1. Project Description

The Long Point Nickel Mining Project of the Berong Nickel Corporation is a mining operation expansion over the areas originally explored by the ATLAS mining three (3) decades ago in barangay Apurawan, Aborlan, Palawan. The lifting of the moratorium on new mining permits paved way for BNC to push through its interest in Long Point Nickel Project which aims to explore, develop and utilize the 2,177.34 hectares and also support the government's thrust and policies toward sustainable economic recovery brought about by the pandemic.

The commodity to be mined is nickel laterite which is a product of an ultramafic material subjected to intense weathering and composed primarily of limonite and saprolite minerals at varying nickel content. The mining method is called strip/contour mining where the nickel laterite horizons are extracted from open excavations with a depth of 5 to 10 meters. The method employs several phases that include mine planning, survey, land clearing, overburden hauling, ore mining, and mine rehabilitation.

Through the use of exploration data, mine plans will be generated to guide the operations team on the location of ore and the design of the open excavation. The plan takes into account the road base parameters, slopes, mining limit, location of stockpile, equipment, workforce, target output per period and other auxiliary support requirements to run the operation.

The project is expected to create employment opportunities in the various phases of its operations (exploration phase - 200 personnel, construction phase - 200 personnel, and operation phase - 2,000 personnel) with a proposed capital investment cost of PhP 1,100,000,000.00 at an extraction rate of 1,000,000 DMT of lateritic nickel ore per annum.

This Environmental Impact Statement Report for the proposed Long Point Nickel Mining Project of the Berong Nickel Corporation presents the executive summary of the report. This is followed by the project description which includes the purpose and physical characteristics of the project or activity, the land use requirements and other physical features of the project during construction, when operational, and after the project has finished or ceased its operation; baseline characterization and assessment of environmental impacts which includes the various parameters in the environment surrounding the project including the flora and fauna, soil, water, air, landscape, policy, economic environment and others; environmental management plan; Environmental Risk Assessment (ERA) & Emergency Response Policy and Guidelines; Social Development Plan/Framework (SDP) and IEC Framework; Environmental Compliance Monitoring; Decommissioning/ Abandonment /Rehabilitation Policy; and Institutional Plan for EMP Implementation.

a. Project Component

Table 1. Project Components

Project Name	Proposed Long Point Nickel Mining Project
Project Location	Long Point, Barangay Apurawan, Aborlan, Palawan
Total Project Area	2,177.34 hectares for mining
Nature of the Project	Mining Exploration and Operations

Project Type	Mining Category A: Environmentally Critical Project (ECP)
Commodity	Lateritic Nickel Ore
Proposed Extraction Rate	1,000,000 DMT per annum
Mining Method	Shallow Surface Mining / Contour Strip Mining

Project Components	No. of Units	Area (ha)/ Capacity (m^3)
Progressive Mining Area	1	441.30 ha
Support Facilities		
Haul Roads (from Mining Area to Pier)	1	0.203
Access Roads (within the Mining Area)	1	Approx. 4.45 km
Stockyard	1	20.72 has.
Fuel Farm	1	0.0250 ha./2,500 cu. M 92,000 liters of diesel, 4 tanks @23,000 capacity
Electrical Room/Power House	1	0.010 ha.
Operation Office	1	0.022 ha.
Compliance Office	1	0.018 ha.
HR/Admin Office	1	0.015 ha.
Finance Office	1	0.005 ha.
Conference Room	1	0.015 ha.
Assay Laboratory	1	0.042 ha.
Project Utilities		
Power Source		
Electric Cooperative	0	0
Genset Facility	1	0.0082 ha
Genset 1	1	360 kVa

Project Components	No. of Units	Area (ha)/ Capacity (m^3)
Genset 2	1	303 kVa
Water Source		
Deep Well	4	Approx. 50-60 m^3/day
Spring, rivers, creeks		
In-house Purification System	1	0.002 ha.
Mine Camp		
Amenities		
Badminton Court	2	0.26 ha.
Basketball Court	1	0.070ha
Recreational Facility	1	0.020 ha.
BNC Clinic	1	0.026 ha.
Guest House	1	0.009 ha.
Visitor's Quarter	1	0.009 ha.
Palace Building	1	0.0075
Corporate Retreat (2 storey)	1	0.037
Bunkhouse (46.5 sq. m per unit)	20	0.093 ha.
Water Station	1	0.002 ha.
Paint House	1	0.011 ha.
Dining Hall	1	0.030 ha.
Laundry House	1	0.005 ha.
Sampling Station	3	0.009 ha.
Guard House	4	0.005 ha.
Pier	1	0.47 ha
Wash Pad	1	0.006 ha.

Project Components	No. of Units	Area (ha)/ Capacity (m^3)
Pollution Control Structures/ Facilities/Devices and other Environmental Structures		
Settling Pond		
Area A	1	3.72 136,116 m^3
Area B	1	3.72 136,116 m^3
Interceptor Canal	2	0.17 has
Stockpile Area (1st mined out area)		
Topsoil	1	10.88 has 108,000 m^3
Subsoil	1	10.88 has
Overburden	1	10.88 has
Nursery Area	1	3.46 has 300,000
Sanitary Landfill	1	0.25 ha.
Environmental Shed/ Materials Recovery Facility	1	0.0182 ha. 364m^3
SDMP Stockroom	1	0.0039 ha.
Hazardous Waste Storage Facility	1	0.009 ha. 166m^3
Oil-Water Separators		28 m^3
Septic Tanks		205 m^3
Buffer Zones		20m inward from the mining tenement boundary and outward from the edges of the normal high waterline of rivers and streams that are within the mining tenement area
Manpower Requirement	The Long Point Nickel Mining Project is expected to create employment opportunities in the various phases of its operation: Exploration phase: 200 personnel	

Project Components		No. of Units	Area (ha)/ Capacity (m^3)
	Construction phase: 200 personnel Operation phase: 2,000 personnel		
Proposed Capital Investment Cost	Php 1,100,000,000.00		

b. Process/Technology

The mining method that will be employed is simple shallow surface mining or contour mining where the weathered nickeliferous ore horizons are extracted from open excavations averaging 5 to 10 meters in depth. The method employs several phases including land clearing, overburden removal, ore mining, and mine rehabilitation. Since the nickeliferous laterite horizons are the products of the natural weathering of the underlying ultramafic host rocks, extraction will be restricted to the material between the topsoil and the ultramafic parent rock.

The mine plans are established to guide the operations team on the location of ore and the design of the open excavation. The plan is based on the road base parameters, slope, mining limit, and location of stockpiles, equipment, workforce, target output for specific period and other auxiliary support requirements of the project.

An excavator will be use to dig a 3-meter cut bench to start the extraction of the limonite ore. The Grade Control team will conduct sampling across the channel, at every 5 meters interval. All samples collected will be sent to the laboratory for analysis. Once the results are out within the timeframe of typically 24 hours, the Grade Control crew will delineate the areas of low and high nickel values. This will guide the operators on actual digging.

Following the initial cut, the mine bench is prepared through surface matting using rocks and boulders. The application of these method will ensure ground stability for moving dump trucks. The resulting grade of assay will dictate the classification of the material loaded, and the specific location of stock delivery.

Daily and weekly production plan is prepared and coordinated with the engineering and production teams for scheduled delivery of ore to the stockyards. This work process of material recovery ensures that the least amount of error is incurred in the process.

The nickel and iron content of the stockpiled product shall be dependent on the buyer's specification. To comply with the maximum stockpile capacity, BNC only haul materials with scheduled shipment for buffer stocks. BNC will maximize the use of direct to barge shipping operation to reduce handling cost.

As mining proceeds, rehabilitation of mined-out areas will be progressively undertaken. Per DENR Administrative Order 2018-19, the maximum disturbed area at any one time for a nickel mining operation is dependent on the scale of production. BNC plans to produce up to 1.43 million WMT nickeliferous laterite ore per year. This equates to a maximum active mining area of 60 hectares, outside of ancillary and

rehabilitation of areas. Any area that exceeds the disturbed limit, an equivalent mined out area shall be rehabilitated. Fast-growing trees from seedlings provided by both company and contract nurseries will be routinely planted in the said areas.

The process from shallow surface mining to shipping will involve the following sequential steps as shown in Figure 2.

Generally, the area mined is established with an on-contour terrace or bench design. Mine haul roads will be developed initially on the natural topographic surface, constructed with the appropriate road base parameters for safe and efficient traffic ability.

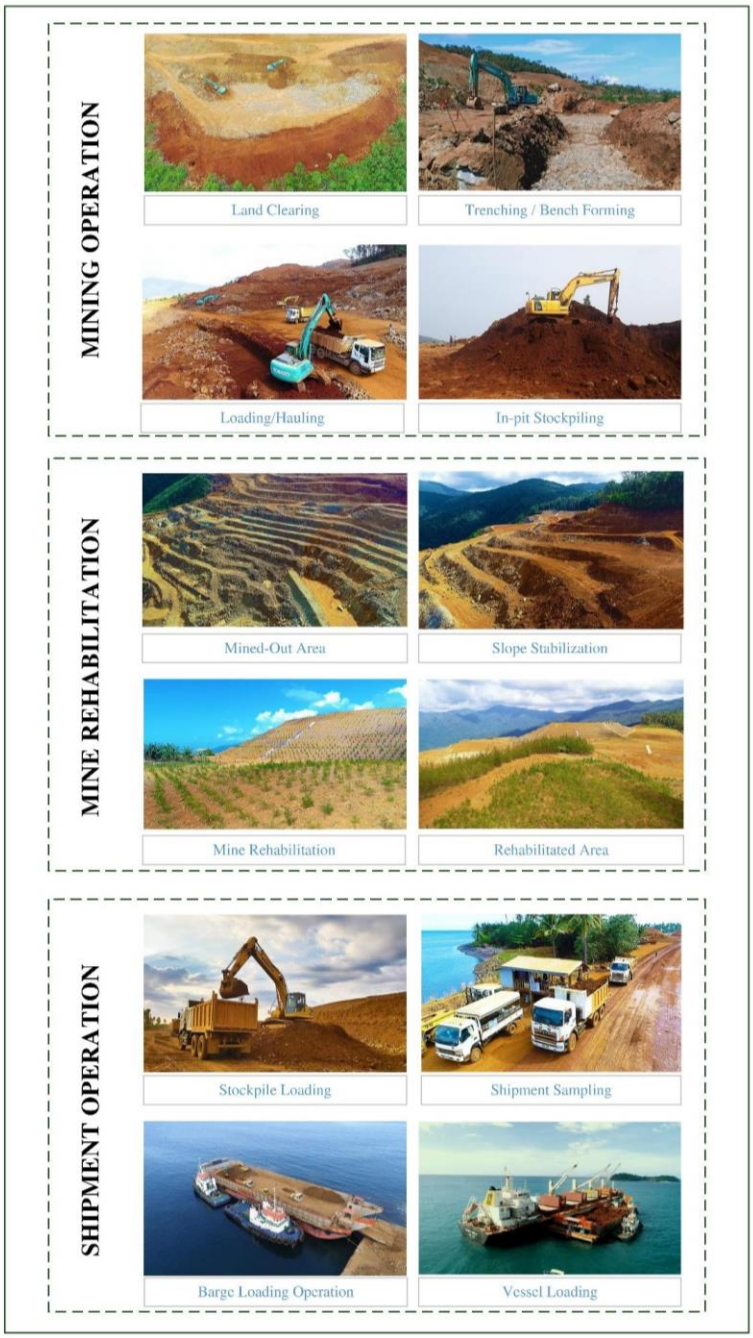

Figure 2. BNC Mine Process

C. Resource Utilization

There are no alternative sources for raw materials for project construction and operation. For power source at the project site the only alternative available is to use of generator sets since there is no local electricity

provider available and accessible to the project site. However, possibility of using renewable energy such as solar power is considered by BNC. For water source, deep well will be the main source and an in-house purification system will be installed. Rain water collectors will be installed in identified areas of the mine site.

Sources of power, water and other raw materials are not susceptible to ground shaking, liquefaction, rupture, earthquake and tsunami due to the nature of its geologic structure and Palawan has no active volcanoes, no active fault lines and no deep trenches surrounding the area.

2. Proposed Location

The BNC's proposed project is located at Long Point of Barangay Apurawan, Aborlan, Palawan. The area lies on the western coast of the municipality (Figure 1). Barangay Apurawan is the lone host barangay for Long Point while Barangay Culandanum is the only neighboring barangay. It is bounded on the east by Puerto Princesa City, on the west-by-West Philippine Sea, on the southwest by the municipalities of Quezon and Narra. It can be reached by land through a very accessible road passing through Napsan Road which passes through from the east coast to west coast through the mountains and travels south along the western coastline of the island of Long Point. The road is approximately 71 kms. and travel time is by 1 ½ to 2 hours. It can also be travelled via pump boat.

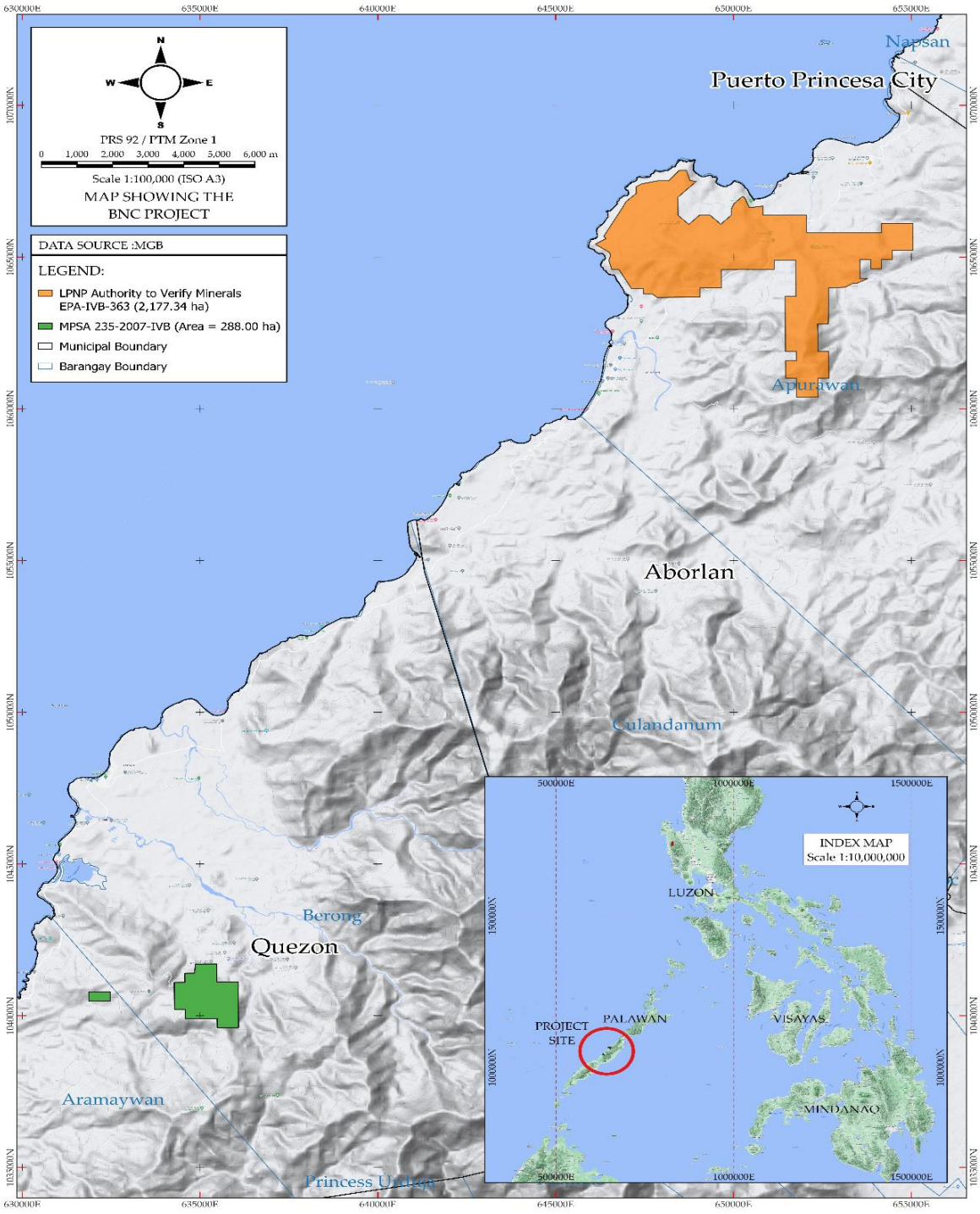

Figure 1. Map showing the location of the Long Point Nickel Mining Project

3. Project Proponent

Berong Nickel Corporation (BNC) is a Philippine Securities and Exchange Commission- registered joint venture company established in 2004 by Toledo Mining Corporation and Atlas Consolidated Mining and Development Corporation (ACMDC) of the Philippines. Berong Nickel Corporation has a management agreement with David M. Consunji Inc. – Mining Corporation (DMCI-MC), a wholly owned subsidiary engaged in ore and mineral mining and exploration to supervise and manage its activities especially on technical and financial aspects of mineral exploration and development of nickel laterite in BNC areas of interest.

The company was established to explore, develop, mine, operate, produce, utilize minerals and by-products in its properties. BNC holds a Philippine Department of Environment and Natural Resources/Mines and Geosciences Bureau-approved Mineral Production Sharing Agreement (MPSA-235-2007-IVB) over a 288-hectare area in Barangay Berong, Municipality of Quezon, Palawan Province, Philippines, including applications for Mineral Production Sharing Agreement/Exploration Permits (jointly with ACMDC and one with another associated company) in adjoining areas (Figure 1). It was issued an Environmental Compliance Certificate (ECC) No. 0507-008-301 by the DENR on 14 June 2006. Likewise, the Palawan Council for Sustainable Development (PCSD) issued SEP Clearance No. MEP-092921-055 to Berong Nickel Project on September 29, 2021.

The company started its progressive mine rehabilitation along with its mining operations in 2008. Currently, BNC has already rehabilitated and reforested a total area of four hundred thirty (430) hectares. These areas include the mine rehabilitation areas and mangrove areas. It has partnered with the DENR through the National Greening Program (NGP) and Mining Forest Program (MFP). Around a total of one million four hundred twenty-eight thousand two hundred three (1,428, 203) seedlings of various indigenous and other forest tree species have been planted in above mentioned areas and mechanisms. At present, BNC continues the progressive rehabilitation of its mined-out areas whilst producing various indigenous and native forest tree species to be planted in the rehabilitation and reforestation sites it has prioritized.

Over the past 16 years, BNC has built a solid reputation as a model company for responsible mining operations in Palawan. BNC was issued a SEP clearance in September 29, 2021 to open “Long Point” which was covered by the original areas explored by ATLAS mining way back 1990’s. The area is a new project under the same entity, located at Long Point, Barangay Apurawan, Municipality of Aborlan.

4. Project Timeframe of the Project Implementation

BERONG NICKEL CORPORATION
Long Point Nickel Project
Rate of Extraction and Time Table
June 13, 2023

Activities	Year 0				Year 1				Year 2				Year 3				Year 4				Year 5				Year 6				Year 7				Year 8				Year 9				Year 10			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Permitting																																											
ECC																																											
MPSA																																											
Port Permits																																											
STCP for Mine Area																																											
Infrastructure																																											
Access Roads																																											
Pier Facilities																																											
Base Camp Facilities																																											
Support Facilities																																											
Repair and Maintenance																																											
Site Development																																											
Clearing and Stripping																																											
Waste Hauling																																											
Waste Stockpiling																																											
Mine Access Roads																																											
Site Maintenance																																											
Mining @ 1Million DMT/Year																																											
Limonite Mining																																											
Saprolite Mining																																											
Rehabilitation																																											
Slope Stabilization																																											
Tree Replacement																																											
Safety & Health Implementation																																											
SDMP Implementation																																											
FRMDP Implementation																																											

Year one (1) will commence upon issuance of required permits. Rate of production will be at 1,000,0000 Dry Metric Tons Per Year of mixed Limonite and Saprolite Ore.

Figure 4. Project Timeframe and Project Implementatio5.

5. Summary of Baseline Characterization

Table 2. Summary of Baseline Characterization

Module	Summary of Findings
Land	
Land use and classification	The proposed Long Point Nickel Mining Project area has only two (2) existing land cover classification, the closed forest and the open forest along ultrabasic soils. Based on the 2021 revised ECAN map of the Municipality of Aborlan, most of the proposed mine area (2,033.46 ha) is within the controlled use zone. A small portion of the area falls under restricted use zone with an area of 148.88 ha. The proposed project is least likely to cause impact to the declared protected areas in the province of Palawan based on the analysis of its proximity made using the maps prepared (Figure 3) where the nearest is 29 km (Palawan Flora, Fauna, and Watershed Reserve) and farthest at 160 km (Malampaya Sound Protected Landscape and Seascape). The proposed Long Point Nickel Mining Project of 2,177.34 hectares covered by an approved Mineral Production Sharing Agreement (MPSA) entered into by the Berong Nickel Corporation and the Government of the Philippines through the Department of environment and Natural Resources. In several visits to the area, the presence of several light material and semi-concrete houses including make shift huts have been observed, indicating the presence of settlers. However, majority of these are abandoned and dilapidated. Conducted assessment of the area reveals no visually significant land formations and/or structures observed. The generation of solid waste in the area is minimal. Solid waste management is done at household level through solid waste segregation.
Geology and Geomorphology	The province of Palawan is known to be composed of two distinct terranes- the North Palawan Block, wherein the rocks are closely related to the Eurasian Plate, and the South

Module	Summary of Findings
	Palawan Block composed of Palawan Ophiolite Complex, believed to be joined together at Ulugan Bay Fault. The northern part of the province is usually composed of metasediments and some granitic intrusions, while the south is composed of mantle-derived rocks such as peridotite and harzburgite. The southern part of the province is also known for its being rich in nickel deposits. The province is also known to be aseismic, with no record of devastating earthquake occurring in the province for the last hundreds of years. The Long Point Nickel Project is located in the southwestern part of Puerto Princesa, accessible via a cemented national highway in 2-hour time. The geology of the area is composed mainly of ultramafic rocks, particularly the dunite, gabbro and the harzburgite. These ultrabasic rocks are of mantle affinity and are the rocks associated with nickel mineralization in the area. Due to their high nickel content, when these rocks become weathered, enrichment blankets also form where the liberated nickel, iron and other metals accumulate, that eventually become the laterite deposits. Structures in the area are generally NE and SW trending high angle faults and fractures, with some noted thrusts faults that enables local superimposition of lithologic units. The soils in the area are the Tagburos and Luisiana series which are found to be shallow to moderately deep and well drained clayey soil developed from volcanic materials and ultramafic protolith. They are usually very dark grayish brown to dark yellowish brown, with low to rarely moderate fertility and ph values ranging from 5.6- 6.2. With these types of soil, the vegetation cover of the area and the slope of the terrain, it was found out that the soil erosion potential for minimum, average and maximum precipitation conditions is of very low, with values of about 1.3046 tons/ year and 0.3511 tons per year for minimum precipitation conditions. Hazard-wise, the project is somehow safe from earthquakes and volcanic hazards. In other hazards identified like flood, liquefaction and tsunami, the mining tenement itself, due to its relatively high elevation and solid bedrock, is somehow safe from such. However, the low-lying areas adjacent to the tenement where settlement can be found is somehow at risk should there be instances that the mentioned hazards occur. Landslides in the tenement, can occur, with risks

Module	Summary of Findings
	ranging from moderate to high especially along steep slopes, while the settlement adjacent to the tenement have low risk of landslides due to flat surfaces.
Terrestrial Flora	Identified sampling stations were established on the ground with the purpose of assessing the floral components of the different forests and other vegetated ecosystems within and adjacent to Sitio Long Point. Five (5) sampling stations representing various vegetation such as natural forest stands and forest cover between secondary and brushland areas were mapped, identified, and marked on the ground. For each sampling station, two (2) 100-m transect lines with a width of 5 meters were located and randomly established. Each transect line was divided into 5 contiguous plots, each with 5 m x 20 m size. All individual tree species that are within the plots were identified and the diameter at breast height (DBH) were measured and recorded. One (1) 1 m x 1m subplot were randomly established within each plot to cover ground cover/understorey vegetation. Sampling stations 1 to 5 exhibited a general diversity index of 3.4503 for the entire sampling site based on Fernando's diversity scale. Sampling area 5 recorded the most diverse flora species, with a computed diversity score of 3.1042, indicating high diversity. Sampling areas 1, 3, and 4 showed moderate diversity levels, ranging from 2.7900 to 2.8374, while sampling area 2 had a low diversity index of 2.0044. The resulting biodiversity index per sampling sites and the overall biodiversity index in understorey species are from moderate - high and very high respectively. This means that, in the 5 sampling sites areas are highly diverse which means adapting to all environmental changes poses no issues and that resulting to a great stability and also this means that the community has a greater variety of species, and individuals are more evenly distributed among those species. Based on PCSD Resolution 15-521 and the 2014 updated list of terrestrial and marine wildlife in Palawan, categorized in accordance with RA 9147, also known as the Wildlife Resources Conservation and Protection Act of 2011, and DENR Administrative Order 2017-11, the following species are

Module	Summary of Findings
	classified as endangered: *Hopea acuminata* (Manggachapui), *Xanthostemon verdugonianus* (Mangkono), *Vitex parviflora* (Mulawin/molave), and *Guioa acuminata* (Pasi). Additionally, seven other species are classified as vulnerable: *Dipterocarpus grandiflorus* (Apitong), *Palaquim luzonensis* (Aripa/nato), *Diospyros pilosanthera* (Bolong eta), *Tristaniopsis decorticata* (Malabayabas), *Dillenia luzoniensis* (Malakatmon), *Calophyllum pulgarense* (Pangasaan), and *Swintonia foxworthyi* (Rimaraw). Measuring understorey plant species is important in forest assessments, as the understorey plays a crucial role in the overall health and biodiversity of a forest ecosystem. Understanding the composition, diversity, and dynamics of understorey vegetation provides valuable insights into the ecological functioning of forests. This information is essential for effective conservation, sustainable forest management, and the protection of ecosystem services provided by forests. The resulting biodiversity index per sampling sites and the overall biodiversity index are from moderate - high and very high respectively. This means that, understorey species in the 5 sampling sites areas are highly diverse which means adapting to all environmental changes poses no issues and that resulting to a great stability and also this means that the community has a greater variety of species, and individuals are more evenly distributed among those species.
Terrestrial Fauna	The study employed a systematic approach using two (2) 100-meter by 50-meter strip transects per sampling station, totaling ten transects across five randomly distributed locations. Each transect was surveyed by 3 to 5 individuals equipped with binoculars, GPS, steel tape, field guides, and other necessary materials. Avifauna species were observed through transect walks. Bird observations included direct sightings, vocalizations, and traces, complemented by mist nets for capturing birds and bats not observed during transect walks. Mammal species were assessed through direct observation, recording numbers and activities, and the use of live traps for smaller mammals. Herpetofauna species were observed through a combination of direct observation and opportunistic searches, given their cryptic nature. The same methodology was applied during both the wet and dry seasons to ensure consistency and comparability of data. Additionally, the conservation status was assessed based on the International Union for the Conservation of Nature (IUCN)

Module	Summary of Findings
	Red List category and PCSD Resolution No. 15-521. During the dry season, a total of 57 fauna species were documented across the five survey areas within established sampling sites. Among this overall count, 37 are classified as avifauna species, 13 fall into the herpetofauna category, and eight represent the observed mammalian population at the study site. The recorded fauna individuals amounted to 525 across the five established sampling stations. Based on the Shannon-Weiner diversity index, Sampling Station 2 exhibited a low diversity index of 4.88, according to the Fernando diversity scale. Sampling Station 3, with a diversity index of 4.89, was categorized as moderately diverse. Conversely, Sampling Stations 1, 4, and 5 displayed diversity indices of 3.20, 3.14, and 3.38, respectively, indicating high levels of diversity. The overall diversity index for the entire study site was calculated at H' = 3.56, signifying a remarkably high level of diversity. The majority of fauna species observed during the monitoring within the mining area and its surrounding habitat were assessed as Least Concern. Consequently, 56% of the fauna species are non-endemic to the country while 44% of the remaining species are Philippine endemic. The majority (56%) of these fauna species are experiencing a decrease, 33% are stable, and the remaining 11% have an unknown population trend. During the wet season, a total of 60 fauna species were recorded. Among these, 39 are avifauna species, 7 fall under the category of mammals, and 14 represent herpetofauna observed in the study site. The observations yielded a total of 843 individual fauna within the five established sampling stations. Based on the Shannon-Weiner diversity index, Sampling Station 2 recorded a diversity index of 4.88, while Sampling Station 4 had a diversity index of 4.99, both classified as moderately diverse according to the Fernando diversity scale. Sampling Station 1 displayed a diversity index of 3.41, Sampling Station 3 had 3.05, and Sampling Station 5 exhibited a diversity index of 3.53, all classified as high on the diversity scale. The overall diversity index for the study sites was computed at H' = 3.63, indicating a very high level of diversity. The majority of the recorded fauna species within the sampling sites and its surrounding habitat were categorized as Least Concern. A significant proportion, 60%, of the fauna species are non-endemic to the country, while

Module	Summary of Findings
	40% are Philippine endemic. Furthermore, 50% of these fauna species are experiencing a population decrease, 40% are stable, while 10% have unknown population trends.
Water	
Hydrology	The LPNP Project covers a total of 2177.4 hectares of land area for mineral exploration and extraction. This area, at least, have five (5) catchment areas identified with the largest being with the catchment of the Apurawan River, with a total area of 9872 hectares and the smallest having an area of around 256 hectares which only hosts seasonal streams in the area. The study was able to collect data from three (3) perennial streams that flow in the area and within its vicinity, with the largest being the Apurawan River, having a flow velocity of about 0.332 m/s, the Ilijan River, 0.277 m/s and the smallest of the three rivers, the Tagpalit River with 0.626 m/s, giving discharge values of 225.76, 33.24 and 12.4 m3 /s, respectively. Water balance was also calculated from the data gathered as well as precipitation and mean temperature data gathered from the site from 2006 to 2021. Precipitation trends confirms the presence of two climatic situation in the area, with dry season occurring from November to May, with May being the driest, and wet season starts from June and usually, precipitation peaks during September to November. Pre mining data and simulation revealed that the highest water deficit occurs during the month of April with about 8.6mm or about 1,412,034 m3, while the highest surplus values run to as high as 314.6mm or 51,555,660 m3 during the month of September. These values change slowly as the simulation includes the change in soil water holding capacity brought about by the mining activity as well as the factor of climate change. During mining without much change in precipitation and temperature changes, yield little change even with the change in soil water holding capacity already considered. However, with climate change factored in, at RCP 4.5, the deficit increased to 31.2 mm or 5,122,728 m3 and the surplus also decreased to 241.5mm or 39,651,885 m3. Deficit at RCP 8.5 drastically increased to 123.1mm or 20,211,789 m3 and the surplus also drastically decreased to 219.2 mm or 35,990,448 m3. The current ratio between the precipitation and the actual evapotranspiration rate is at 1.9 and is indicative of a good water balance condition in the area. With climate change considered, the extreme simulation data

Module	Summary of Findings
	placed the same ratio down to 1.4, wherein the precipitation is somewhat is higher than the actual evapotranspiration rate. The groundwater in the area is associated with unconsolidated alluvium found in the flood plains, starting from the foothills down to the sea. Mapping by the Mines and Geosciences Bureau identified that adjacent areas close to the mining tenement as highly productive aquifers, with flow rates of 50-100L/s to as much as 150L/s, which are relatively shallow, with actual groundwater depth ranging from 1.8-2.3 meters below ground level. With the area of unconsolidated alluvium measured at about 1142 hectares, an estimate of about 46,106,000 m3 volume of groundwater is in place. Possible use of water was established by the company from their previous operations for development phase and operation phase to be 44.8m3/day and 172.8m3/day, respectively and for the per capita consumption at 90L/day with 1114 household and an average of 5 persons per family, the settlement water consumption is at 501.1m3/day. With the water consumption figured, including during operation, the available water both surface and on ground seemed to be sufficient.
Oceanography	Generally, the hydrodynamics of coastal regions are influenced by a combination of natural and anthropogenic factors. These factors interact in complex ways, impacting the movement of water, sediment transport, and the overall dynamics of coastal environments. In the project, the part of the coastal area that will be affected by the operations is only the Pier Site. Once the operations commence, there will be no significant alterations in the hydrodynamic patterns in the coastal regions because of the depth (about 10 – 20 meters) and its composition (rocky and hard corals). The coastal integrity findings at test stations gives a good to excellent results which means that it has low vulnerability to erosion and damaged from tidal and storm events. The baseline current patterns in the coastal vicinity of Long Point were patterned on measurements done in Berong which is about 20 km from the Project site both located on the western coast of Palawan with similar hydrography and likely to have the same ocean current characteristics. Both are shallow with maximum depth of about 30 – 40 m, about 6 km from the coast. The sea bed is rocky and marked with shallow coral outcrops and some seagrass/seaweeds. The baseline current patterns have magnitude that ranges from 0.6 to 6.0 cm/sec

Module	Summary of Findings
	that generally moves toward the coastal area. The ebb current showed a generally north – northwest to north – northeast flow with magnitude range of 0.4 to 4.8 cm/sec. The drift current or mass movement of water was recorded at about 6.1 to 12.6 cm/sec, which estimates a drift current of 9.6 cm/sec for 80 minutes towards the south – southwest. The drift current that moves toward the north – northwest was measured at a ranged from 4.9 to 6.5 cm/sec, with a resultant drift of 4.9 cm/s within a 90 – minute period directed towards the north – northwest for Stations CM1 and CM2 respectively. For Stations CM3 and CM4, water movements the resulting drift currents are 6.2 cm/sec and 8.2 cm/sec towards the northwest and north – northwest respectively. At Station CM5, it is from 6.6 to 10.1 cm/sec with resultant drift for about 90 minutes at 8.0 cm/sec towards the east – southeast. The observed water movements for the five stations showed a drift distance of not more than 500 m (302 to 442 m) within an hour and half period. The spatial and temporal asymmetries in the hydrodynamic energy due to tides and wind waves contribute to landward and seaward sediment transport. The transport direction depends on differences in the magnitude and duration between the ebb and flood tidal currents. These ebb-flood differences are produced by the distortion of the tidal wave propagating on the shelf and in the estuaries. Switches from ebb-dominant to flood-dominant transport are sensitive to the local water depth, which can change because of sea level rise, changes in the magnitude of wind waves, and river runoff. Deposition and erosion of sediment results in continuous bathymetry changes, minimizing the spatial asymmetries in the hydrodynamic energy. In the project area, the difference in speed of flood current to ebb current is only 0.2 – 1.2 cm/s and considering that the project area is surrounded by mangroves, its coastal integrity is good to excellent, and tropical cyclones tracked from 1948 – 2015 ranges only from 1 – 2 to 5 – 6, which makes the change in bathymetry of the project site to minimum. Generally, the hydrodynamics of the coastal regions or nearshore areas are affected by the tidal current that flows towards the shoreline from the open waters. The difference in flood and ebb currents is only 0.2 to 1.2 cm/sec which indicates that particles will move at an approximate rate of 0.5 cm/sec away from the coast in the north – northeast

Module	Summary of Findings
	direction which means an accidental pollutant particle will not move towards the open sea but will only move towards the coastal regions at minimum pace.
Meteorology	The study emphasizes the importance of considering both the local micro-climate impact of a long-term project and the effects of climate change on the project. To assess climate change, the Climate Projection Map Interface (CliMap) developed by DOST-PAGASA was utilized. CliMap offers a platform to access climate data, including mean temperature and mean rainfall, over various time frames and scenarios. Mean temperature projections for Palawan indicate an increase in the medium-term (+0.9°C to +1.3°C) and long-term projections (+1.3°C to +2.6°C) under two Representative Concentration Pathways (RCPs): RCP 4.5 and RCP 8.5. Notably, RCP8.5 projects higher temperatures compared to RCP4.5, particularly evident in the long-term. The warmest months are June, July, and August for RCP 4.5, and March, April, May, as well as September, October, and November for RCP 8.5. Similarly, mean rainfall projections reveal a decline over the medium-term (-9.90% to -25.70%) and long-term projections (-15.2% to -32.20%) for both scenarios, with RCP8.5 showing lower rainfall than RCP4.5. The most significant decrease is expected during the wet season of March, April, May (MAM). The primary contribution of greenhouse gas emissions from the operations of the BNC (presumably a mining company) is anticipated to originate from engine exhaust, notably heavy equipment such as bulldozers, graders, backhoes, and dump trucks, as well as generator sets. BNC's estimates indicate that around 3,000,000 liters of diesel are needed annually to extract 1,000,000 metric tons of ore. Accordingly, the calculated CO2 emissions for the Long Point Nickel Mining Project amount to 8,091.59 tons of CO2 annually.
Groundwater quality	Predominantly, areas with low vulnerabilities (89.55%) are found in mountainous regions, notably in eastern and southeastern parts of Basins 2, 3, 4, 5, and 6. Steep slopes in these areas lead to rapid runoff, limiting contaminant infiltration into aquifers. Conversely, less steep areas show relatively higher vulnerability due to potential contaminant accumulation. Streams' locations coincide with higher vulnerability levels within the low vulnerability range (7.79%), notably around river mouths of Basins 5 and 6, and low-lying banks of Basin 3. These sites include populated areas, necessitating effective regulation to prevent worsened

Module	Summary of Findings
	vulnerability. The measured water table depth falls within the range of 1.8 to 2.2 meters, indicating that the aquifers are shallow and unconfined. Sampling was conducted at four wells to assess groundwater quality. Analysis revealed that, during both the dry and wet seasons, most water quality parameters met the prescribed levels set by DENR. Exceptions were observed in fecal coliform levels and Total Hardness as CaCO3. All samples exceeded the threshold of 1.1 MPN/100mL for Fecal Coliform, likely originating from anthropogenic sources. Additionally, Total Hardness as CaCO3 at two sampling sites surpassed guideline levels. To evaluate groundwater vulnerability to contamination, DRASTIC Modeling was employed. Results indicated low vulnerability in most areas within the identified basins, primarily located in mountainous regions. High and very high vulnerabilities concentrated in a specific area—the coastal community center, where a significant portion of the Barangay's economic activities is situated. Elevated vulnerability indices in this region are primarily attributed to the flat terrain and the aquifer and vadose medium, both composed of alluvium. These areas demand attention due to potential untreated effluent introduction from human activities.

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Freshwater Quality	Marine water samples were collected from seven (7) stations, both during the dry season and the wet season. These samples underwent on-site analysis for temperature, pH, conductivity, salinity, and TDS using a Multiprobe meter (model) at all seven stations. Dissolved oxygen, oil and grease, TSS, BOD, and heavy metals (Hg, Pb, Cd, As, Cr6+) were analyzed at Ostrea Mineral Laboratories, Inc. The results of the marine water sample analysis conducted across the seven (7) sampling stations were compared against the DENR 2016-08 Class SC standards for both dry and wet seasons, utilizing various analysis methods and instruments. The biochemical oxygen demand (BOD), pH, and total suspended solids in marine water samples conform to the prescribed limits outlined in DAO 2016-08 Class SC marine water. Dissolved oxygen levels are slightly elevated across all sampling areas during both the dry and wet seasons, compared to the typical range of 6.0 to 7.0. Monitoring dissolved oxygen in the region holds great importance as it serves as a key indicator of water quality and is essential for the survival of fish and other aquatic organisms. The sole secondary parameter (Organic) assessed across all sampling stations is oil and grease, and the findings indicate that it falls below the standard values, remaining within the limits outlined in DAO 2016-08 Class SC marine water for both the dry and wet seasons. These low values of the parameter signify the absence of significant marine water contamination, even in proximity to residential wells and due to reduced boat traffic in and out of all sampling stations. All five secondary parameters (Metals), including Arsenic, Cadmium, Chromium, Lead, and Mercury, were found to be below the guideline values specified in the relevant standards of DAO 2016-08 Class SC marine water for both the dry and wet seasons. While these secondary parameters (metals) remain within acceptable levels prior to the commencement of mining activities.

Module	Summary of Findings
Microbiological Assessment of Marine Water	Surface marine water samples were collected using sterile polyethylene plastic bottles and stored in thermal insulation polystyrene boxes or ice chests. A 500 ml sample of marine water was taken from each of the seven (7) stations and homogenized in a sterile container. These samples were collected during both the dry season and the wet season. Analysis was conducted at DOST MIMAROPA, Puerto Princesa City, using the Multiple-Tube Fermentation Technique. The fecal coliform levels at all seven (7) sampling stations were found to be within the normal range, in accordance with the DENR Department Administrative Order 2016-08 Water Quality Guidelines for Class SC standards, both during the dry and wet seasons. Normal fecal coliform levels indicate that the marine water in all sampling stations is safe for the propagation and growth of fish and other aquatic resources. It is also suitable for commercial and sustenance fishing, boating, and similar public recreational activities. Regarding total coliform counts, Stations 2 (wet season), 4 (dry season), 5 (dry season), and 7 (dry season) remained within the normal range. However, Stations 1 (dry and wet seasons), 2 (dry season), 3 (dry and wet seasons), 4 (wet season), 5 (wet season), 6 (dry and wet seasons), and 7 (wet season) exceeded the normal value, based on the standard outlined in DAO 2016-08 for Class C, which is 10,000 MPN/100mL. It's important to note that there is no specific standard value listed in the guidelines for Marine Water Class SC.
Seaweeds and Seagrasses	Seagrasses and seaweeds play a significant role in a marine environment which is home for different marine organisms. Communities of seaweed are closely related to seagrass and corals. At every location, seaweed was identified along the transects and was noted. At all locations, a total of 28 species were identified. Four (4) species of Chlorophyceae (green algae), eleven (11) species of Phaeophyceae (brown algae), and thirteen (13) species of Rhodophyceae (red algae). In a seagrass survey conducted between 2014 and 2015, seagrass beds in Aborlan were determined to be in fair condition. However, species diversity was relatively limited, with only eight common species identified. In the more recent 2023 seagrass survey conducted in Long Point, Barangay Apurawan, a total of three (3) seagrass species were documented: *Cymodocea rotundata, Syringodium isoetifolium,* and *Enhalus acoroides*.
Corals and Associated Benthos	A modified C5 and C30 methods were used to assess the

Module	Summary of Findings
	condition of benthic cover of coral reef, and some macroinvertebrate indicators such as the giant clams, crown-of-thorn seastar, blue Linckia, Topshell (*Rochia nilotica*), and chocolate chips seastar in four selected reef stations. For reef fishes, only the butterflyfishes were surveyed in accordance to the method used. Data collection was done during dry season and wet season. A total of three transects were randomly positioned parallel to the reef flat and reef slope in each selected station. The randomization of transects were based from the method used in C5 method within the 75 x 25 m (1,875 m2) station. After the transects were positioned, photo-documentation were done in every 2.5 meters interval in each transect. A total of 60 photos (20 photos in each transect) were captured per station. The abundance of butterflyfishes and macro-invertebrates were noted and counted in every 75 m x 25 m surveyed station. Counting of butterflyfishes were done within the surveyed station. All butterflyfishes observed were counted and identified to the species level using the printed and laminated identification field guide. The data collection for target benthic macro-invertebrates such as identification and counting using the laminated field guide was conducted simultaneously while assessing the butterflyfishes. The size classes (small, medium, large) of giant clams were determined using the arm length wherein half of arm length is considered as small (< 20 cm), full arm length as medium (22 to 29.7 cm), while bigger than the arm length as large (> 29.7 cm). All transect images of benthic cover were analyzed using the Coral Point Count with Excel extensions (CPCe) software (Kohler and Gill 2006). Ten randomly-positioned scoring points per image were used in obtaining the average percentage cover of benthic categories in CPCe in each transect and interpreted following Licuanan et al. (2017;2019). The six benthic life form categories code in C30 methods (Go et al. 2020) were used in scoring the substrate photos. Meanwhile, abundance was calculated for macroinvertebrates and butterflyfishes.

Module	Summary of Findings
Reef Fish Communities	For dry season, there were 13 butterfly fishes recorded in four surveyed reef stations during dry season. Among species, only the *Chaetodon baronessa* and *Zanlus cornutus* were present in four stations, the rest were only found in either two or one station. During the wet season survey, only 12 butterflyfishes recorded in four surveyed reef stations. Among species, only the *Zanlus cornutus* was present in four stations, while *Chaetodon baronessa* and *C. trifascialis* were present in three surveyed stations. The rest were only found in either two or one station. Compared to dry season survey, there are many butterflyfishes during the wet season particularly the *C. kleinii*.
Marine Plankton	Water samples were collected during both the Dry Season and Wet Season of 2023. The samples were obtained from the surface of the sea, taken at a depth of 1 meter, and collected by vertical towing. Phytoplankton and Zooplankton samples were collected using a one-meter conical Plankton net with a 20µm mesh size and a 30cm mouth opening diameter. After collection, the water samples were placed in clean bottles, fixed with 3 to 5 ml of 10% formalin, and stored in a cooler. Quantification of phytoplankton and zooplankton was performed using a Sedwick-Rafter counting chamber with the assistance of a compound microscope (Cole-Parmer, USA). Images were captured using an Android phone camera. Verification of harmful species was conducted using the IOC-UNESCO Taxonomic Reference List of Harmful Micro Algae. In the eight (8) selected sites, the phytoplankton community encompasses 46 genera, with twenty-eight belonging to diatoms, sixteen (16) to dinoflagellates, and one (1) to cyanobacteria. Among the diatoms, *Chaetoceros spp*. and *Bacteriatrum spp.* were observed in all eight selected areas. Station 1 recorded the highest Phytoplankton abundance, with a count of 183 cells/L. Six phytoplankton genera found in these locations—*Pseudo-nitzschia*, *Dinophysis*, *Akashiwo*, *Protoperidinium*, *Alexandrium*, and *Pyrodinium*—are included in the IOC-UNESCO Taxonomic Reference List of Harmful Micro Algae. These six genera were identified in the chosen locations. Dinoflagellates encompass five harmful algal bloom (HAB) genera: *Dinophysis, Akashiwo, Protoperidinium, Alexandrium*, and *Pyrodinium*. Cyanobacteria were represented by the sole species Oscillatoria, which was identified at station 5. Among the diatoms observed at station 5, an impressive 87 genera were recorded, with *Chaetoceros sp*. being the most dominant, constituting half of the total diatom abundance. In total, 14

Module	Summary of Findings
	major groups were identified, categorizable as larval groups. Station 8 stands out with the highest abundance and diversity, recording 44 cells/L, surpassing other selected locations. Station 6 closely follows as the second-highest in terms of abundance, with 36 cells/L. For Wet season, a total of thirty-six (36) phytoplankton genera, which are characteristic of tropical regions, were identified. Diatoms overwhelmingly dominated all samples, comprising an impressive 1014 cells/L, accounting for 85.3% of the total phytoplankton observed. Among the diatoms, *Chaetoceros* emerged as the most abundant. Station 1, 3, and 8 is the highest abundance in chosen locations diatoms comprises diatoms abundance. Zooplankton samples were collected in Apurawan, Aborlan, Palawan during the wet season to assess their abundance and composition. The sampling involved vertical towing, which led to the identification of 16 distinct zooplankton taxa. Stations 1 and 8 exhibited a greater diversity of zooplankton. However, the overall area displayed a relatively high concentration of zooplankton cells per liter but a low diversity of species. To gain a more comprehensive understanding of plankton productivity in Apurawan, Aborlan, Palawan, it is essential to consider factors such as wind and current patterns, as well as nutrient composition. These variables can provide valuable insights into the dynamics of the local plankton community. Regarding the sampling events, Station 1 and 8 exhibited a notably high abundance, while Station 5 demonstrated a decrease in abundance. The abundance of plankton displays variation both vertically and seasonally. The results indicate that the towing distance has a greater impact on sample accuracy than the size of the net, as noted by previous research. Zooplankton tend to concentrate near the surface, primarily for feeding purposes and to evade predators.
Marine Benthos	The data collection for target benthic macro-invertebrates such as identification and counting using the laminated field guide was conducted simultaneously while assessing the butterflyfishes. The size classes (small, medium, large) of giant clams were determined using the arm length wherein half of arm length is considered as small (< 20 cm), full arm length as medium (22 to 29.7 cm), while bigger than the arm length as large (> 29.7 cm). All transect images of benthic cover were analyzed using the Coral Point Count with Excel extensions (CPCe) software (Kohler and Gill 2006). Ten randomly-positioned scoring points per image were used in obtaining the average percentage cover of benthic categories in CPCe in each

Module	Summary of Findings
	transect and interpreted following Licuanan et al. (2017;2019). The six benthic life form categories code in C30 methods (Go et al. 2020) were used in scoring the substrate photos. Meanwhile, abundance was calculated for macroinvertebrates and butterflyfishes.
Mangroves	The Citizen Science Guide served as a valuable resource in the assessment of Mangroves. The mangrove survey begins with the initial selection of a specific area within the mangrove forest for evaluation, utilizing a printed map. Typically, mangroves are situated along coastlines, riverbanks, and near river mouths. This chosen area should be sufficiently large to accommodate three distinct survey zones: landward, middle intertidal, and seaward. The next important step is to prepare the data sheet and pinpoint key locations of interest. After identifying the designated survey area, record the date and starting time at the header of the data sheet. Begin your exploration of the forest, actively seeking out these points of interest. Employ a GPS device or app to accurately document these locations. Establish a 10 x 10 meter boundary using a transect tape and estimate distances of 5 meters to the front, back, left, and right. While navigating the area, make sure to take note of any valuable information or observations. The third step entails commencing the listing process during your exploration, including the identification of mangrove species, associated fauna, and human activities. Moving on to the fourth step, delineate the boundaries of the survey zone. At this point, select a zone and return to one of the previously marked sites of interest from Step Number 2. Record the coordinates in the appropriate section, distinguishing between landward, middle, and seaward. Estimate a distance of 5 meters in all directions (front, back, left, and right), and if necessary, employ a transect tape to assist in this task. The fifth step involves quantifying the number of stems per category, while also continuing to identify additional mangrove species. Categorize trees as Young/Small (<15cm), Largest (15-150 cm), and Old-Growth (>150 cm). Continuously measure the Girth at Breast Height (GBH) within the designated 10m x 10m area. Use marking methods (e.g., I, II, III, IIII) to keep an accurate count. Simultaneously, while counting, reference the Mangrove Species Photoguide for species identification. Document any additional findings related to fauna and human activities. Lastly, repeat Steps Number 3 through 6 for the other two zones. Upon completion of all three zones' measurements and counts, record the end

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	time of the survey. Summarize the total counts for each category to conclude the assessment. Out of the twenty-three (23) mangrove species identified in the 2015 survey conducted across Aborlan, Palawan, only five (5) mangrove species were found within the Apurawan area across three (3) sampling area (Near Iliwan River, Long Point, Near Old Port). *Sonneratia alba* was present in all plots, while *Avicennia alba*, *Bruguiera sexangula*, and *Lumnitzera littorea* were observed in 2 out of the 4 plots. The least common species, *Xylocarpus granatum*, was exclusively identified in 1 out of the 4 plots, specifically at station 2. Station 2 displayed the highest mangrove species diversity, owing to its favorable environmental conditions and adaptability. In terms of mangrove tree demographics, large trees outnumbered both young and old trees. A total of 85 large mangrove trees, 30 young trees, and 3 old mangrove trees were recorded across all stations. This diversity of tree age classes is indicative of a healthy mangrove ecosystem. In the context of mangrove zonation in Apurawan, there are only three areas where mangrove trees are found. This limited distribution is primarily attributed to the fact that these areas are exposed to the open sea, facing the South China Sea, which experiences strong waves and tidal forces. Consequently, mangrove trees struggle to thrive under these challenging environmental conditions. The sampling also revealed the presence of associated fauna in the mangrove area, including mollusks, fishes, crustaceans, insects, and birds. This underscores the significance of mangroves as breeding grounds for marine life. Nevertheless, despite the promising presence of an abundance of mangrove trees, certain troubling observations came to light during the sampling period. Freshly cut mangrove branches were observed at station 3, indicating recent human activity that could potentially harm the mangrove ecosystem. Furthermore, a significant amount of litter and fishing gear (hooks and lines) were discovered in the vicinity, particularly at stations 3 and 1. In contrast, station 2 seemed to be relatively untouched by human interference. The overall condition of the mangrove areas along Long Point, Apurawan, is generally favorable, but there are concerns related to recent human activities that need to be addressed to ensure the continued health of the ecosystem.
Coastal Integrity	In this study, the coastline of Long Point, Barangay Apurawan in Aborlan, Palawan was profiled and monitored using the Emery Method and Coast walk, to provide beach profiles. This area

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	was a coastal barangay where much of the livelihood was anchored in coastal ecosystems. The data obtained from this study could be used to inform sustainable coastal management strategies that aimed to protect and preserve the important natural resource of beaches. The purpose of this assessment provides information that can be used to assess whether a shoreline is eroding or accreting on a long-term basis, the amount of erosion and cut back of beaches during storm events and how the beach recovers after those events. This will utilize standard methodologies for coastal profiling and monitoring. The beach near Iliwan River was surveyed using 8 transects to determine its length and elevation profile. The average distance or length of the beach from the fixed-point of reference (landward) to the waterline (seaward) was found to be 16.57 meters. This information is important as it provides a baseline for measuring changes in the beach profile over time. In addition to the length of the beach, the survey also measured the uncorrected elevation of the beach. The average uncorrected elevation was found to be 89.63 cm. This measurement is significant as it provides information on the height of the beach relative to sea level. To obtain a more accurate measurement of the beach elevation, the tide level at the time of the survey was also taken into account. This was done using the software WXTIDE, which identified the tide level as 137.63 cm. This corrected measurement is important as it provides a more accurate representation of the beach elevation relative to sea level, which is important for understanding the impact of tides and sea level rise on the beach. The survey of the beach near Iliwan River provides important baseline information that can be used to monitor changes in the beach profile over time.
Air	
Air Quality and Noise	Air samples were obtained from four sampling sites during the wet and dry seasons. The air quality parameters include TSP, PM10, NO_2, and SO_2. Analysis revealed that the air qualities on all the sites for both seasons are well within the limit set by the DENR. The corresponding air quality indices on each parameter are interpreted as “Good”, suggesting that the ambient air is healthy for the public. To identify the impact of the mining operations on the area, an Air dispersion and particulate deposition Modelling for the access road for both PM10 and TSP were executed using the

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	Hybrid Single-Particle Lagrangian Integrated Trajectory (HYSPLIT). The estimated daily emission of TSP and PM10 from the hauling activities are 2,326.43 kg and 7,881.90 kg, respectively. The study reveals that during the Amihan season, PM10 and TSP particle concentrations peak in the afternoon at the Long Point Area, with levels of 130 µg/Nm3 and 450 µg/Nm3, respectively. Nearby communities are not directly exposed due to wind patterns. Apurawan Center can experience concentrations of up to 10 µg/Nm3 for PM10 and 100 µg/Nm3 for TSP, while Culandanum Center has lower levels of 1 µg/Nm3 for both particles. Sitio San Jose and Napsan Center remain unaffected by mine-related particle dispersion. Long-range transport causes particle deposition to extend southward in Palawan, with TSP deposition being more intense than PM10. Maximum depositions are 5.2 mg/m2 for PM10 and 18 mg/m2 for TSP, while Apurawan Proper and Culandanum Center may face lower levels. Sitio San Jose and Napsan Center are projected to have no particle deposition. During the Habagat season, the highest PM10 and TSP concentrations, reaching 210 µg/Nm3 and 700 µg/Nm3, respectively, occur at night between 2000 UTC and 2100 UTC in the Long Point Area. Sitio San Jose experiences increased levels of up to 10 µg/Nm3 for PM10 and 100 µg/Nm3 for TSP, while the Napsan Center reaches a maximum of 10 µg/Nm3 for both particles. Conversely, the Apurawan Center and Culandanum Center, located southwest of the mining area, remain unaffected. Particle dispersion from the mining site can extend to the northern part of Palawan, leading to similar extents of deposition for PM10 and TSP, with TSP deposition being more intense. Maximum depositions are 8.1 mg/m2 for PM10 and 27 mg/m2 for TSP. Sitio San Jose experiences up to 1 mg/m2 deposition for both particles, while Napsan Center sees up to 0.1 mg/m2 for PM10 and 1 mg/m2 for TSP. Notably, Apurawan Center and Culandanum Center are not impacted by particle deposition during the Habagat season.
Air Quality and Noise	Particle dispersion from the mining site can extend to the northern part of Palawan, leading to similar extents of deposition for PM10 and TSP, with TSP deposition being more intense. Maximum depositions are 8.1 mg/m2 for PM10 and 27 mg/m2 for TSP. Sitio San Jose experiences up to 1 mg/m2 deposition for both particles, while Napsan Center sees up to 0.1 mg/m2 for PM10 and 1 mg/m2 for TSP. Notably, Apurawan Center and Culandanum Center are not impacted by particle

Module	Summary of Findings
	deposition during the Habagat season. Meanwhile, to evaluate the impact of the Long Point Nickel Mining Project's noise levels on the local community, a comprehensive approach was adopted. This method involved a 24-hour noise grab sampling/monitoring strategy, encompassing 60 readings for each time zone, and aligned with NPCC guidelines. The sampling activities took place between June 17 and July 2, 2023. The assessment of median noise levels across all sampling sites and time periods generally indicates adherence to the recommended limits, signifying compliance. Nevertheless, an exception arises at sampling site LPAQ 6 during the Daytime sampling period (9:00 AM - 6:00 PM), where the noise level surpassed the set limit. The noise sources were identified during the sampling process. These encompassed various factors, such as vehicles moving on access roads, community activities like basketball games, the playing of music through speakers, conversations among people, students playing, and noise generated by domestic birds.
People	
	Barangay Apurawan in the municipality of Aborlan is the location of the project. It has a land area of 317,000 hectares, 300 hectares of this is used for agriculture, 305,200 is forested area, 1,500 hectares is idle land, 5,000 hectares is populated with the community and the remaining 5,000 hectares is not yet titled. Brgy. Apurawan is considered a rural barangay (Apurawan BDRRMP, 2020-2022). Based on the 2020 Census, Barangay Apurawan has total population of 4,303 persons. The inhabitants are migrants coming from the Visayas and Cuyo and indigenous Tagbanua. The migrants predominantly occupied the Barangay proper and sitio Sto Nino while the Tagbanua inhabits the sitio of Daan and Bubusawin.The local economy of Barangay Apurawan primarily relies on farming, fishing and small-scale businesses. The fertile land and favorable climate support the cultivation of crops such as rice, coconut, corn, fruits, and vegetables. Aquaculture activities, including fish farming contribute significantly to the local economy. Fishing is the primary livelihood of respondents from Bubusawin and Apurawan while farming is dominant source of livelihood in Sto Nino and Daan.

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	Additionally, some residents engage in small businesses, including retail stores and food establishments to cater to the community's needs. The sample size for this survey was derived using the Slovin's formula with a 5 percent margin of error. The formula is used to calculate an appropriate sample size from a population. For Barangay Apurawan, the total household population is 1,114, and the calculated sample size is 294 respondent household. The areas covered are the impact areas composed of the sitios of Apurawan proper, Bubusawin, Sto Nino and Daan. These communities will be directly affected by the mining project. The sample size per sitio was also calculated using the same formula. The impact area is part of the ancestral domain claim of the indigenous Tagbanua. There are 2 Certificate of Ancestral Domain Title (CADT) application in Barangay Apurawan. The CADT claim of sitio Bubusawin that covers an area of 13,799.45 hectares of which 8,548.30 ha is land, while 5,251 ha is waters and an island, Isla Batang Batang with an area of .95 ha. While the ancestral domain claim of the Tagbanua of sitio Daan is around 19,000 ha, 11,700 ha (waters) and 7,300 ha (land). The ancestral waters of the these communities are a critical source of sustenance for the Tagbanua of Apurawan. They provide fish, aquatic plants, and other resources that contribute to their traditional diets and livelihoods. Fishing and gathering activities are often essential components of the local economy. The proposed mining project will affect the traditional livelihood of the Tagbanua in the impact area. The proposed area is a traditional hunting, gathering and fishing area. The mining operations can disrupt or contaminate these resources, leading to a loss of livelihoods and economic self-sufficiency. Similarly, this will also affect some of their cultural practices, as well as disrupt their spiritual connections to the land. According to the Tagbanua elders, there are several sacred sites and landscapes in the proposed mining site, and its adjacent areas. Additionally, the influx of external workers and the establishment of mining infrastructure can introduce new cultural influences, potentially eroding indigenous traditions. Similarly, while the archaeological survey conducted on the areas that will be affected by the proposed mining operations were found negative of any archaeological and cultural

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	materials, it is highly recommended that if any unexpected discovery of archaeological remains is made during the execution of earth-moving activities, it should be promptly reported to the Directors of the National Commission for Culture and the Arts (NCCA) and the National Museum of the Philippines to ensure compliance with the provisions of Republic Act (R.A.) No. 10066, otherwise known as "The National Cultural Heritage Act of 2009" and Republic Act 4846, as amended by Presidential Decree 374, also known as the "Cultural Properties Protection and Preservation Act." The recommendation aims to prevent unnecessary delays in the implementation of the project, and contribute to safeguarding the invaluable cultural heritage of the country.

6. Integrated Summary of Impacts and residual effects

Table 3. Integrated Summary of Impacts and Residual Effects

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
Pre-construction and Construction Phase	➢ Landscape disturbance ➢ Clearing of vegetation ➢ Loss of habitat ➢ Threat to existing flora and fauna	✓ Conduct of Biodiversity Conservation Management Plan and a Multi-Layer Conservation Management Plan ✓ A Biodiversity Conservation area identified and allocated to relocate and mimic the environment for the endemic and endangered flora and fauna ✓ Progressive mine rehabilitation shall be implemented to compensate the vegetation loss in the area	80-90%
Pre-construction and Construction Phase	➢ Soil contamination due to possible fuel/oil spills from vehicles and heavy equipment	✓ Areas of operation are limited and localized ✓ Spill control procedure and trained personnel to perform	100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
		containment and clean up	
Pre-construction and Construction Phase	➢ Use of drill rigs during geotechnical investigations may cause soil contamination due to possible oil spill	✓ Area of operation is limited and localized ✓ Use of best available environmental practices in drilling operations will be employed during geotechnical investigations	100%
Pre-construction and Construction Phase	➢ Stripping of in-situ soil resources in mining disturbance areas ➢ Alteration of physical and chemical soil properties ➢ Alteration of soil structure	✓ Stripping of soil shall be done in phases according to the approved mine plan ✓ Top soil shall be stored in a designated stockpile accessible for re-use	100%
Pre-construction and Construction Phase	➢ Landscape disturbance ➢ Clearing of vegetation ➢ Loss of habitat ➢ Threat to existing flora and fauna ➢	✓ Conduct of Biodiversity Conservation Management Plan and a Multi-Layer Conservation Management Plan ✓ A Biodiversity Conservation area identified and allocated to relocate and mimic the environment for the endemic and endangered flora and fauna ✓ Progressive mine rehabilitation shall be implemented to compensate the vegetation loss in the area	80-90%
Pre-construction and Construction Phase	➢ Soil contamination due to possible fuel/oil spills from vehicles and heavy equipment	✓ Areas of operation are limited and localized ✓ Spill control procedure and trained personnel to perform containment and clean up	100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
Pre-construction and Construction Phase	➢ Use of drill rigs during geotechnical investigations may cause soil contamination due to possible oil spill	✓ Area of operation is limited and localized ✓ Use of best available environmental practices in drilling operations will be employed during geotechnical investigations	100%
Pre-construction and Construction Phase	➢ Stripping of in-situ soil resources in mining disturbance areas ➢ Alteration of physical and chemical soil properties ➢ Alteration of soil structure	✓ Stripping of soil shall be done in phases according to the approved mine plan ✓ Top soil shall be stored in a designated stockpile accessible for re-use ✓	100%
Pre-construction and Construction Phase	➢ Soil erosion and sediment movement ➢ Disruption of natural drainage patterns ➢ Landslide /mass wasting ➢ Rock fall ➢ Mud/debris flow	✓ Provide self-sustaining vegetation cover ✓ Use of biological or mechanical erosion control measures such as cococoir mesh nets and cococoir logs, vegetative (grass) matting, germination blankets or construct retaining walls along the slopes of the access, planting of indigenous or endemic tree species along the slopes ✓ Install diversion channels before the construction areas to divert stormwater run-off from draining through the open areas or towards the settling pond	90-100%
Pre-construction and Construction Phase	➢ Soil erosion and sediment movement ➢ Disruption of natural drainage patterns ➢ Landslide /mass wasting	✓ Provide self-sustaining vegetation cover ✓ Use of biological or mechanical erosion control measures such as cococoir mesh nets	90-100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
	➢ Rock fall ➢ Mud/debris flow	and cococoir logs, vegetative (grass) matting, germination blankets or construct retaining walls along the slopes of the access, planting of indigenous or endemic tree species along the slopes ✓ Install diversion channels before the construction areas to divert stormwater run-off from draining through the open areas or towards the settling pond	
Pre-construction and Construction Phase	➢ Dust generation due to traffic and increased numbers of vehicle	✓ Dust suppression /watering of haul roads and areas of operation ✓ Planting of trees at the buffer zone area ✓ Strict implementation of speed limit (e.g max of 30kph) and monitoring activity (use of speed gun), assigned traffic controllers	100%
Pre-construction and Construction Phase	➢ Disposal of wastes materials (solid and liquid)	✓ Solid Waste Management Plan will be developed for the mine site. ✓ Implement proper waste management in compliance to RA 9003 and 6969) ✓ Provision of ecologically sound designed sanitary landfill	100%
Pre-construction and Construction Phase	➢ Sedimentation	✓ Install sediment fences or traps	100%
Pre-construction and Construction Phase	➢ Accidental oil spill during construction of pier/causeway resulting to	✓ Provision of storage for oil/used oil ✓ Provision of properly designed bund for	100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
	contamination of marine water	containment ✓ Trained personnel to respond to spill ✓ ERP for Oil Spill	
Pre-construction and Construction Phase	➢ Reduction of surface and groundwater availability	✓ Consider potential impact to water balance prior commencing any dewatering activities reuse, recycle if feasible	90-100%
Pre-construction and Construction Phase	➢ Entrainment and transport of eroded sediments to valuable aquatic environment downstream of the mine footprint ➢ Change in stream depth ➢ Degradation of surface water bodies	✓ Provision of temporary sediment control measures at the downstream side of the construction area (i.e sand bags)	100%
Pre-construction and Construction Phase	➢ Threat to existence or loss of local marine and freshwater species ➢ Threat to abundance and distribution of marine and freshwater species	✓ Regular monitoring of water quality. Testing and analysis will be done by a DENR accredited laboratory based on the established parameters.	100%
Pre-construction and Construction Phase	➢ Drilling Machines and support water pumps will generate air emissions and noise ➢ Nuisance to community and workers on site	✓ Operation of more recent and silenced equipment where possible and maintenance for good working condition. ✓ Operation of heavy equipment on schedule (i.e 8am-5pm)	100%
Pre-construction and Construction Phase	➢ Disturbance, degradation or loss of habitat ➢ Reduced diversity and modification of plant species ➢ Population decline	✓ Stage clearing of vegetation to minimize areas of bare ground and clear land ✓ Designate a separate and wider area that has an array of	

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
		resources, physical and biotic factors that could allow the survival and reproduction for those threatened flora and fauna species.	90-100%
Pre-construction and Construction Phase	➢ Increase in population due to in-migration ➢ Generation of jobs ➢ Increased economic activity ➢ Exposure to occupational safety and health hazards ➢ Threat to public health and safety	✓ LGU will be provided with the basic profile of the workers at the mine site for reference and monitoring ✓ Local first policy in hiring for vacancies ✓ LGU to monitor existing businesses in the area ✓ SHE policy in place and regular hygiene monitoring/surveillance ✓ Increased visibility of Brgy. Tanod and PNP ✓	100%
Operations Phase	➢ Disturbance of soil structure ➢ Slope instability, Collapse of overburden, landslide, mud/debris flow, rock fall, subsidence, liquefaction ➢ Surface runoff, flooding, erosion, loss of topsoil	✓ Progressive mine-rehabilitation process will be used for the extraction component of the Long Point project. Waste overburden will be removed to recover nickel ore and all the topsoil will be stockpiled to a designated area.	90-100%
Operations Phase	➢ Disturbance of soil structure ➢ Slope instability, Collapse of overburden, landslide, mud/debris flow, rock fall, subsidence, liquefaction ➢ Surface runoff, flooding, erosion, loss of topsoil	After extracting the ore, the waste and soil will be backfilled to the mined-out voids and slopes will be stabilized. Stabilized areas will be planted with suitable seedlings. ✓ BNC will maintain a	90-100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
		nursery for sustainable supply of seedlings. ✓ BNC will ensure that mining operations is within the MGB approved mine plan and necessary buffer zone will be maintained at the periphery of the mining area. Buffer zones with me maintained and enhanced. ✓ Erosion control such as combined hydroseeding with coconet coir reinforcement, retaining wall and vegetation cover established, regular inspection and maintenance as necessary ✓ Designated areas for the stockpile of excavated materials will be provided with a proper drainage system with silt and sediment traps for the control of erosion and siltation.	
Operations Phase	➢ Generation of solid and hazardous wastes e.g used oil, contaminated containers, used light bulbs, used batteries	✓ A Solid Waste Management Plan will be developed for the mine site. ✓ Implement proper waste management in compliance to RA 9003 and 6969) ✓ Provision of ecologically sound designed sanitary landfill	100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
Operations Phase	➢ Soil contamination due to possible fuel/oil spills from vehicles and heavy equipment	✓ Areas of operation are limited and localized ✓Spill control procedure and trained personnel to perform containment and clean up	100%
Operations Phase	➢ Stripping of in-situ soil resources in mining disturbance areas ➢ Alteration of physical and chemical soil properties ➢ Alteration of soil structure	✓ Stripping of soil shall be done in phases according to the approved mine plan ✓ Top soil shall be stored in a designated stockpile accessible for re-use	100%
Operations Phase	➢ Soil erosion and sediment movement ➢ Disruption of natural drainage patterns ➢ Landslide /mass wasting ➢ Rock fall ➢ Mud/debris flow	✓ Provide self-sustaining vegetation cover ✓Use of biological or mechanical erosion control measures such as cococoir mesh nets and cococoir logs, vegetative (grass) matting, germination blankets or construct retaining walls along the slopes of the access, planting of indigenous or endemic tree species along the slopes.	90-100%
Operations Phase	➢ Dust generation due to traffic and increased numbers of vehicle	✓ Dust suppression /watering of haul roads and areas of operation ✓ Planting of trees at the buffer zone are ✓ Strict implementation of speed limit (e.g max of 30kph) and monitoring activity (use of speed gun), assigned traffic controllers	100%
Operations Phase	➢ Increase in Total Suspended Solids (TSS) brought about by erosion of exposed slopes in the mine area and	✓ For mine area and road management mitigation, buffer zones will be established in the periphery of the mining	90-100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
	siltation from any overflow run off in stockpiles ➢ Possibility of discharge or spillage in to the streams and coastal areas oil oil-containing washing of equipment and of surface runoff laden with oil and grease.	areas and will be planted with suitable endemic plants and slope stabilization will be done. ✓ Adequately-sized settling ponds will be engineered to capture water that flows within the disturbed mining area. Clean runoff from the upper catchments will be diverted away from the disturbed area by temporary diversion drains ✓ Storm water management and sediment control system will be established to ensure surface run off from the mining areas will be directed/ channeled towards the settling ponds, sumps and diversion drains.	
Operations Phase	➢ Dust generation due to traffic and increased numbers of vehicle	✓ Dust suppression /watering of haul roads and areas of operation ✓ Planting of trees at the buffer zone are ✓Strict implementation of speed limit (e.g max of 30kph) and monitoring activity (use of speed gun), assigned traffic controllers	100%
Operations Phase	➢ Increase in Total Suspended Solids (TSS) brought about by erosion of exposed slopes in the mine area and siltation from any overflow run off in stockpiles ➢ Possibility of	✓ Fuel storage areas will be provided with properly designed containment bund to contain spills. A separate storage for used oil will be provided and will be disposed accordingly by the site PCO.	90-100%

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
	discharge or spillage in to the streams and coastal areas oil oil-containing washing of equipment and of surface runoff laden with oil and grease.	✓ For accidental spills in land and sea during transport of materials, BNC will have an Emergency Response Plan to contain and clean-up the spill. ✓ Sanitation system in the mine facilities such as showers, urinals, toilets and lavatories will be properly maintained and will have standard design of septic tanks. ✓ For ore transport Management, dried ore from the stockyard will be hauled to the stockpile area by tarpaulin covered trucks prior to loading and shipment. ✓During shipment, trucks accompanied by aid of loaders will convey the ore from the product stockpile into the barges. This will ensure minimal wastage of ore brought about by mishandling.	
Operations Phase	➢ Domestic wastes and sewage generation resulting in a potential for depletion of dissolved oxygen, turbidity and affecting recreational use of water, and unpleasant odor.	Construction of a sewerage treatment facility	100%
Operations Phase	➢ Generation of fugitive dust from exposed soil in the shallow surface of the mine operations, earthworks and transport of mined ore	✓ Long Point is sparsely populated, impact and nuisance to residents is minimal. ✓ Use of water truck to water the road and	

Project Activity	Potential Impact	Proposed Mitigating Measures	Performance/ Target Efficiency
	and from stockpile area. ➢ Increase in Total Suspended Particulates (TSP) , Pm10 and air pollutants such as SO2 and NO2 in areas where there are ongoing civil work activities and vehicle movement.	suppress dust generated as a result of the operations Vehicles will be properly maintained to reduce fugitive emissions	100%
Operations Phase	➢ Increase in ambient noise level	✓ Operation of more recent and silenced equipment where possible and maintenance for good working condition. ✓ Operation of heavy equipment on schedule (i.e 8am- 5pm) ✓ Awareness of workers on noise hazards ✓ Provision of appropriate PPE Audiometric test for workers exposed in high noise environment	100%
Operations Phase	➢ Disturbance degradation or loss of habitat ➢ Reduced diversity and modification of plant species ➢ Population decline	✓ Stage clearing of vegetation to minimize areas of bare ground and clear land ✓ Annual Biodiversity Assessment	100%

7. Identified Stakeholders based on Section 10 of DAO 2017-15

Stakeholders were identified based on the delineation of the Direct Impact Area (DIA)

and the Indirect Impact area (IIA) for the proposed project's impacts on air, water, land and people. The following are the identified stakeholders for the Long Point Nickel Mining Project.

1. Local Government Unit in areas where the proposed Long Point Nickel Project (LPNP) will be situated

   - ✓ Municipality of Aborlan (Host Municipality)
   - ✓ Barangay Apurawan (Direct Impact Area)
   - ✓ Barangay Culandanum (Indirect Impact Area)

2. Government Agencies with related Mandate on Type of the Project and its impacts

   - ✓ Provincial Government of Palawan
   - ✓ DENR EMB – Provincial Environmental Management Unit
   - ✓ Palawan Council for Sustainable Development (PCSD)
   - ✓ Provincial Environment and Natural Resources Office (PG ENRO)
   - ✓ DENR Environment and Natural Resources Office (PENRO)
   - ✓ DENR City Environment and Natural Resources Office (CENRO)
   - ✓ Municipal Environment and Natural Resources Office (MENRO)
   - ✓ Municipal Agriculturist of Aborlan (MAO)
   - ✓ Municipal Health Office (MHO)
   - ✓ Municipal Planning and Development Office (MPDO)

3. Interest groups, preferably those with mission/s specifically related to the type and impacts of the proposed LPNP

   - ✓ Religious sector – Sto. Nino Catholic Church
   - ✓ Indigenous People's Organization – NCIP – MIMAROPA, NCIP – Palawan
   - ✓ Non-government Organization – HARIBON Palawan
   - ✓ People's Organization – Farmer's Association, Senior Citizen Association, Fishermen's Association

4. Local Institutions

   - ✓ Apurawan Elementary School
   - ✓ Apurawan National High School
   - ✓ Culandanum Elementary School
   - ✓ Culandanum High School

5. Residents of Brgy. Apurawan and Brgy. Culandanum