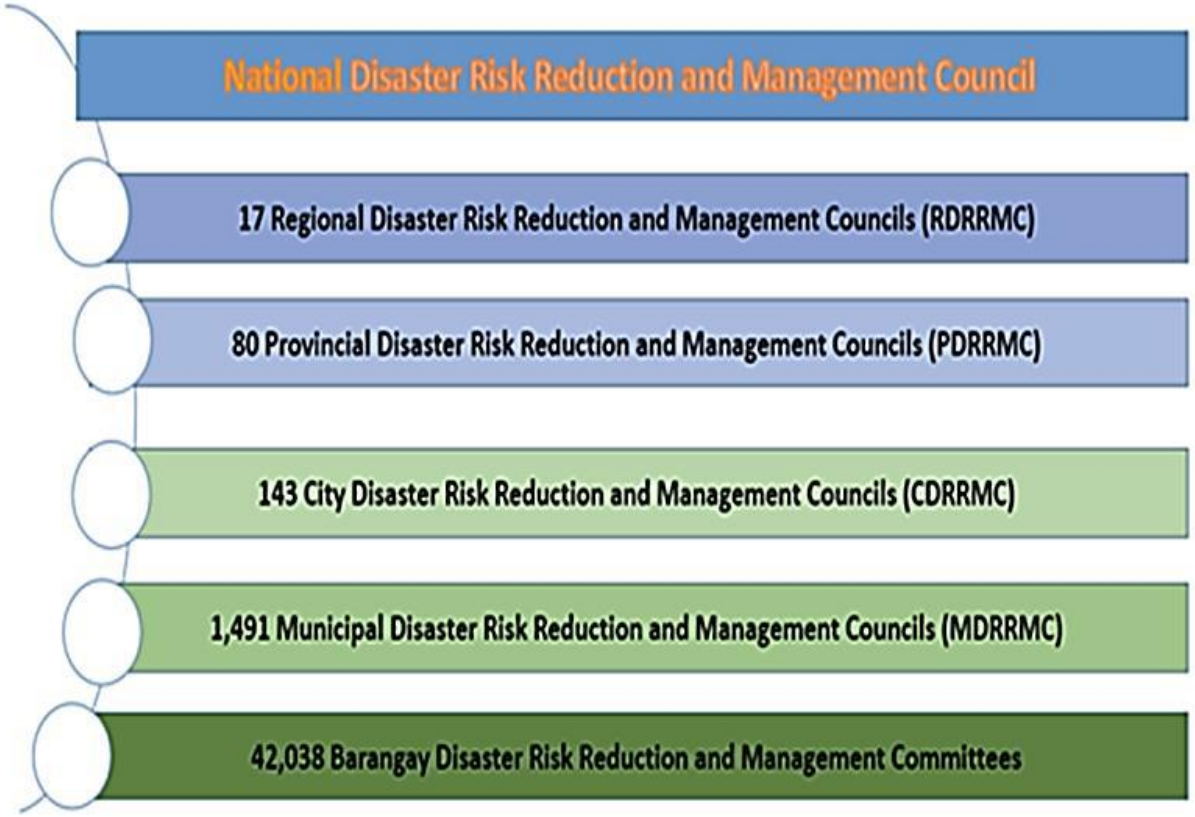


Figure 4-4 the Disaster Risk Reduction and Management Council Network

The council is replicated in the regional down to the barangay level, thus linking all disaster-related offices and LGUs which have specific roles to play in disaster management.

The RDRRMC3 is tasked to coordinate, integrate, supervise and evaluate the activities of the Local DRRM Council (LDRRMC). It is responsible in ensuring disaster-sensitive regional development plans and, in case of emergencies, shall convene the different regional line agencies and concerned institutions and authorities.

The LDRRMC is primarily tasked to take the lead in preparing for response and recovery from any disaster and its effects based on the following criteria:

- The Barangay Disaster Council, if a barangay is affected;
- The City/Municipal DRRMC, if two or more barangays are affected;
- The Provincial DRRMC, if two or more municipalities are affected;
- The Regional DRRMC, if two or more provinces are affected;
- The NDRRMC, if two or more regions are affected.

The NDRRMC and intermediary LDRRMCs support the LGUs who are in the frontline and have the primary responsibility of responding to disaster. The NDRRMC and LDRRMCs set the coordination mechanisms and policies for the private sector and civil society groups.

The present structure under a cluster approach is a National Coordinating Council, headed by the DND Secretary, where heads of the various DRRM agencies sit as board members. Our recent experience with typhoon Yolanda led us to take a serious look at the limitations of the ad hoc NDRRMC, its networks and secretariat, the OCD, in dealing with the vast and critical issues brought about by disasters.

4.4.2. Municipal Disaster Risk Reduction and Management Plan

The City of Puerto Princesa already has its own City Risk Reduction and Management Office. There are already flood management plans and procedures. This has to be coordinated with the residents of the condominium units so that they are made aware.

The role of the LGU is to spearhead the disaster risk management team in cases of disasters and insure that people are evacuated rapidly, and injuries are kept to a minimum. The local government must have enough resources available for evacuation in cases of hazards and disasters.

4.4.3. Role of the Condominium Administration / Association

The Condominium association has responsibility for managing the building's safety, and in particular has responsibility for:

- Regular monitoring and visual inspection of the condition of their systems.
- Reporting incidents and/or potential emergency situations to the local government, who shall assess the situation and contact provincial and regional councils for incidents with potential for escalation of consequences.
- Resolving emergency situations, as far as practicable,
- Implementing initial stages of emergency procedures until, where relevant.
- Providing the initial timely and accurate notifications to the CDRRMC to assist them in making timely and accurate decisions regarding their warning and evacuation responsibilities.
- Management of existing resources to make the buildings safe and minimize any impacts to the community.

4.5. Abandonment Decommissioning Policy

This section serves as a guideline preparatory to Abandonment/Decommissioning in case necessary. It would only be probable if and when the Sierra Valley Condominium have reached the end of its projected life or in case other unforeseen events (market demand, natural disasters, regulatory judgment, etc.) cause the project to cease from operating. Although the structures are not expected to be decommissioned in the next 50 years or so, this plan of action would be better in place to ensure that ceasing or closure of the condominium would not cause unforeseen negative environmental and socio-economic effects.

4.5.1. OBJECTIVES

Sierra Valley structures are expected to remain in operation for the next 50 or more years. To prepare for the abandonment, or at least few years prior to actual decommissioning, a new assessment in terms of the environmental cost or benefits will be prepared. The decommissioning plan or program should cover the operations and maintenance costs, cost/benefit analysis of decommissioning and future environmental considerations. The plan should have following objectives:

- Mitigate the remnant contamination on land, air and water due to the condominium's and its facilities ceasing of operation. It must clean up areas within and outside of the premises;
- Rehabilitate or restore to normal the disturbed areas occupied by the residents infrastructures and facilities; and
- Conduct comprehensive monitoring and evaluation after decommissioning the findings of which shall be communicated to the community and LGUs.

4.5.2. GENERAL DESCRIPTION

The Abandonment Plans for the project include the following basic activities:

- Conduct a review of Environmental Impact Assessment (EIA) prepared for the project to be able to determine the condition of the environment and communities living near it;
- Review the Monitoring Reports and conduct a new and separate assessment of the actual impacts caused by the project and the planned management measures;
- Consult with host communities regarding their expectations; and
- Review the contracts entered into by the proponent including its workers to determine other legal responsibilities.

The following details should include:

1. The true and real description of the project and its components
2. Detailed programs of activities, work schedule, costs, sources of funds and institutional responsibility including the company officials who would be responsible for the implementation;
3. Listing of condominium facilities, structures and other assets that may be salvaged. Indicate plans for re use of these assets and facilities including the scheme of protection for these facilities.
4. Previous and most recent monitoring reports on environment, social and public health;
5. Options of livelihood alternatives for host communities including the employees to minimize dislocation as a result of project abandonment;
6. Environmental, social and economic projections of host communities years after the company has abandoned the project
7. Action plan of CLI and concerned authorities on severance benefits and dislocation compensation.
8. Proper documentation and accounting of chemicals and other materials utilized during the operation of the wastewater treatment, waste oils and etc. including the MRF;
9. Altered areas must assure the adaption to the existing land-use.

4.6. Environmental Monitoring Plan

4.6.1. MMT Framework

4.6.2. EGF and EMF Fund Commitment

The Environmental Guarantee Fund (EGF) refers to the fund to be set up by CEBU LANDMASTERS and readily accessible and disbursable for the immediate clean-up or rehabilitation of areas affected by damages, if any, resulting in the deterioration of environmental quality as a direct consequence of a project's construction, operation or abandonment. It will likewise use to compensate parties and communities directly affected by the negative impacts of construction or operations, or to fund community-based environment related program including, but not limited to, information and education and emergency preparedness programs.

Since the CEBU LANDMASTERS Project will be building a condominium complex within the built-up area of the city, there will be minimal environmental damage, but which will be within the limits as will be expected for construction activities in the area. The proposed amount for the EMF is P400,000 which will be replenished early as required for monitoring activities. For the EGF, the amount proposed is P500,000.

The amount will be subject to review and approval of EMB Region 4B and shall be replenished, if necessary.

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

- 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.
- the conduct of scientific or research studies that will aid in the prevention or rehabilitation of accidents and/or risk-related environmental damages; or
- for contingency clean-up activities and the necessary IEC and capability building activities to significantly minimize or buffer environmental risk- related impacts.

Key Environmental Aspect per Project Phase	Potential Impacts per Envt'l Sector	Parameters to be monitored	Sampling & Measurement Plan			Lead Person	Annual Estimated Cost	EQPL Management Scheme					
								EQPL Range			Management Measure		
			Method	Frequency	Location			Alert	Action	Limit	Alert	Action	Limit
CONSTRUCTION PHASE													
Construction of condominium units	Degradation of surface water quality	Color, Turbidity, TSS, pH, DO, BOD, COD, Nitrates Oil & Grease and Pb and PCB	In-situ sampling , grab sampling and laboratory analysis	Quarterly		PCO Analysis by a Third-party consultant	Include in monitoring budget	Surface Water Quality for Class C as stipulated in DAO 2016-08/2021-19/2021-19 DENR Standard Limit for Class C as stipulated in DAO 2016-08/2021-19/2021-19for Surface water pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 6.0 mg/L O&G – 1.8 mg/L Pb – 0.03 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19/2021-19: pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 42 mg/L	Surface Water Quality for Class C as stipulated in DAO 2016-08/2021-19/2021-19: pH 8.0 – 8.2 DO – 5.5 mg/L (Min) TSS – not more than 20% increase of the baseline data BOD – 6.5 mg/L O&G – 1.9 mg/L Pb – 0.04 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19/2021-19: pH 7.5 – 8.0 DO – 5.5 mg/L (Min) TSS – not more than 10% increase of the baseline data	Surface Water Quality for Class C as stipulated in DAO 2016-08/2021-19/2021-19 pH 6.5 – 8.5 DO – 5.0 mg/L (Min) TSS – not more than 30% increase of the baseline data BOD – 7 (10) mg/L O&G – 2.0 mg/L Pb – 0.05 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19/2021-19 pH 7.5 – 8.0 DO – 5.0 mg/L (Min)	Reconsider flow rate and rate of particle settlement from treatment ponds to ensure effectiveness	Addition of embankment and control measures to reduce runoff	Conduct immediate de-silting of ponds Establishment of additional aeration ponds

								O&G – 4.25 mg/L Pb – 0.085 mg/L	BOD – 45 mg/L O&G – 4.50 mg/L Pb – 0.090 mg/L	TSS – not more than 10% increase of the baseline data BOD – 47.5 mg/L O&G – 4.75 mg/L Pb – 0.095 mg/L			
	Increase in ambient noise level	Noise level (dB)	Noise Meter	quarterly	Worksite and established monitoring stations	PCO Third party consultant					Identify other of possible source of noise Issuance of ear plugs	Maintenance, adjustment or replacement of mufflers and installation of noise reduction apparatus	Change of equipment or noise minimization device Limit operations during daytime hours
	Generation of solid waste	Volume of solid waste generated including volume recycled and disposed of	Estimation of volume	Weekly	Within plant site and adjacent area	PCO	Include in O&M budget	Foul odor from the site	Sighting of pest such as rats and roaches	-	Review of housekeeping practices when pests are present at holding areas Spread of disease to surrounding areas	Pest eradication Immediate clean-up and disposal of accumulated wastes	All wastes should be contained and disposed to an accredited waste hauler and disposal facility
	Generation of hazardous wastes	Volume and types of hazardous wastes generated	Estimation of volume	Weekly	Within plant site and adjacent area	PCO	Include in O&M budget	Generation of more than 5 m^3/week	Storage of 5 m^3/week	Storage of more than 5 m^3/week	Engage the services of an accredited hauler and treater	Install a secure and leak proof temporary storage facility	
	Threat to workers / public health and safety	Safety record, accident/ fatality incidence/ occurrence	Record keeping	Daily	Construction area	Safety officer	Minimal cost	Increase in frequency of non-lost time accident	Occurrence of non-fatal lost time accident	Occurrence of fatal lost time accident	Conduct quarterly safety briefing and orientation to laborers and workers	Conduct daily inspection of construction area	Work stoppage along accident area and identify proper safety measures and

											Installation of safety signages along accident prone areas within the construction site	Conduct daily briefing on safety program	implement specific safety procedures and protocol
	Social impacts	Number of jobs generated for locals, training programs and other social development programs	Record keeping	Monthly	Barangays Camugao and Camansi	PCO and ComRel	Minimal cost	Number of locally hired employees fall down to less than 40% of the total workforce	Number of locally hired employees fall down to less than 20% of the total workforce	No locals are employed by the company in the last six months	Review hiring policies Review SMR programs and determine reasons for the poor implementation of the program	Implement more skills training program to empower residents Identify alternatives for the program to improve accomplishment	
	Complaints Management	Number of valid complaints	Record keeping	Weekly	Plant site	PCO and ComRel	Minimal cost for record keeping	Formal complaint submitted can be resolved at the ComRel level	Intervention from the Management is needed to resolve a formal complaint	Complaint is broadcasted over mass media	Institution of grievance system Conduct IEC to inform and justify the activities being undertaken during construction	Notify Admin for complaint and take remedial measures to address complaints Investigate all complaints, conduct dialogue with communities and implement mitigating measures	Conduct in depth investigation and identify root cause for valid complaints Institute measures to avoid occurrence of similar problems Compensate affected communities
Operations Phase													
Operations of the	Degradation of surface water quality	Color, Turbidity, TSS, pH, DO, BOD, COD, Nitrates Oil &	In-situ sampling , grab	Quarterly		PCO	Include in monitoring budget	DENR Standard Limit for Class C as stipulated in	DENR Standard Limit for Class C as	DENR Standard Limit for	Conduct maintenance of the WWTP	Temporarily stop effluent discharge	Stop milling operations

condominium Property		Grease and Pb and PCB	sampling and laboratory analysis			Third party consultant		DAO 2016-08/2021-19 for Surface water pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 6.0 mg/L O&G – 1.8 mg/L Pb – 0.03 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 6.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 42 mg/L O&G – 4.25 mg/L Pb – 0.085 mg/L	stipulated in DAO 2016-08/2021-19 for Surface water pH 8.0 – 8.2 DO – 5.5 mg/L (Min) TSS – not more than 20% increase of the baseline data BOD – 6.5 mg/L O&G – 1.9 mg/L Pb – 0.04 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 5.5 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 45 mg/L O&G – 4.50 mg/L Pb – 0.090 mg/L	Class C as stipulated in DAO 2016-08/2021-19 for Surface water pH 6.5 – 8.5 DO – 5.0 mg/L (Min) TSS – not more than 30% increase of the baseline data BOD – 7 (10) mg/L O&G – 2.0 mg/L Pb – 0.05 mg/L Effluent Quality for Class C as stipulated in DAO 2016-08/2021-19: pH 7.5 – 8.0 DO – 5.0 mg/L (Min) TSS – not more than 10% increase of the baseline data BOD – 47.5 mg/L O&G – 4.75 mg/L Pb – 0.095 mg/L	Reconsider flow rate of treated effluent from the STP to the discharge canal	and re-assess holding capacity of the pond and treatment method	

	Degradation of ground water quality	Color, Turbidity, TSS, pH, Nitrates Oil & Grease and Pb and PCB	In-situ sampling , grab sampling and laboratory analysis	Quarterly		PCO Third party consultant	Include in monitoring budget	pH 7.5 – 8.0 TDS – 425 mg/L Nitrates – 0.026 mg/L Pb – 0.0085 mg/L	pH 8.0 – 8.2 TDS – 450 mg/L Nitrates – 0.028 mg/L Pb – 0.009 mg/L	pH 6.5 – 8.5 TDS – 475 mg/L Nitrates – 0.029 mg/L Pb – 0.0095 mg/L	Conduct maintenance of the WWTP Reconsider flow rate of treated effluent from the STP to the discharge canal	Temporarily stop effluent discharge and re-assess holding capacity of the pond and treatment method	Stop milling operations
	Generation of solid and hazardous waste	Volume of solid, oil sludges and sludges form the WWTP, hazardous waste generated	Record keeping of generated solid and hazwaste, mode of disposal and volume disposed or reused and recycled	Monthly	Hazardous waste storage facility	PCO DENR-accredited hazwaste treater	Include in O&M budget	Accumulation of solid and hazardous wastes	Evidence of leakage, spillage or signs of damage of hazardous waste containers	Complaints from workers and communities	Continuous collection, treatment and disposal by DENR-accredited hazwaste treater	Reduction on the use of materials that are potential source of hazardous wastes Immediate disposal or treatment of hazardous wastes	Use of alternative materials which are more environment friendly
	Air Quality Degradation	Ambient PM-10, TSP,	ambient air monitoring for PM-10, TSP, Stack sampling for PM10 and TSP	Quarterly (stack is semiannual)	at stablished sampling sites	PCO	Include in O&M budget	DENR Standard Limit as stipulated in the IRR of Clean Air Act for ambient concentrations: TSP – 184.5 µg/Ncm PM-10 – 120.5 µg/Ncm Stack sampling PM10 – to be determined TSP - to be determined	DENR Standard Limit as stipulated in the IRR of Clean Air Act for ambient concentrations: TSP – 207.5 µg/Ncm PM-10 – 135.5 µg/Ncm Stack sampling PM10 – to be determined TSP - to be determined	DENR Standard Limit as stipulated in the IRR of Clean Air Act for ambient concentrations: TSP – 230 µg/Ncm PM-10 – 150 µg/Ncm Stack sampling PM10 – to be determined		Temporarily halt operation and do corrective measures Conduct of maintenance of equipment/ machinery identified as the source of pollution Increase frequency of water spraying	Stop operations and resume only when corrective measures were in place Replace equipment that emits high concentration of pollutants or use better fuel Increase frequency of water spraying

										TSP - to be determined			
	Increase in ambient noise level	Noise level (dB)	Noise Meter	Monthly	Plant site and residential areas	PCO	Include in monitoring budget	inside the work area: 77 dBA	inside the work area: 81dBA	inside the work area: 86 dBA		Maintenance, adjustment or replacement of noise reduction apparatus	Change of equipment or noise minimization device Limit operations during daytime hours
	Threat to workers / public health and safety	Safety record, accident/ fatality incidence/ occurrence	Record keeping	Daily	Facility sites, access roads, stockyard	Safety officer	Minimal cost	Increase in frequency of non-lost time accident	Occurrence of non-fatal lost time accident	Occurrence of fatal lost time accident	Conduct quarterly safety briefing and orientation to laborers and workers Installation of safety signages along accident prone areas within the construction site	Conduct daily inspection of work site Conduct daily briefing on safety program	Work stoppage along accident area and identify proper safety measures and implement specific safety procedures and protocol
	Social impacts	Number of jobs generated for locals; training programs; and other social development programs	Record keeping; Social Impact Assessment	Monthly	Host communities and secondary impact areas	PCO and ComRel SIA Third party consultant	Minimal cost	Number of locally hired employees fall down to less than 40% of the total workforce SDP falls below 80% of target	Number of locally hired employees fall down to less than 20% of the total workforce SDP falls below 80% of target	No locals are employed by the company in the last six months SDP falls below 40% of target	Review hiring policies Review SDP and determine reasons for the poor implementation of the program	Implement more skills training program to empower residents Identify alternatives for the SDP projects to improve accomplishment	
	Complaints management	Number of valid complaints	Record keeping	Daily	Host communities and secondar	PCO and ComRel	Minimal cost	Formal complaint submitted can be resolved at the ComRel level	Intervention from the Management is needed to resolve a	Complaint is broadcasted over mass media	Institution of grievance system Conduct	Notify Admin for complaint and take remedial	Conduct in depth investigation and identify root cause for

					y impact areas				formal complaint		regular IEC to inform and justify the activities being undertaken	measures to address complaints Investigate all complaints, conduct dialogue with communities and implement mitigating measures Compensate affected communities	all valid complaints Institute measures to avoid occurrence of similar problems

4.7. Institutional Plan for EMP Implementation

Current DENR guidelines provide for the appointment of a Pollution Control Officer (PCO) to oversee the pollution control program of an establishment that discharge solid, liquid, or gaseous wastes to the environment or whose activities, products, or services are actual or potential sources of land, water, or air pollution (Sec 3 of DENR Administrative Order 2014-02 or the Revised Guidelines for Pollution Control Officers Accreditation). These mitigation and enhancement plans shall be implemented by an Environmental Management Office (EMO) that will be organized by the Proponent. The EMO shall be managed by an Environmental Officer (EO) in order to effectively implement the measures contained in the EMP.

In Philippine EIS System, Proponents are enjoined to study previous undocumented environmental issues and long-term impacts in their environmental management program, and by allowing the allocation of a portion of the Environmental Guarantee Fund (EGF) for independent studies and research. The Proponent can adopt such a framework and devote, now a portion of the resources of the company intended for its social development program for research on the environmental impacts of irrigation projects.

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SECTION 6.0 ANNEXES

6.1. SEC Articles of Incorporation

6.2. Signed and sealed Site Development Plan / Vicinity Map

6.3. Photographs of the site

6.4. LGU certification on Zoning Compatibility of the project site

6.5. Proof of Authority over the project site

6.6. Proof of Public Consultation and Participation

6.7. Barangay Endorsement

6.8. Barangay Resolution

6.9. Laboratory Analysis Results of Water Samples

6.10. Laboratory Analysis Results of Ambient Air Sample

6.11. Duly accomplished Project Environmental Monitoring & Audit Prioritization Scheme (PEMAPS) Questionnaire

6.12. Technical Scoping Checklist

6.13. Original Sworn Accountability Statement of the Proponent

6.14. Original Sworn Accountability Statement of Key EIS Consultants

6.15. Original Sworn Accountability Statement on PEMAPS Questionnaire

6.16. Copy of Perception Survey Form

6.17. Geohazard Identification Report

6.18. CAAP Clearance

6.19. SEP Clearance

6.20. Waste Water Plan

6.21. Power Supply Certification

6.22. Water Supply Certification

6.23. Performance Specification of Proposed Sewage Treatment Plant