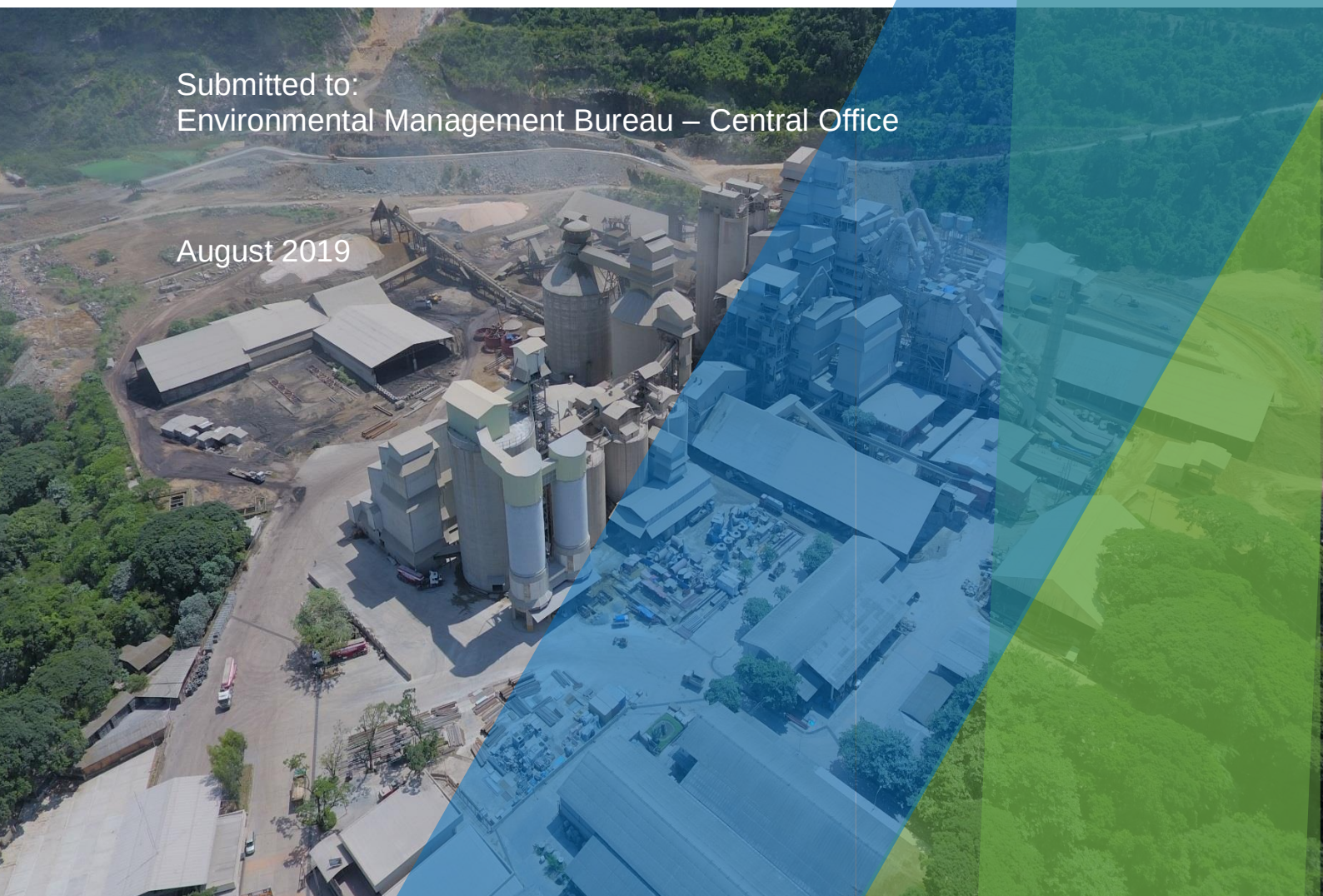
ENVIRONMENTAL PERFROMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

SMNCI New Cement Production Project

Barangay Labayug, Sison, Pangasinan

Submitted by:

SAN MIGUEL
NORTHERN CEMENT, INC



Submitted to:
Environmental Management Bureau – Central Office

August 2019

An Environmental Report By:

LCI ENVI CORPORATION
Unit 8L-M, Future Point Plaza 3
111 Panay Avenue, South Triangle
Quezon City, Metro Manila, The Philippines, 1103

Submitted To:

Department of Environment and Natural Resources
Environmental Management Bureau
EMB Building, DENR Compound, Visayas Avenue
Diliman, Quezon City

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List of Acronyms

AERMIC	-	American Meteorological Society/EPA Regulatory Model Improvement Committee
BACT	-	Best and Available Control Technology
BFAR	-	Bureau of Fisheries and Aquatic Resources
BMB	-	Biodiversity Management Bureau
BLGU	-	Barangay Local Government Unit
CAA	-	Clean Air Act
CADC	-	Certificate of Ancestral Domain Claim
CADT	-	Certificate Ancestral Domain Title
CALC	-	Certificate of Ancestral Land Claim
CALT	-	Certificate of Ancestral Land Title
CARP	-	Comprehensive Agrarian Reform Program
CBFMA	-	Community-Based Forest Management Agreement
CENRO	-	Community Environment and Natural Resources Office
CMR	-	Compliance Monitoring Report
DENT	-	Department of Environment and Natural Resources
DIA	-	Direct Impact Area
DIV		Dutch Intervention Values
DOLE	-	Department of Labor and Employment
ECC	-	Environmental Compliance Certificate
EGF	-	Environmental Guarantee Fund
EIA	-	Environmental Impact Assessment
EIS	-	Environmental Impact Statement
EMB	-	Environmental Management Bureau
EMP	-	Environmental Monitoring Fund
EMoP	-	Environmental Monitoring Plan
GHG	-	Greenhouse Gas
GLC	-	Ground-Level Concentration
GPS	-	Global Positioning System
IEC	-	Information and Education and Communication
IFMA	-	Integrated Forest Management Agreement
IIA	-	Indirect Impact Area
IRR	-	Implementing Rules and Regulations
KBA	-	Key Biodiversity Area
kW	-	Kilowatts
kWh	-	Kilowatt hour
LCI	-	LCI Envi Corporation
MASL	-	Meters above sea level
MENRO	-	Municipal Environment and Natural Resources Office
MGB	-	Mines and Geoscience Bureau
MHO	-	Municipal Health Officer
MMTPY	-	Million Metric Tons per Year
NAAQS	-	National Ambient Air Quality Standards
NAAQGV	-	National Ambient Air Quality Guideline Values
NCC	-	Northern Cement Corporation
NESSAP	-	National Emission Standard for Source Specific Air Pollutants
NGOs	-	Non-Government Organizations
NIPAS	-	Network of Integrated Protected Areas System
nm	-	Nanometer
NOAH	-	Nationwide Operational Assessment of Hazards
NPCC	-	National Pollution Control Commission
NSCB	-	National Statistical Coordination Board
NWRB	-	National Water Resources Board
PAGASA	-	Philippine Atmospheric, Geophysical, and Astronomical Services Administration

PAR	-	Philippine Area of Responsibility
PAWB	-	Protected Areas and Wildlife Bureau
PBL	-	Planetary Boundary Layer
PDR	-	Project Description Report
PEISS	-	Philippine Environmental Impact Statement System
PENRO	-	Provincial Environment and Natural Resources Office
PHILVOCS	-	Philippine Institute of Volcanology and Seismology
PM	-	Particle Matter
PNSDW	-	Philippine National Standards for Drinking Water
PPS	-	Personal Protective Equipment
PSA	-	Philippine Statistics Authority
PSR	-	Public Scoping Report
RHU	-	Rural Health Unit
SB	-	Sangguniang Bayan
SBCs	-	Sensitive Biological Communities
SDP	-	Social Development Program
SMNCI	-	San Miguel Northern Cement, Inc.
SMR	-	Self-Monitoring Report
SRTM	-	Shuttle Radar Topography Mission
SWMP	-	Solid Waste Management Program
TSP	-	Total Suspended Particles
UN	-	United Nations

EXECUTIVE SUMMARY

Project Fact Sheet

Name of Project	**SMNCI NEW CEMENT PRODUCTION PROJECT**
Project Location	Province of Pangasinan, Municipality of Sison, Barangay Labayug
Project Category & Type (based on Annex A of MC 2014-005 Guidelines)	Non-Metallic Mineral Processing
Project Size	6.2 Million Metric Tons per Year (MMTPY) Cement/150,000,000 Cement Bags
Summary of Major Project Components	

Component	Line A	Line B
Raw Material Crushing System	Limestone - 1,400 tons per hour (tph) capacity with an impact hammer crusher Additive Materials – 500 tons per hour (tph) capacity with an impact hammer crusher	
Raw Material Storage	Limestone - circular dome type 60,000 MT capacity Additive materials - Longitudinal storage with 50,000 MT capacity and with mechanical reclaimer	
Coal Crusher	2.0x 2.0m Ø Single Rotor Hammer Crusher 500 tph	
Raw Grinding	Vertical Roller Mill, dynamic separator, cyclone dust collector, 420tph capacity	Vertical Roller Mill, dynamic separator, cyclone dust collector, 420tph capacity
Homogenizing Silo	15,000 MT raw meal silo	• 15,000 MT raw meal silo
Plant Dedusting System	Bag Filter with Gas conditioning tower 720,000 cubic meter/hr.	Bag Filter with Gas conditioning tower • 720,000 cubic meter/hr.
Coal Milling	Vertical Roller Mill, dynamic separator, cyclone dust collector, 54tph capacity	Vertical Roller Mill, dynamic separator, cyclone dust collector, 54tph capacity
Rotary Kiln	4.8m Ø x 72m, 3 support station kiln 5,750 MPTD with IKN pendulum grate cooler, low NOx burner	4.8m Ø x 72m, 3 support station kiln • 5,750 MPTD with IKN pendulum grate cooler, low NOx burner
Preheater	Suspension, single string, 5 stage w/ Calciner	Suspension, single string, 5 stage w/ Calciner
Clinker Cooler Dedusting System	Bag filter (Fiber glass + PTFE Membrane filter bags) 600,000 cubic meter/hr.	Bag filter (Fiber glass + PTFE Membrane filter bags) 600,000 cubic meter/hr.
Clinker Silo	2 units x 25,000 MT capacity with 1,500MT for off-spec clinker storage	1 unit x 25,000 MT capacity with 1,500MT for off-spec clinker storage

	Cement Mill	Vertical Roller Mill, dynamic separator, cyclone dust collector, 270tph capacity	Vertical Roller Mill, dynamic separator, cyclone dust collector, 270tph capacity
	Cement Silo	1 unit x 15,000 MT capacity	1 unit x 15,000 MT capacity
	Cement Packing & Dispatch	2 x 120tph rotary packing machine	
	Water Source	1 unit deep well 1 unit induced well at water impounding reservoir	
	Air Pollution Facilities	Cyclone separators & bag filters	Cyclone separators & bag filters
	Support Facilities		
	• **Administration Building** • **Machine Shop** • **Warehouse** • **Guest house/Staff house** • **Sewerage Treatment Plant** • **Truck Scale**		
Project Cost	Php 20,820,000,000.00		
Construction Period	2018 to 2020		
Commercial Operation Date	2020-2022		
Proponent Name	**San Miguel Northern Cement, Inc.**		
Proponent Authorized Representative	**Mr. Oliver R. Gorrospe** Vice President & General Manager		
Proponent Address and Contact Details	3rd Floor, 155 EDSA, Brgy. Wack-Wack, Mandaluyong City, Metro Manila, Philippines		
EIA Preparer (Consultant)	**LCI Envi Corporation**		
Preparer Contact Person	**Engr. Jose Marie U. Lim, MSc.** EIA Team Leader		
Preparer Address and Contact Details	Unit 8L-M Future Point Plaza 3 111 Panay Avenue, Brgy. South Triangle, Quezon City, Metro Manila, Philippines Tel. No.: (632) 442-2830 Fax No.: (632) 961-9226		

Process Documentation

Terms of Reference for the EPRMP

1 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.

2 **Northern Cement Corporation (NCC)** currently has ECC Reference No. 9909-106-105 for its Line 3 cement plant (5,000 TPD clinker) and quarry operation (8,500 TPD limestone and 2,100 TPD shale) in Barangay Labayug, Sison, Pangasinan, secured last February 24, 2000. However, only the quarry was operated, and Line 3 was never constructed due to economic downturns.

3 NCC entered an agreement with its sister company, **San Miguel Northern Cement, Inc. (SMNCI)**, that SMNCI will take over the construction and operation of the NCC Line 3 (now referred as SMNCI Line A) cement plant project but the quarry operation will still be under the NCC. With this, SMNCI will be the new owner of ECC Reference No. 9909-106-105. A letter of request for the transfer of ownership of the ECC was submitted by NCC and SMNCI to the EMB last March 5, 2019. Last June 18, 2019, the EMB responded to the request letter and provided the requirements that should be submitted to grant the request of transfer of ownership.

4 **San Miguel Northern Cement, Inc. (SMNCI)** intends to amend the ECC Reference No. 9909-106-105 to be the new owner and to increase the clinker production capacity from 5,000 TPD to 11,500 TPD. The operation of the quarry of NCC will be transferred to the ECC of NCC for its Line 1 and Line 2 cement plant (ECC Ref. No. 9207-032-301c). Another EPRMP is being prepared for this. The limestone and shale requirement for the operation of the SMNCI cement plant will be mostly supplied by the NCC quarry.

5 The Proponent is required to amend its existing Environmental Compliance Certificate (ECC) from the DENR-EMB prior to any development in the project site. Pre-requisite to the acquisition of amended ECC for the project is the submission of an Environmental Performance Report and Management Plan (EPRMP) as stated on the EMB Memorandum Circular 005-2014 (Revised Guidelines for Coverage Screening and Standardized Requirements under the Philippine EIS System). The EPRMP used the EIS Scoping and Screening Form for Mining Projects as a guide in the impact analysis.

Scope of the EPRMP

6 This EPRMP documented the prevailing environmental conditions in the project area and in its surrounding environment using recent compliance monitoring reports. This will also serve as binding document where **San Miguel Northern Cement Inc.** presents its updated environmental commitments through a comprehensive environmental management and monitoring plan.

7 This EPRMP document shall be submitted to the Environmental Management Bureau (EMB) Central Office for review and evaluation. The EPRMP is a prerequisite for the acquisition of the new or amended ECC, that would include the proposed changes of **San Miguel Northern Cement Inc.**

EPRMP Team

8 LCI Envi Corporation (LCI) was commissioned by **San Miguel Northern Cement, Inc.** to conduct the EIA study for the proposed cement grinding facility project. LCI was tasked to prepare, document, and, on behalf of the Proponent, submit to the DENR-EMB all the necessary information related to the proposed Project. The following table presents the EPRMP Study Team composition.

CONSULTANT	EXPERTISE	REGISTRATION NO.
Engr. Jose Marie U. Lim, MSc.	Team Leader/ Environmental Management Specialist	IPCO-029
Kevin Paolo G. Bartolome	Environmental Management Specialist (Air)	IPCO-353
Engr. Patricia Ann Go	Environmental Management Specialist (Water)	IPCO- 352
Jerome B. Leaño	Sociology/ Social Development Specialist (People) Environmental Management Specialist (Land)	IPCO-059
Teodora Haresco-Salvador*	Land Use and Social Modules	IPCO 111
Jose Dennis Regalado*	Terrestrial Flora, Entomology and Benthic Survey	Deceased
Alan Salvador*	Water Quality, Hydrogeology and Hydrology	IPCO-281
*Note: *Envitech Environmental Management Consultancy Services, Inc. (Previous EPRMP consultants of NCC)*		

EPRMP Study Schedule & Area

EPRMP Study Schedule

9 The timetable for the EPRMP study is shown in the following table:

PROCESS	EIA STUDY MILESTONES	DATE
PUBLIC CONSULTATION/IEC ACTIVITY	Barangay Labayug	June 14, 2017 Aptil 8, 2018
	Barangay Calunetan	June 16, 2017 April 4, 2018
	Barangay Inmalog	June 17, 2017 April 4, 2018
	Barangay Paldit	June 15, 2017 April 4, 2018
	Barangay Sugcong	June 15, 2017 April 4, 2018
	Sitio Saguitlang	April 8, 2018

EPRMP Study Area

10 The proposed project site is situated in Brgy. Labayug in the Municipality of Sison, Pangasinan, Region I (Ilocos Region). Initially, the project impact area generally consisted of the 18.3-hectare project footprints as the direct impact area (DIA) and the areas in the immediate vicinity of the project site in the host barangay LGU Labayug as the indirect impact area (IIA). In accordance with the guidelines provided in DAO 2017-15, after the completion of the EIA study, the delineation of the direct and indirect impact areas was updated as follows:

- For the Land component, the direct impact area (DIA) pertains to the areas that will be cleared and developed for the construction and operation of the proposed project components, which are identified in **Section 1.4**.

- For the Water component, the DIA refers to the location of the deep well within the project site that will be tapped to supply the water requirements of the project. Nearby creek and groundwater sources were considered in the general characterization of the project area.

- For the Air component, the DIA covers the areas within the host barangay of Labayug where the ground-level concentrations (GLC) of total suspended particles (TSP), the criteria pollutant of potential concern, were projected to exceed 40 µg/Ncm based on 1-hr averaging time. According to the dispersion modelling, the maximum GLC does not exceed the standards stated in DAO 2000-81.

- For the People component, the IIA encompasses the communities in the host Municipality of Sison, particularly Brgy. Labayug (host barangay), which are expected to benefit from the employment, business opportunities, taxes, and other potential socio-economic contributions of the project.

EPRMP Methodologies

11 The methods employed in each of the four modules of the EPRMP study are summarized as follows:

EIA MODULE	METHODS	PURPOSE
LAND	• Review of land use plan in the host municipality of Sison, Pangasinan • Soil sampling and quality analysis • Review of relevant geologic maps covering the study area • Assessment of terrestrial ecology in the study area	• To assess land use/zoning compatibility of the proposed project • To establish baseline information on soil quality in the proposed project site • To assess possible impacts of geologic hazards on the proposed development • To establish baseline information on terrestrial flora and fauna in the proposed project site
AIR	• Climatological data from the Philippine Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) • Review of NCC's and SMNCI's self-monitoring reports on ambient air quality, noise level and stack emissions • Air dispersion modeling	• To assess possible impacts of meteorology on the proposed development • To assess possible impacts of proposed project activities on air quality in the impact area
WATER	• Groundwater and surface water sampling and quality analysis to establish the baseline • Review of available water quality monitoring data covering the study area • Assessment of freshwater ecology in the study area • Review of actual water production and consumption data	• To determine existing groundwater and surface water quality in the area • To assess possible impacts of the project to groundwater and freshwater quality and ecosystem.
PEOPLE	• Socio-economic and perception survey in the project impact areas • Review of socio-economic profile of the communities in the impact area (Barangay Labayug), Stakeholder consultations (focused group discussion, key informant interview with various stakeholders	• To assess impacts of the project on the project-affected persons • To hear the opinions of stakeholders on the project. • To ensure that the company provides social development programs suitable for the project-affected community.

Scoping and Public Participation

Information and Education Campaign

12 Various information and education campaign (IEC) and focused group discussions (FGDs) were conducted to the affected barangays last June 2017 and April 2018 by the Envitech Environmental Management Consultancy Services, Inc., the former EPRMP consultant of SMNCI.

Socio-Economic and Perception Survey

13 As part of the baseline characterization and impact assessment on People, a socio-economic and perception survey was conducted last June 25, 2019. The survey covered the residents of Barangays Labayug, Paldit, inmalog, Calunetan and Sugcong with a total of 295 respondents.

14 Each respondent was asked to fill out a two-page survey form, which was written in Tagalog. The perception survey form had two parts. The first part contained 11 questions on the respondent's profile, while the second part had six questions that aimed to gauge the awareness and gather the opinion of the respondent regarding the proposed project.

EPRMP Summary

Summary of Alternatives

Site Selection

15 No alternative sites were suggested since the best area to build Line A & B is within the current NCC facility because of a variety of reasons. Buildings Line A & B within the current site is more economical since the new project can have shared facilities with the existing facility. Furthermore, there will be significantly less environmental impacts if Line A & B are built within the existing factory as opposed to building in a new area. There is no need for land clearing if the facility is built within the existing NCC complex, which should lessen impacts on land, water, and air. Transportation of raw materials is also more convenient since the source is located adjacent to the proposed site. Also, people in the area are already quite receptive regarding the existence of the cement plant in the area.

Technology Selection

16 There are two types of cement production processes: the wet process and the dry process. **SMNCI** will still be using dry process because of its minimal water requirement. The savings in fuel cost by using the dry process as opposed to the wet process is the compelling reason why modern cement plants use the dry process.

Resources and Alternative Fuels

17 The proponent is committed to improve the cement production in its project by seeking energy efficient processes and sustainable alternative energy sources. They are considering the use of alternative fuels, which is well proven and well established in most cement industries in Europe and Asia.

18 Possible alternative fuels that can be used for the proposed cement plant include industrial wastes such as: used tires, waste oils, pet coke, rice husks and refuse derived fuel. The use of waste as alternative fuel in cement production has numerous environmental benefits such as:

- The use of waste will reduce the use of non-renewable fossil fuels, such as coal, and reduce the environmental impacts associated with coal mining. The use of waste as alternative fuel will contribute towards lowering of greenhouse gases emissions by reducing waste materials to be incinerated in municipal waste incinerators.
- The use of waste as alternative fuel is technically sound, since the process basically destroys the organic components and retains the inorganics, such as insoluble residues, ashes and silicates, and integrates these to the product. Cement kilns have a number of characteristics which make them ideal installations for alternative fuels to be vaporized and burnt safely. The following characteristics are high operating temperature, long residence time, presence of oxidizing atmosphere and alkaline environment, high thermal inertia, retention of ash in clinker and the continuous supply of fuel.
- Concrete made from cement manufactured using alternative fuels will have the same properties as concrete made from cement manufactured using fossil fuel as the heavy metal concentrations in concrete are not significantly changed by the use of alternative fuels. It is expected that quantities of leached metals will be immeasurable and significantly below levels allowed for drinking water.

No Project Options

19 If the proposed cement plant will not be pursued, the cement market will be affected. Cement prices may be higher if the supply does not meet the current demand. The market may also resort to buying of imported cement instead of the local cement if the supply is low.

20 The proposed project will also provide job opportunities to about 200 workers during the operation. It will also generate additional local taxes and revenues. Estimated annual business tax for the project is ~Php 17-35 Million and ~Php 124-166 Million for the real property tax. These positive impacts will not be realized if the proposed project will not push through.

Key Findings of the Environmental Baseline Studies

21 The findings of the environmental baseline studies conducted for each of the four EIA modules are summarized in the following table.

MODULE	SUMMARY OF FINDINGS
LAND	
Land Use and Classification	▪ The area where the proposed project is situated is designated as industrial zone. ▪ The proposed project site does not fall within any declared ECA and is not covered by any tenurial instrument.
Geology/Geomorphology	▪ There are three fault lines near the location of the proposed SMNCI cement plant. ▪ The project site has medium susceptibility in terms of earthquake-induced landslide. ▪ The project site is not susceptible to liquefaction. ▪ The project site has high to moderate susceptibility to landslide. ▪ The project site is not a flood-prone area. ▪ There are no active volcanoes near the project site. ▪ The project site is not prone to tsunami.
Terrestrial Ecology	▪ From the terrestrial flora survey, 2 species are considered as endangered, one species is vulnerable, and 3 species are critically endangered according to the IUCN Red List of Threatened Species. On the other hand, based from the DAO 2017-11, there are one species that is endangered, one species is critically endangered and five are vulnerable.

MODULE	SUMMARY OF FINDINGS
	▪ There are no critically endangered fauna species found in the project site based from the IUCN list. However, only the *Python reticulatus* (Reticulated phyton) was listed in the DAO 2004-15 as other threatened species (OTS).
WATER	
Hydrology/Hydrogeology	▪ The project site is located within the catchment area of Aloragat River. There are four creeks near the project site; Buli Creek, Bettac Creek, Sapid Creek and Cabuar Creek.
Competition in Water Use	▪ The proposed cement plant will require water of 3,996 m^3/day. ▪ Deep wells will be constructed as water source.
Water Quality	▪ SW1, SW3, SW4 and SW5 exceeded the standard for fecal coliform. All the stations have high total coliform content. ▪ All the groundwater samples collected exceeded the standard limit for fecal coliform
Freshwater Ecology	▪ Station 1 and Station 2 have the highest number of macroinvertebrate individuals observed with 63 and 50 individuals, respectively. These transects in Sapid creek are located near the spring pond where riparian vegetation thrives like bamboo, figs and other shade trees favorable for macroinvertebrates growth and survival. ▪ Family Culicidae, Family Ampulariidae and Family Gyrinidae are the most abundant species.
AIR	
Meteorology	• The project area mainly belongs to Type I climate under the modified Coronas classification (two pronounced seasons, dry from December to May and wet from June to November). • Temperature is highest in April and lowest in January. • The rainiest month is August with mean monthly rainfall values of 581.3mm. The driest month in the area is January with only 6.7 mm of rainfall. • An average of 5 cyclones pass through the area every three years.
Ambient Air Quality and Noise	All sampling stations showed acceptable ambient air and noise conditions, with the values below the specified NAAQS and NPCC limits, respectively.
PEOPLE	
	▪ Water supply sources in Sison and Pozorrubio include piped connection, deep wells, shallow wells and spring sources. ▪ Sison is served by 2 power supply service providers namely: Benguet Electric Cooperative (BENECO) and La Union Electric Cooperative (LUELCO). ▪ The municipality of Pozorrubio is served by a power supply service provider namely: Pangasinan III Electric Cooperative, Inc. (PANELCO III). ▪ The consistent leading cause of morbidity in Sison (2014-2018) was Hypertension and Upper Respiratory Tract Infection. ▪ Based on the perception survey, (~60%) of all the respondents have prior knowledge about the proposed project. (36.2%) of the respondents believed that the proposed project would be beneficial for their respective communities. ▪ The most cited potential positive impact of the project for the impact Barangays is employment generation (76%), followed by increased local tax revenue collection (28%). ▪ Conversely, the most cited potential negative impact of the project is air pollution (84%), followed by water (45%) and land (33%) pollution.

Integrated Summary of Impacts and Residual Effects After Mitigation

22 The main project impacts of the proposed Project for each environmental component are summarized in the following table.

POTENTIAL IMPACTS	PROJECT PHASES	DESCRIPTION	MITIGATING MEASURES
LAND			
Devaluation of land value as a result of improper solid waste management and other related impacts	Construction, Operation, Abandonment	Solid waste is expected to be produced	Implementation of a solid waste management plan
Soil erosion/Loss of topsoil	Construction	There may be some soil erosion due to the earth movement during the construction	Limitation of earth movement to areas where necessary
Change in soil quality/fertility	Construction, Operation, Abandonment	There is a risk of soil contamination due to the maintenance of heavy equipment	Use sawdust, rice hulls, or coir dusts to absorb the oil spills
WATER			
Degradation of ground water quality/ surface water quality	Construction /Operation	Accidental oil spill from delivery trucks	• Use sawdust, rice hulls, or coir dusts to absorb the oil spills • Maintain canal in the maintenance and repair area of vehicles and equipment
	Construction/ Operation	Ground and surface water contamination from improper disposal of wastes, percolated wastewater, sludge and fecal matter	• Provision of sanitation facilities for workers (e.g. toilets, showers, etc.) • Provision of Sewage Treatment Plant
Degradation of surface water quality	Construction, Operation	Possible siltation and surface runoff Increase in turbidity of surface water	• Construction of siltation ponds
AIR			
Impact on Air Quality	Construction	NO_x, SO_2, and CO emissions from heavy equipment that will be used during construction	Proper maintenance on heavy equipment
	Operation	TSP and PM_{10} emissions from the cement plant is of primary concern	• Installation of bag filters that will control at least 90% of the emissions from the pyro-processing and cement grinding facility • Road watering within the plant site to control dust
		Gaseous emissions are expected from the kiln and the coal mill.	• Proper maintenance of equipment to ensure efficiency
		Heavy metal emissions are expected from the kiln due to use of alternative fuels	• Bag filters can also control up to 92% of heavy metal emissions
Increase in Ambient Noise Level	Construction/ Operation	Noise will be generated by heavy equipment during construction	• Maintenance of engines and other mechanical parts of the equipment • Installation of exhaust mufflers

POTENTIAL IMPACTS	PROJECT PHASES	DESCRIPTION	MITIGATING MEASURES
		The cement plant will generate some noise	• Constructing enclosures surrounding the project site • Maintenance of vegetation surrounding the area to serve as natural noise barriers
PEOPLE			
Threat to Public Health and Safety	Construction Operation	• Dust may cause negative health effects (i.e., respiratory) to the community and workers if not properly mitigated • Crime incidence may also increase in the local community	• Conduct of medical missions and regular check-ups to workers and host barangay • Coordination with Municipal Health Officer (MHO) and barangay health units to address health-related needs of the community • Coordination with barangay officials to ensure peace and order among workers and community members
Generation of Local Benefits from the Project	Operation	• Generation of additional source of income and livelihood • Additional revenue for the local government • Increased basic social services • Addition and improvement of local residential dwelling	Implementation of social development programs that are responsive to local needs in the impact area
Traffic Congestion	Construction Operation	Increase in traffic generation in the area due to delivery trucks coming in and out of the Plant	• Coordination with LGU on scheduling and handling the flow of traffic near the project area • Traffic Management Plan

Risks and Uncertainties

23 The risks and uncertainties identified relating to the EIA findings of for each environmental component are summarized in the following table.

MODULE	RISKS AND UNCERTAINTIES	IMPLICATION ON DECISION MAKING
Air/People	Failure of existing air pollution control devices	Consider redundancy for emergency air pollution control

SECTION 1

PROJECT DESCRIPTION

1 **Northern Cement Corporation (NCC)** currently has ECC Reference No. 9909-106-105 for its Line 3 cement plant (5,000 TPD clinker) and quarry operation (8,500 TPD limestone and 2,100 TPD shale) in Barangay Labayug, Sison, Pangasinan, secured last February 24, 2000. However, only the quarry was operated, and Line 3 was never constructed due to economic downturns.

2 NCC entered an agreement with its sister company, **San Miguel Northern Cement, Inc. (SMNCI)**, that SMNCI will take over the construction and operation of the NCC Line 3 (now referred as SMNCI Line A) cement plant project but the quarry operation will still be under the NCC. With this, SMNCI will be the new owner of ECC Reference No. 9909-106-105. A letter of request for the transfer of ownership of the ECC was submitted by NCC and SMNCI to the EMB last March 5, 2019. Last June 18, 2019, the EMB responded to the request letter and provided the requirements that should be submitted to grant the request of transfer of ownership. A copy of the communication letters is attached in **Annex 6**.

3 SMNCI intends to expand the existing clinker production capacity of the cement plant. SMNCI will construct two lines of cement plant, Line A and Line B that will have a rated capacity of 5,750 TPD per line. The construction of Line A (formerly Line 3) is on-going. With this, SMNCI will amend the ECC Reference No. 9909-106-105 to increase the clinker production capacity from 5,000 TPD to 11,500 TPD.

4 The operation of the quarry of NCC will be transferred to the ECC of NCC for its Line 1 and Line 2 cement plant (ECC Ref. No. 9207-032-301c). Another EPRMP is being prepared for this. The limestone and shale requirement for the operation of the SMNCI cement plant will be mostly supplied by the NCC quarry.

5 **Table 1-1** shows the details of the project, the Proponent, and the EIA Preparer.

Table 1-1: Basic Information on the Proposed Project, Proponent, and EIA Preparer

Name of Project	**SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT**			
Project Location	Province of Pangasinan, Municipality of Sison, Barangay Labayug			
Project Category & Type (based on Annex A of MC 2014-005 Guidelines)	Non-Metallic Mineral Processing			
Project Size	**Existing**	**Proposed Expansion**		
	Line 3	**Line A**	**Line B**	**Total**
	5,000 TPD	5,750 TPD	5,750 TPD	11,500 TPD
Proponent Name	**SAN MIGUEL NORTHERN CEMENT, INC.**			
Proponent Authorized Representative	**Mr. Oliver R. Gorrospe** Vice President & General Manager			
Proponent Address and Contact Details	3rd Floor, 155 EDSA, Brgy. Wack-Wack, Mandaluyong City, Metro Manila, Philippines			
EIA Preparer (Consultant)	**LCI ENVI CORPORATION**			
Preparer Contact Person	**Engr. Jose Marie U. Lim, MSc.** EIA Team Leader			
Preparer Address and Contact Details	Unit 8L-M Future Point Plaza 3 111 Panay Avenue, South Triangle Quezon City, Metro Manila, Philippines Tel. No.: (632) 442-2830 Fax No.: (632) 961-9226			

6 **Table 1-2** summarizes the coverage and status of ECC 9909-106-105.

Table 1-2: Status of ECC 9909-106-105

Reference No	Year issued	Project Proponent	Existing Coverage		Existing Status	Proposed Amendment
			Quarry	Cement Production		
9909-106-105	2000	Northern Cement Corporation	163 hectares of the 630-hectare MPSA-106-98(1) 8,500 MTPD limestone quarry 2,100 MTPD shale quarrying	5,000 MTPD clinker (Line 3)	• NCC Line 3 was never constructed, but quarry is operating • SMNCI Line A (in place of Line 3) is currently being constructed.	• Transfer of ownership to SMNCI • Cement plant expansion from NCC Line 3 to **SMNCI** Lines A & B with total clinker production capacity of 11,500 TPD • Exclude quarry operation

1.1 Project Location and Area

1.1.1 Project Location

7 The proposed **SMNCI** facility will be constructed within the current complex owned by NCC in Barangay Labayug, Sison, Pangasinan. The general location map of the proposed project is shown in **Figure 1-1**. The geographic coordinates defining the boundary of the proposed project site are provided in the table below.

Table 1-3: Coordinates of the Proposed Project Site

POINT	LATITUDE (N)	LONGITUDE (E)
1	16°10'01.15379"	120°33'51.36625"
2	16°10'01.54546"	120°33'53.75321"
3	16°10'00.29393"	120°33'53.96937"
4	16°10'00.66578"	120°33'56.03097"
5	16°10'05.46708"	120°33'55.39318"
6	16°10'06.17857"	120°33'59.71004"
7	16°10'03.70258"	120°34'00.14698"
8	16°10'04.00327"	120°34'01.98216"
9	16°10'07.17298"	120°34'01.07317"
10	16°10'11.30051"	120°33'55.18522"
11	16°10'16.20347"	120°33'53.80056"
12	16°10'15.38905"	120°33'49.34476"
13	16°10'20.50338"	120°33'48.34384"
14	16°10'19.46091"	120°33'42.64070"
15	16°10'10.98199"	120°33'44.30029"
16	16°10'11.32838"	120°33'46.19563"
17	16°09'55.98473"	120°33'49.19793"
18	16°09'56.47512"	120°33'52.18794"

1.1.2 Project Area

8 The proposed 18.3-hectare **SMNCI** cement facility will be constructed in a portion of the NCC property located in Barangay Labayug, Sison, Pangasinan.

9 The nearest industrial plants near the proposed cement grinding facility are listed in the table below:

Table 1-4: Proximity of Other Plants with the Project Area

DIRECTIONAL REFERENCE (FROM THE PROJECT AREA)	TYPE OF PLANT	BRIEF DESCRIPTION
East *(Brgy. Tiblong, San Fabian, Pangasinan)*	LPG Terminal	▪ Pryce Gases Inc. operates a 7.5-hectare liquified petroleum gas (LPG) terminal with a storage capacity of 8,400 MT in Brgy. Tiblong, San Fabian. It is approximately 15 kilometers away from the project site.
Southwest *(Brgy. San Roque, San Manuel, Pangasinan)*	Hydroelectric Power Plant	▪ San Roque Power Corporation operates a hydroelectric power plant with a capacity of 435 MW in the Municipality of San Manuel, Pangasinan. It is approximately 13 kilometers away from the project site.

1.1.3 Project Impact Areas

10 The project impact area generally consisted of the 18.3-hectare project footprint as the direct impact area (DIA) and the areas in the immediate vicinity of the project site in the host barangay

LGU Labayug as the indirect impact area (IIA). In accordance with the guidelines provided in DAO 2017-15, after the completion of the EIA study, the delineation of the direct and indirect impact areas was updated as follows:

- For the Land component, the direct impact area (DIA) pertains to the areas that will be cleared and developed for the construction and operation of the proposed project components, which are identified in **Section 1.4.**

- For the Water component, the DIA refers to the location of the deep well within the project site that will be tapped to supply the water requirements of the project. Nearby groundwater sources were considered in the general characterization of the project area.

- For the Air component, the DIA covers the areas within the host barangay of Labayug where the ground-level concentrations (GLC) of total suspended particles (TSP), the criteria pollutant of potential concern, were projected to exceed 40 µg/Ncm based on 1-hr averaging time. According to the dispersion modelling, the maximum GLC does not exceed the standards stated in DAO 2000-81.

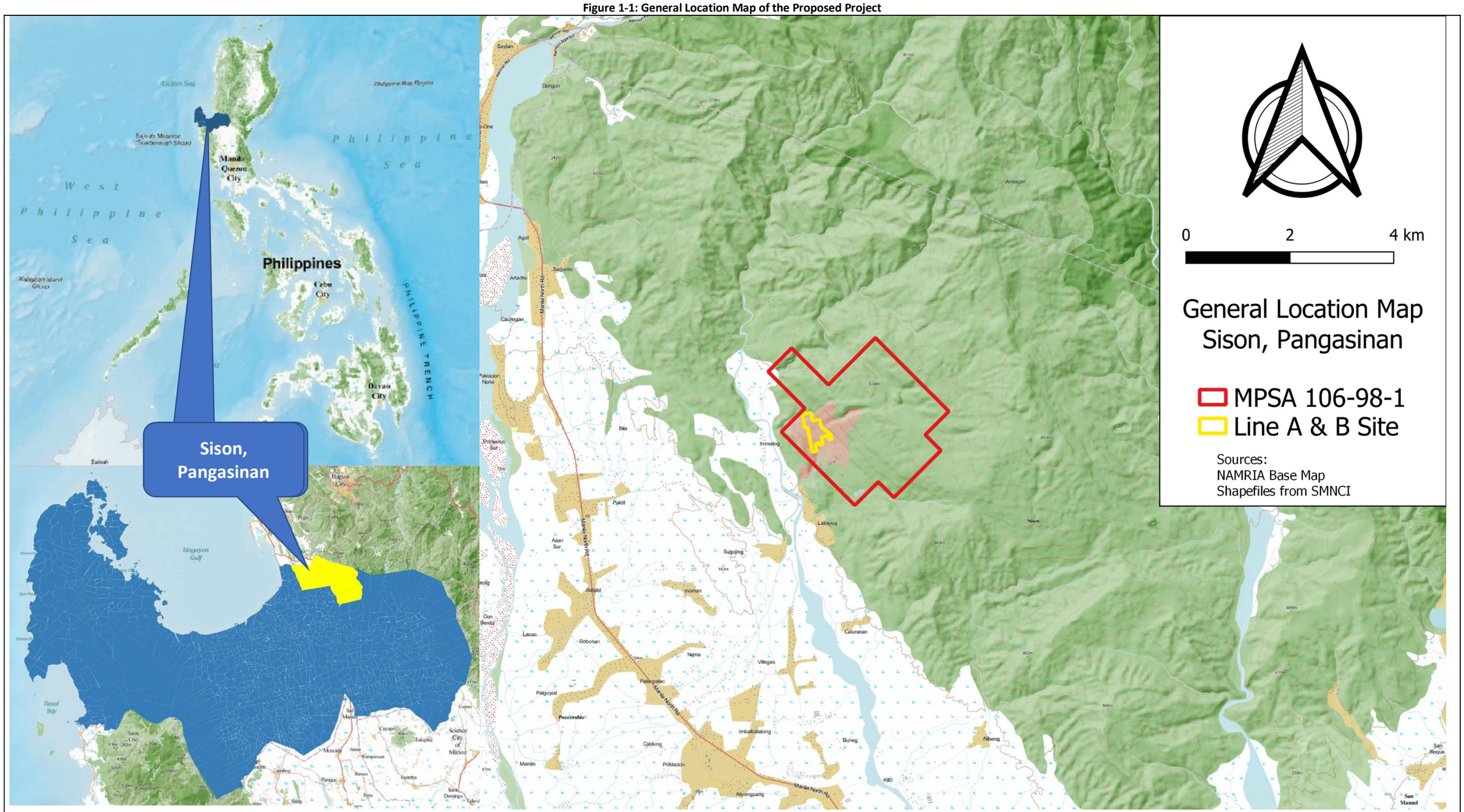
- For the People component, the IIA encompasses the communities in the host Municipality of Sison, particularly Brgy. Labayug (host barangay), which are expected to benefit from the employment, business opportunities, taxes, and other potential socio-economic contributions of the project.

11 The impact area delineation for the proposed project is graphically presented in **Figure 1-2.**

1.1.4 Accessibility of the Project Site

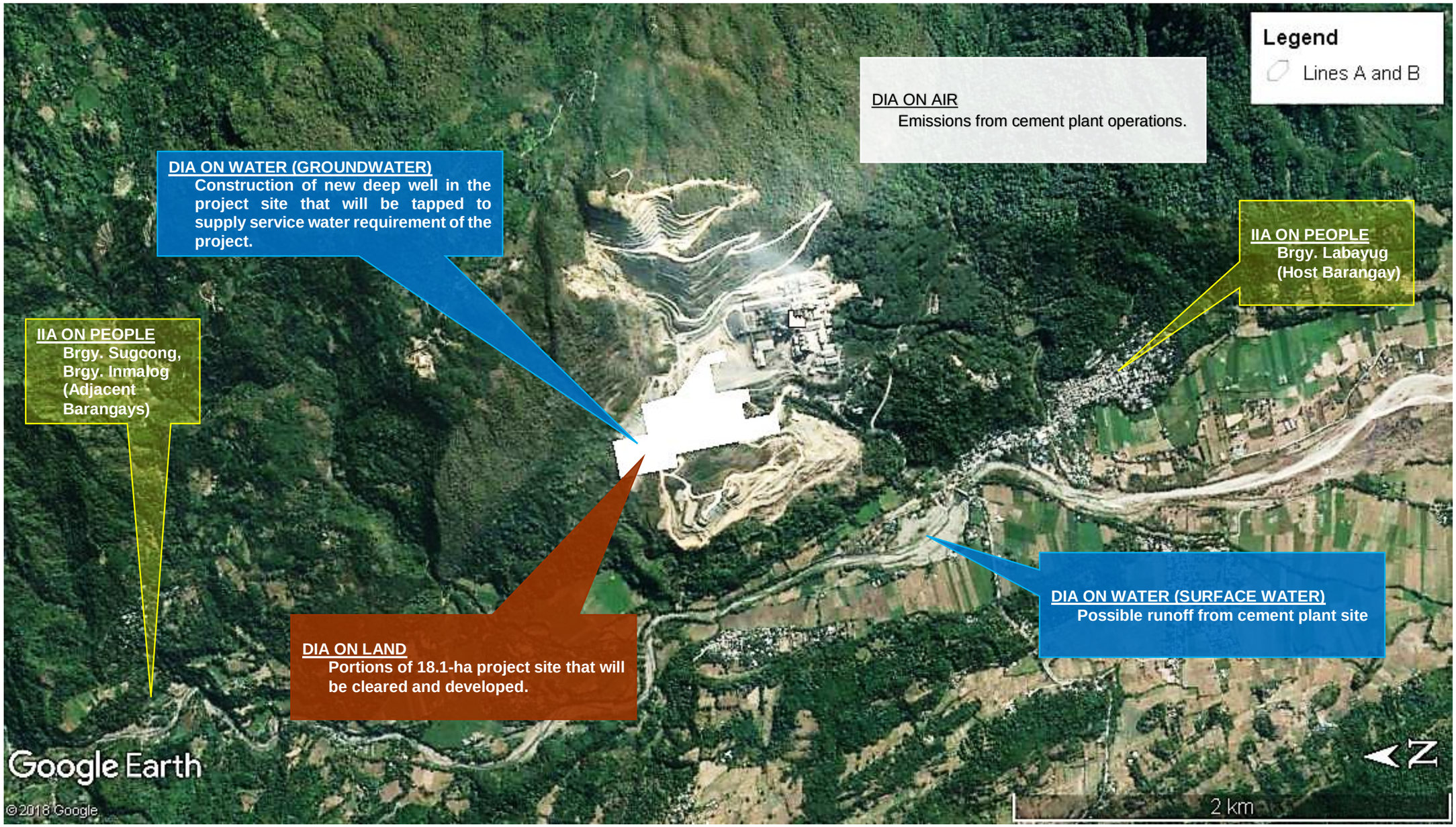
12 The proposed project site is approximately 212 kilometers away (3 hours and 10 minutes) from Kilometer Zero in Manila. It is accessible by any type of land vehicle. The fastest route will traverse the North Luzon Expressway (NLEX) and Tarlac-Pangasinan-La Union Expressway.

Figure 1-1: General Location Map of the Proposed Project



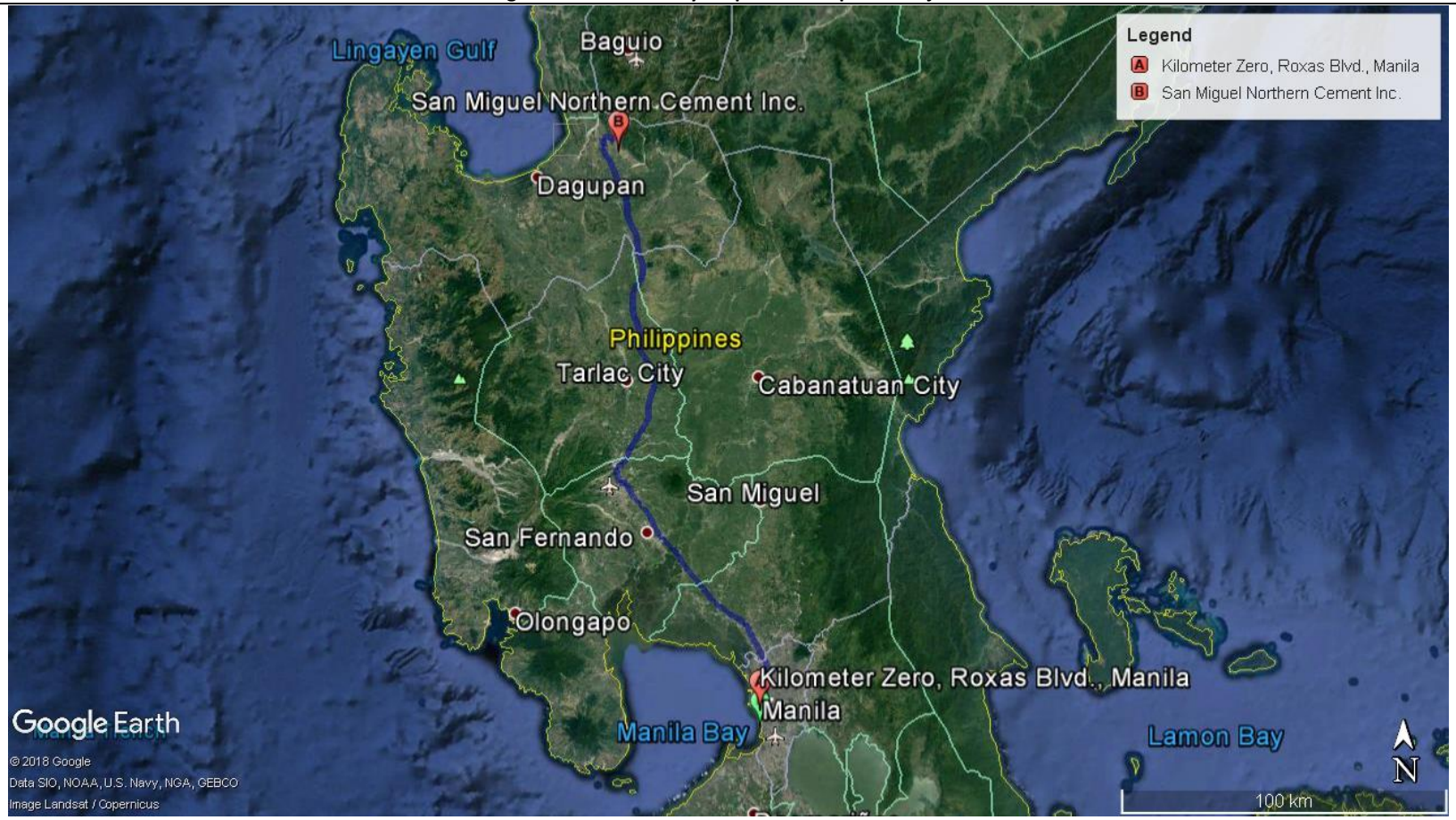
PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **GENERAL LOCATION MAP OF THE PROPOSED PROJECT**	FIGURE NO.: **1-1**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: MAP GENERATED IN QGIS BASE MAP: NAMRIA & JICA Map No. 3033-II (Dagupan City)

Figure 1-2: Primary and Secondary Impact Areas



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **PRIMARY AND SECONDARY IMPACT AREAS**	FIGURE NO.: **1-2**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: MAP GENERATED IN GOOGLE EARTH Satellite Imagery taken last 12 February 2019

Figure 1-3: Accessibility Map of the Proposed Project Site



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ACCESSIBILITY MAP OF THE PROPOSED PROJECT SITE**	FIGURE NO.: **1-3**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: MAP GENERATED IN GOOGLE MAPS

1.2 Project Rationale

13 Expansion of the cement plant is in line with the goal of the national government to build infrastructure, as cement is a major construction material. Public and private developments hinge on the steady supply of cement. Furthermore, higher supply of cement leads to lower prices. Cement is almost universal in terms of building applications—ranging from government projects such as low-cost socialized housing, public elementary schools and hospitals, highways and bridges, and to privately-funded endeavors such as condominiums, commercial centers, and individual housing units.

14 It is important to maintain the supply of cement to maintain its prices. If supply of cement curtails, higher prices of cement may impede the progress of infrastructure projects, which may then lead to cutting of basic social services. A solution to low supply of cement is importation, but this solution undermines the local economy. Establishing cement manufacturing facilities in the country us important to provide a reliable supply of cement, lessen the dependence on imported cement products, and to assure competitive prices that supports local economy.

15 The Philippine Board of Investments (BOI) is looking for investors as it expects demand to bubble to 40 million tons/year by 2020[1]. This increase in demand is aided by the current administration's plan to focus its spending on infrastructure building. According to the Cement Manufacturers' Association of the Philippines, the cement facilities in the country have an installed and operating capacity of 34.5 million tons annually[2]. Based on the reports, a demand of about 5.5 million metric tons must be filled. Additionally, other sources warn that the current shortage of cement may delay construction of new buildings, which in turn will hold back creation of more spaces that can be used for business enterprises[3].

16 Expansion of the cement plant also has effects on the local economy Sison, Pangasinan. The project can contribute to the development of the area by providing local employment, tax contributions, and increased commercial trading.

1.3 Project Alternatives

17 Alternatives analysis is carried out to determine the most favorable alternative considering such factors as economic viability, technical feasibility, magnitude and extent of impacts on environment and people. The project is analyzed as the preferred alternatives while assessing "without the project" alternatives or "do nothing" alternatives. Technology employed by the project was also assessed against similar technologies employed in the sector. **Table 1-5** compares the environmental impacts of constructing and operating a full cement plant as opposed to the no-project scenario.

Table 1-5: Comparison of Anticipated Environmental Impacts of Project Alternatives

ALTERNATIVES	ANTICIPATED ENVIRONMENTAL IMPACTS
Full Cement Plant	• **Land:** Site preparation and earthworks for a wider tract of land may entail considerable changes in the surface landform/terrain/slope and threat to terrestrial ecology due to vegetation removal and loss of habitat. Solid waste generation may be higher due to use of more resources and employment of more personnel. • **Water:** Construction and operation of larger facilities may have higher water supply requirement that may, in turn, result to higher wastewater generation.

[1] Manila Bulletin. BOI seeks more cement investments as infra projects lifting demand. 2 June 2017.
[2] Inquirer.net. Cement supply enough for Build, Build, Build. 17 January 2019
[3] Philippine News Agency. Cement shortage seen to delay new construction projects. 10 April 2019

ALTERNATIVES	ANTICIPATED ENVIRONMENTAL IMPACTS
	• **Air:** Dust emissions from the cement processing may also adversely affect ambient air quality in the project area if not properly mitigated. • **People:** Local benefits from the large-scale project (i.e., increased employment, social and economic activities, tax revenues, and basic social services) may be greater. However, dust generated from the cement plant may cause adverse health effects to the community and workers if not properly mitigated.
No-Project Scenario	• **Land:** Quarrying activities to supply raw materials for NCC will continue. Adverse impacts due to quarrying will still be experienced. • **Air:** The ambient air quality in the area, as well as the source emissions from the facilities of NCC Line 1 and 2 are within DENR standards. • **Water:** The current operation will continue to consume water for industrial and domestic uses. • **People:** The no-project scenario entails loss of local employment and service opportunities. If the project is not pursued, the supply of cement will be affected, especially with the Duterte Administration's push for infrastructure development under the "AmBisyon Natin 2040" and the "Build, Build, Build" program.

1.3.1 Site Selection

18 No alternative sites were suggested since the best area to build Line A & B is within the current NCC facility because of a variety of reasons. Building Line A & B within the current site is more economical since the new project can have shared facilities with the existing facility. Furthermore, there will be significantly less environmental impacts if Line A & B are built within the existing factory as opposed to building in a new area. Transportation of raw materials is also more convenient since deliveries will be focused only in one area. There is no need for land clearing if the facility is built within the existing cement plant, which should lessen impacts on land, water, and air. Also, people in the area are already quite receptive regarding the existence of the cement plant in the area.

1.3.2 Technology Selection

19 There has recently been a global trend for *"stand-alone"* cement-grinding plants instead of installing grinding units within integrated cement lines. **San Miguel Northern Cement, Inc.** will choose to implement a cement full cement plant instead of the cement grinding facility because of the presence of raw materials in the area.

20 There are two types of cement production processes: the wet process and the dry process. **SMNCI** will use dry process because of its minimal water requirement. The savings in fuel cost by using the dry process as opposed to the wet process is the compelling reason why modern cement plants use the dry process.

1.3.3 Resources and Alternative Fuels

21 The proponent is committed to improve the cement production in its project by seeking energy efficient processes and sustainable alternative energy sources. They are considering the use of alternative fuels, which is well proven and well established in most cement industries in Europe and Asia.

22 Possible alternative fuels that can be used for the proposed cement plant include industrial wastes such as: used tires, waste oils, pet coke, rice husks and refuse derived fuel. The use of waste as alternative fuel in cement production has numerous environmental benefits such as:

- The use of waste will reduce the use of non-renewable fossil fuels, such as coal, and reduce the environmental impacts associated with coal mining. The use of waste as alternative fuel will contribute towards lowering of greenhouse gases emissions by reducing waste materials to be incinerated in municipal waste incinerators.
- The use of waste as alternative fuel is technically sound, since the process basically destroys the organic components and retains the inorganics, such as insoluble residues, ashes and silicates, and integrates these to the product. Cement kilns have a number of characteristics which make them ideal installations for alternative fuels to be vaporized and burnt safely. The following characteristics are high operating temperature, long residence time, presence of oxidizing atmosphere and alkaline environment, high thermal inertia, retention of ash in clinker and the continuous supply of fuel.
- Concrete made from cement manufactured using alternative fuels will have the same properties as concrete made from cement manufactured using fossil fuel as the heavy metal concentrations in concrete are not significantly changed by the use of alternative fuels. It is expected that quantities of leached metals will be immeasurable and significantly below levels allowed for drinking water.

1.3.4 No Project Option

23 If the proposed project will not be pursued, the cement market will be affected. Cement prices may be higher if the supply does not meet the current demand. The market may also resort to buying of imported cement instead of the local cement if the supply is low.

24 The proposed project will also provide job opportunities to about 200 workers during the operation. It will also generate additional local taxes and revenues. Estimated annual business tax for the project is ~Php 17-35 Million and ~Php 124-166 Million for the real property tax. These positive impacts will not be realized if the proposed project will not push through.

1.4 Project Components

1.4.1 Major Components

25 Line A & B cement manufacturing lines will be built adjacent to the NCC Line 1 and 2 and will share some support facilities with the existing facilities. As previously discussed, NCC Line 3 was never constructed. Therefore, new facilities for **SMNCI** Line A & B will be constructed – no NCC Line 3 components will be modified or used for the new lines.

26 The project components for SMNCI Line A & B are summarized in **Table 1-6** while **Figure 1-4** shows the plant layout. Some of the facilities of SMNCI will be shared to NCC for the operation of the NCC Line 1 and Line 2 cement plant expansion. These facilities are listed in **Table 1-7**.

Table 1-6: Project Components of SMNCI Line A & B

Component	Line A	Line B
Raw Material Crushing System	Limestone - 1,400 tons per hour (tph) capacity with an impact hammer crusher Additive Materials – 500 tons per hour (tph) capacity with an impact hammer crusher	
Raw Material Storage	Limestone - circular dome type 60,000 MT capacity Additive materials - Longitudinal storage with 50,000 MT capacity and with mechanical reclaimer	
Coal Crusher	2.0x 2.0m Ø Single Rotor Hammer Crusher 500 tph	
Raw Grinding	Vertical Roller Mill, dynamic separator, cyclone dust collector, 420tph capacity	Vertical Roller Mill, dynamic separator, cyclone dust collector, 420tph capacity
Homogenizing Silo	15,000 MT raw meal silo	• 15,000 MT raw meal silo
Plant Dedusting System	Bag Filter with Gas conditioning tower 720,000 cubic meter/hr.	Bag Filter with Gas conditioning tower • 720,000 cubic meter/hr.
Coal Milling	Vertical Roller Mill, dynamic separator, cyclone dust collector, 54tph capacity	Vertical Roller Mill, dynamic separator, cyclone dust collector, 54tph capacity
Rotary Kiln	4.8m Ø x 72m, 3 support station kiln 5,000 MPTD with IKN pendulum grate cooler, low NOx burner	4.8m Ø x 72m, 3 support station kiln 5,000 MPTD with IKN pendulum grate cooler, low NOx burner
Preheater	Suspension, single string, 5 stage w/ Calciner	Suspension, single string, 5 stage w/ Calciner
Clinker Cooler Dedusting System	Bag filter (Fiber glass + PTFE Membrane filter bags) 600,000 cubic meter/hr.	Bag filter (Fiber glass + PTFE Membrane filter bags) 600,000 cubic meter/hr.
Clinker Silo	2 units x 25,000 MT capacity with 1,500MT for off-spec clinker storage	1 unit x 25,000 MT capacity with 1,500MT for off-spec clinker storage
Cement Mill	Vertical Roller Mill, dynamic separator, cyclone dust collector, 270tph capacity	Vertical Roller Mill, dynamic separator, cyclone dust collector, 270tph capacity
Cement Silo	1 unit x 15,000 MT capacity	• 1 unit x 15,000 MT capacity
Cement Packing & Dispatch	2 x 120tph rotary packing machine	
Water Source	1 unit deep well 1 unit induced well at water impounding reservoir	
Air Pollution Facilities	Cyclone separators & bag filters	Cyclone separators & bag filters
Support Facilities	• Medical Clinic • Administration Building • Machine Shop • Warehouse • Access Roads • Guest house/Staff house • Sewage Treatment Plant	

Table 1-7: Shared Facilities with Northern Cement Corporation

Shared Facilities with Northern Cement Corporation	
Operational Facilities	Capacity
Main Crushing Plant	1400 tph
Coal Storage	60,000 mt
Clinker Silo 3	25,000 mt
Clinker Silo 4	25,000 mt
Cement Silo 10	15,000 mt
Bulk Silo 11	5,000 mt
Cement Silo 12	15,000 mt
Packhouse (Roto packer 8 & 9)	2 x 120 tph
Truck Scale (Motorpool area)	120 mt
Truck scale (Main Crusher area)	120 mt
SUPPORT FACILITIES	
• Administration Building • Machine Shop • Warehouse • Access Roads • Guest house/Staff house • Sewage Treatment Plant	

1.4.2 Temporary Facilities (During Construction)

27 Temporary facilities during construction includes: (a) re-purposed container vans which will serve as on-site office and accommodation for workers, (b) sanitary facilities with septic tank (will be emptied-out and condemned after construction is completed), (c) temporary sub-station will be installed to provide power supply during construction activities.

28 To support the construction activities, temporary facilities such as the following will be installed in the project site:

- Re-purposed container vans which shall serve as on-site office and accommodation for workers;
- Sanitary facilities with septic tank that will be emptied-out and condemned after construction is completed;
- Temporary protective fencing and lighting;
- Gatehouse and site security facilities;
- Temporary parking space;
- Temporary and secured equipment and material storage areas (i.e. diesel storage area);
- Temporary site office;
- Emergency spill kits;
- First aid stations;
- Temporary solid and hazardous waste storage areas;
- Portable sanitation facilities;
- Diesel storage tanks;
- Generator sets

Figure 1-4: Plant Layout for the Proposed Project

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **PLANT LAYOUT FOR THE PROPOSED PROJECT**	FIGURE NO.: **1-4**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

1.4.3 Pollution Control Devices

1.4.3.1 Air Pollution Control

29 The priority in the cement industry is to minimize the increase in ambient particulate levels by reducing the mass load emitted from the stacks, from fugitive emissions, and from other sources.

30 Collection and recycling of dust in the kiln gases is required to improve the efficiency of the operation and to reduce atmospheric emissions. For control of fugitive particulate emissions, ventilation systems should be used in conjunction with hoods and enclosures covering transfer points and conveyors. Drop distances should be minimized using adjustable conveyors. Dusty areas such as roads should be regularly sprinkled with water to reduce dust generation.

31 The main air pollution sources in cement manufacturing are the milling or resizing of cement raw materials; homogenizing of milled materials and kiln-feeding, kiln operation, clinker storage and transport to grinding equipment.

32 **Table 1-8** enumerates the air pollution source equipment and control facility.

Table 1-8: Air Pollution Sources with Corresponding Control Facilities

Location	Air Pollution Source Equipment	Air Pollution Control Equipment	Capacity (m^3/hr)
Raw Materials Pre-blending	Limestone Crusher	Baghouse	45,000
	Raw Mill Bins	Baghouse	5,000
	Vertical Raw Mill Line A Transport 1	Baghouse	40,000
	Vertical Raw Mill Line B Transport 1	Baghouse	40,000
	Main Dedusting System Line A	Baghouse	720,000
	Main Dedusting System Line B	Baghouse	720,000
	Continuous Homo Silo Line A	Baghouse	36,000
	Continuous Homo Silo Line B	Baghouse	36,000
Pyro-processing	Vertical Coal Mill Line A	Baghouse	220000
	Vertical Coal Mill Line A, Fine Coal Bins	Baghouse	30,000
	Vertical Coal Mill Line B	Baghouse	220,000
	Vertical Coal Mill Line B, Fine Coal Bins	Baghouse	30,000
	Kiln Feeding System Line A	Baghouse	6,000
	Kiln Feeding System Line B	Baghouse	6,000
	Clinker Cooler Line A	Baghouse	600,000
	Clinker Cooler Line B	Baghouse	600,000
	Clinker Silo 3	Baghouse	30,000
	Clinker Silo 4	Baghouse	30,000

Location	Air Pollution Source Equipment	Air Pollution Control Equipment	Capacity (m^3/hr)
	Clinker Silo 5	Baghouse	30,000
	Sub-Standard Silo 1	Baghouse	30,000
	Sub-Standard Silo 2	Baghouse	30,000
Finish Mill	Vertical Cement Mill Line A	Baghouse	687,600
	Vertical Cement Mill Line A – Transport 1	Baghouse	30,000
	Fly Ash Silo (Line A)	Baghouse	6,000
	Clinker Bin (Line A)	Baghouse	6,000
	Vertical Cement Mill Line B	Baghouse	687,600
	Vertical Cement Mill Line B – Transport 1	Baghouse	30,000
	Fly Ash Silo (Line B)	Baghouse	6,000
	Clinker Bin (Line B)	Baghouse	6,000
Packhouse	Cement Silo 10	Baghouse	12,000
	Cement Silo 12 (Bulk)	Baghouse	6,000
	Packing Machine 1 Line A	Baghouse	20,000
	Packing Machine 2 Line A	Baghouse	20,000

1.4.3.2 Water Pollution Control

33 Since processes for cement production are dry processes, wastewater generated will be limited to domestic wastewater, wastewater during maintenance activities and from surface run-off only. The wastewater flow diagram in SMNCI is presented in **Figure 1-5**.

34 A sewage treatment plant will be constructed and operated by SMNCI. The STP will treat the domestic wastewater from NCC and SMNCI. The design capacity of the STP will be 80 m^3/day.

35 Siltation ponds will be constructed within the cement plant and pre-treat the collected surface run-off. Line A & B cement plant will install siltation and settling pond. Rainwater flows to the existing drainage system inside the plant going to the siltation ponds. Ponds will retain the water until most of the dust particulates and suspended solids settle at the bottom of the pond. In order to maintain the efficiency of the ponds, the ponds will be frequently desilted. Silt in the drainage will also be regularly removed. The collected silt will be re-used as raw material for cement manufacture.

36 Oil and water separator tank with design capacity of 174 m^3 will also be installed within the plant facility to capture oil-contaminated water during operation and maintenance activities. Effluent from this tank will be discharged to the nearby creek.

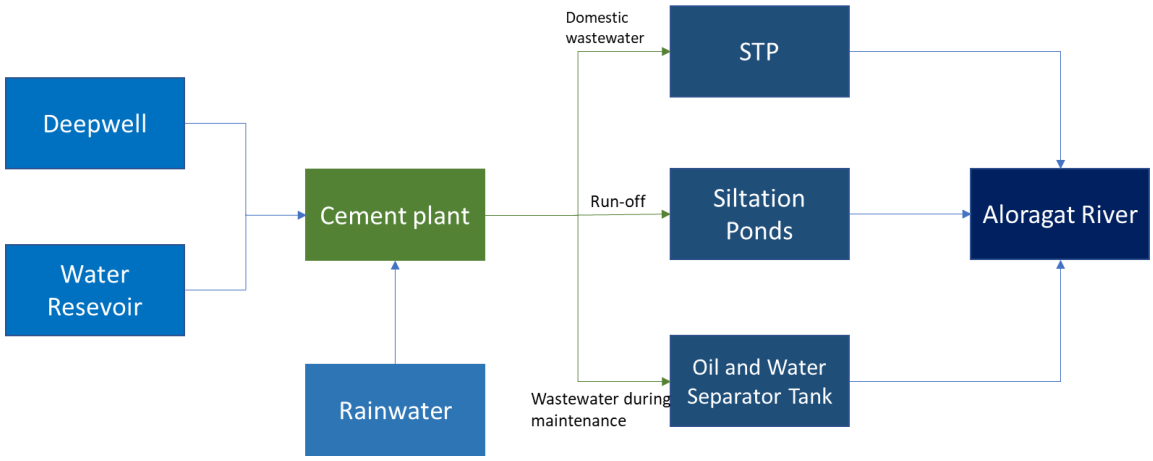
37 The stormwater drainage system within the plant is shown in **Figure 1-6** while the sewer layout of the SMNCI is shown in **Figure 1-7**. The capacities of the water pollution control facilities are shown in

38 **Table** 1-9**.**

Table 1-9: Location and Capacities of Water Pollution Control Facilities

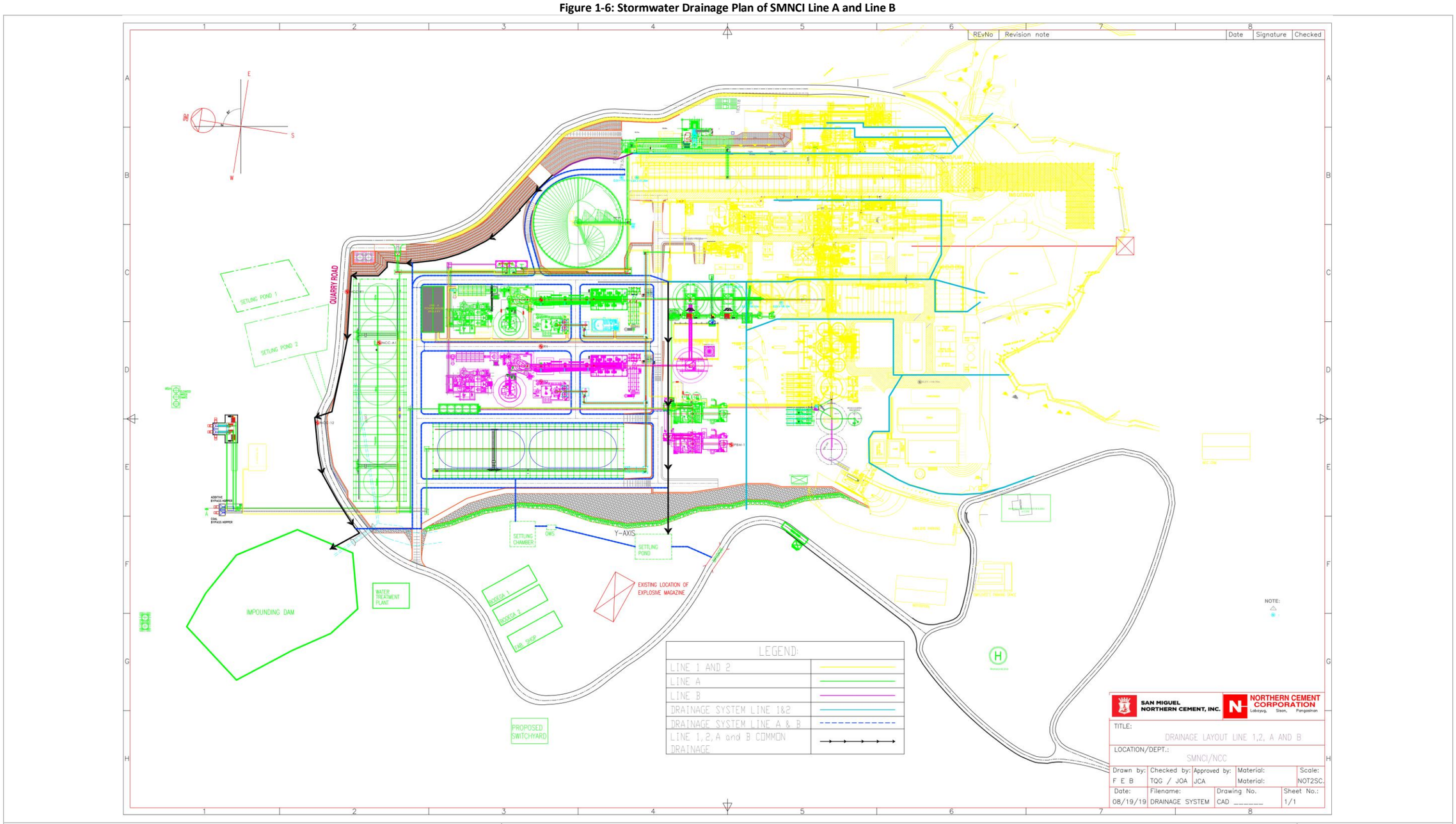
Water Pollution Control	Location	Capacity
Settling Pond	Main Plant Area	1,060.63 m^3
Oil & Water Separator	Coal Storage	174 m^3
Siltation Pond	Before Bagutan Creek	4,500 m^3
Sewage Treatment Plant	SMNCI Cement Plant	80 m^3/day

Figure 1-5: Wastewater Flow Diagram in SMNCI Line A and Line B



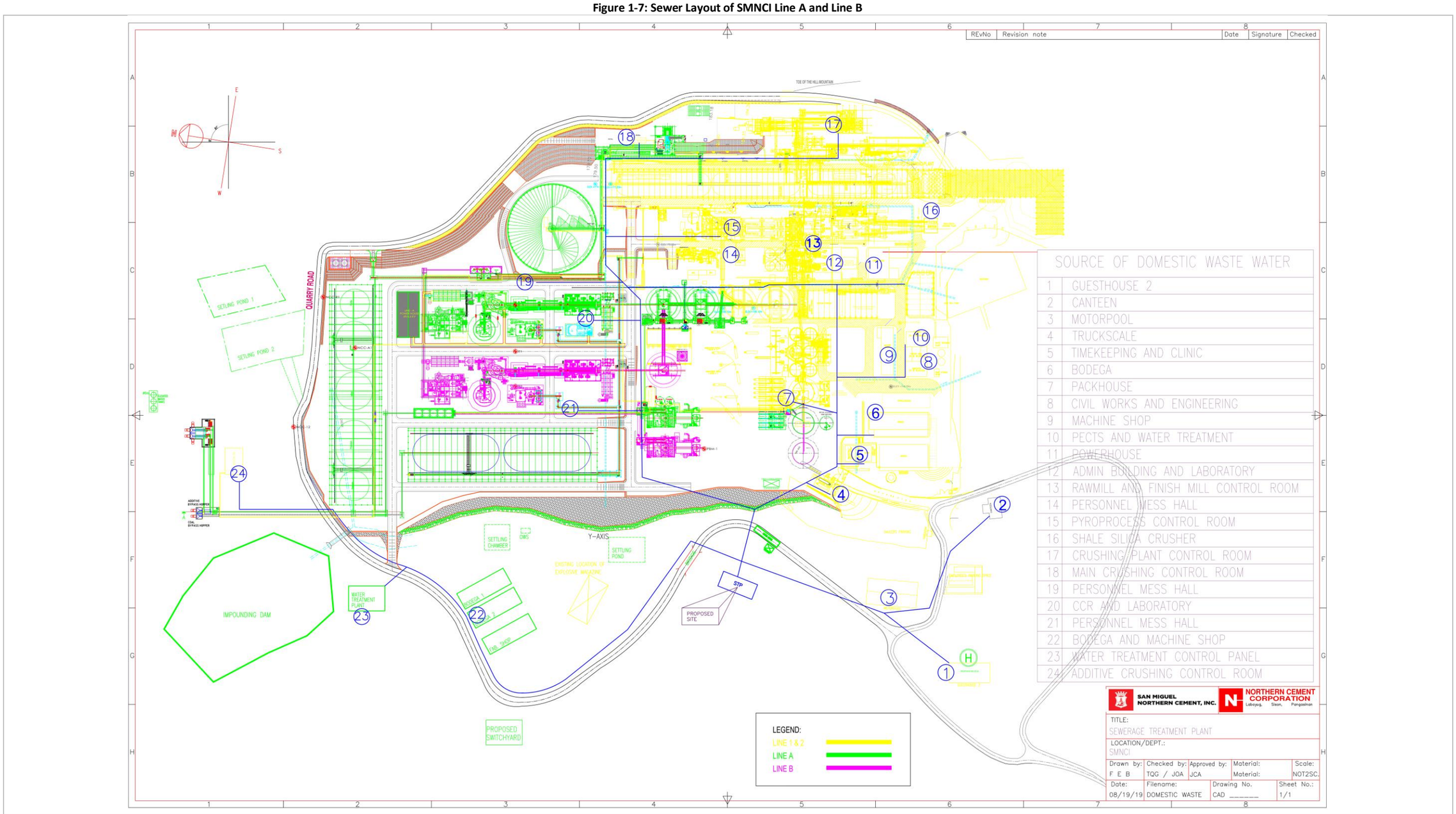
PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **WASTEWATER FLOW DIAGRAM IN SMNCI LINE AND LINE B**	*FIGURE NO.:* **1-5**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

Figure 1-6: Stormwater Drainage Plan of SMNCI Line A and Line B



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **STORMWATER DRAINAGE PLAN OF SMNCI LINE A AND LINE B**	FIGURE NO.: **1-6**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

Figure 1-7: Sewer Layout of SMNCI Line A and Line B



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **SEWER LAYOUT OF SMNCI LINE A AND LINE B**	FIGURE NO.: **1-7**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

1.4.3.3 Solid Waste Control

39 A temporary solid waste storage area will be provided in the site during construction. All solid wastes will be properly segregated and disposed. Designated spoil disposal area will also be provided. All of these will be located inside the project site

40 Solid wastes from the office, dormitory/kitchen and other facilities will be segregated as to bio-degradable or not and will be disposed of accordingly with the help of the municipal government.

1.4.3.4 Controlled Chemicals and Hazardous Materials

41 Similar to NCC Line 1 and 2, this Project will be using and generating controlled chemicals wastes and hazardous materials in its operation. The following controlled chemicals will be used in the Quality Assurance Laboratory once the operation of the cement plant starts.

- Ammonium Hydroxide;
- Sodium Hydroxide;
- Hydrochloric Acid;
- Ethyl Alcohol;
- Ethylene Glycol;
- Ammonium Nitrate

42 Lines A & B will also be generating the following hazardous wastes which will require handling and treatment by trained professionals in properly equipped treatment facilities:

- Spent Lead-Acid Battery
- Busted LED Bulbs
- Clinic Waste
- Used Oil & Lubricants

43 Use of the controlled chemicals entails the generation of hazardous waste chemicals of approximately 2,180 liters of liquid and about 6.13 kg of solid hazardous wastes. SMNCI will apply for permit in compliance to the guidelines under DAO 1992-29, the Implementing Rules and Regulations of Republic Act 6969, the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990.

2.4.7.1 Ash Disposal and Absorption

44 Ash from coal and fuels used in clinkering mix with the materials during the clinkering process and become part of the clinker product. Residual materials of heavy metals in the co-processed industrial wastes such as the heavy fuels adhere to the ash when the fuel is fully combusted and eventually become encapsulated in concrete, away from causing environmental harm or damage. These metallic particulates improve the quality and performance of the resulting cement.

1.4.4 Access Road

45 The existing private road network and proposed industrial road that will be constructed by Northern Cement Corporation will also be utilized by SMNCI for its access road. The new industrial access road will be constructed by NCC traversing barangay Sugcong, Nama, Inoman and Bobonan in Pozorrubio town having its road entry right across the exit/entrance of TPLEX Pozorrubio.

1.4.5 Alternative Fuel

46 The Project will co-process industrial waste materials as part of its utilization of alternative fuels in cement manufacturing to reduce the net carbon footprint of its cement operations. The proponent will submit its technical position on its use of alternative fuels to EMB and secure the necessary permits from appropriate agencies prior to implementation. **Table 1-10** shows the list of the alternative fuels being considered by SMNCI.

1.4.5.1 Kiln Start-Up

47 Used oil can be co-processed with the diesel oil during the kiln start-up. Used oil will be added to the kiln when temperature exceeds 1,500˚C, to ensure complete combustion, chemical restructuring of pollutive chemicals including separation of heavy metals to be mixed and entrapped in the clinker structure The calorific value of used oil to be added to kiln fuel is 10,813 kcal/kg, with sulfur content of 1.19% .

1.4.5.2 Kiln Calcination

48 SMNCI is considering four alternative fuels to be added to the coal during the kiln operation; pet coke, used tires, rice husk and refuse derived fuel.

49 SMNCI will secure supply agreement to potential sources of these alternative fuels that meet the plant's and DAO 2000-81 requirement.

Table 1-10: Proposed Alternative Fuels considered by SMNCI

Kiln Operation	TYPE OF FUEL USED	Proposed AFR	Energy Potential (Mcal per MT)	% FUEL Substitution
Kiln Start-up (Temp @ 1200˚C)	Bunker Oil	Used Oil	10,813	0-10%
Kiln Calcination	Coal	Petcoke	8,395	0-30%
		Shredded Tires	8,609	0-10%
		Rice Husk	2,400	0-10%
		Refuse Derived Fuel from Municipal Waste	2,957	0-10%

1.5 Process/Technology

50 The new cement manufacturing plant will be constructed showcasing the most modern and advanced available cement technologies from Europe, USA and Asia. Major manufacturing facilities such as crushers and cement grinding mills will be sourced out from Europe. The pyro-processing section engineering and equipment will be a combined set-up of Europe and Asia while the main dust suppression system which is also an essential component of cement plant operation is a USA design and supply. The latest model of the Haver & Boecker packing machines, the RVT10 will be installed featuring its performance of high filling speed that guarantees a high productivity on bag output. This innovative design sets a milestone for the company, pioneering to be the first among cement plant in the Philippines to employ this latest technology on cement packaging.

51 This new cement manufacturing plant also aims to focus on an environment-friendly and energy efficient design featuring its components of achieving a lower fuel and power consumption by selecting equipment and processes that would ensure a lower heat rate and specific power

consumption. It also aims to focus on reduced CO_2 emission by reducing clinker content in the cement mix, since clinker causes the main CO_2 emissions during cement production.

52 The new line will operate using modern analytical methods and will be equipped with the latest quality control devices along the line from its raw material preparation down to its packaging equipment. Automatic on-line samplers and analysers will be installed along the production line. Operation process control shall be programmed to be fully automated and centralized to optimize process efficiencies, reduce production cost and increase productivity.

53 Each of the above-mentioned technological advancement features and state of the art engineering of process equipment will be supervised by foreign technical experts during installation to ensure its world class performance. The SMNCI cement manufacturing process flow is shown in **Figure 1-8**.

1.5.1 Raw Materials

54 The **SMNCI** cement manufacturing operations in Sison, Pangasinan is assured of the major raw material, limestone and shale. The global trend in the cement industry is such that the raw materials are generally purchased from an external source, rather than obtained directly from a captive operation by the cement plant. Majority of raw materials will be supplied by NCC.

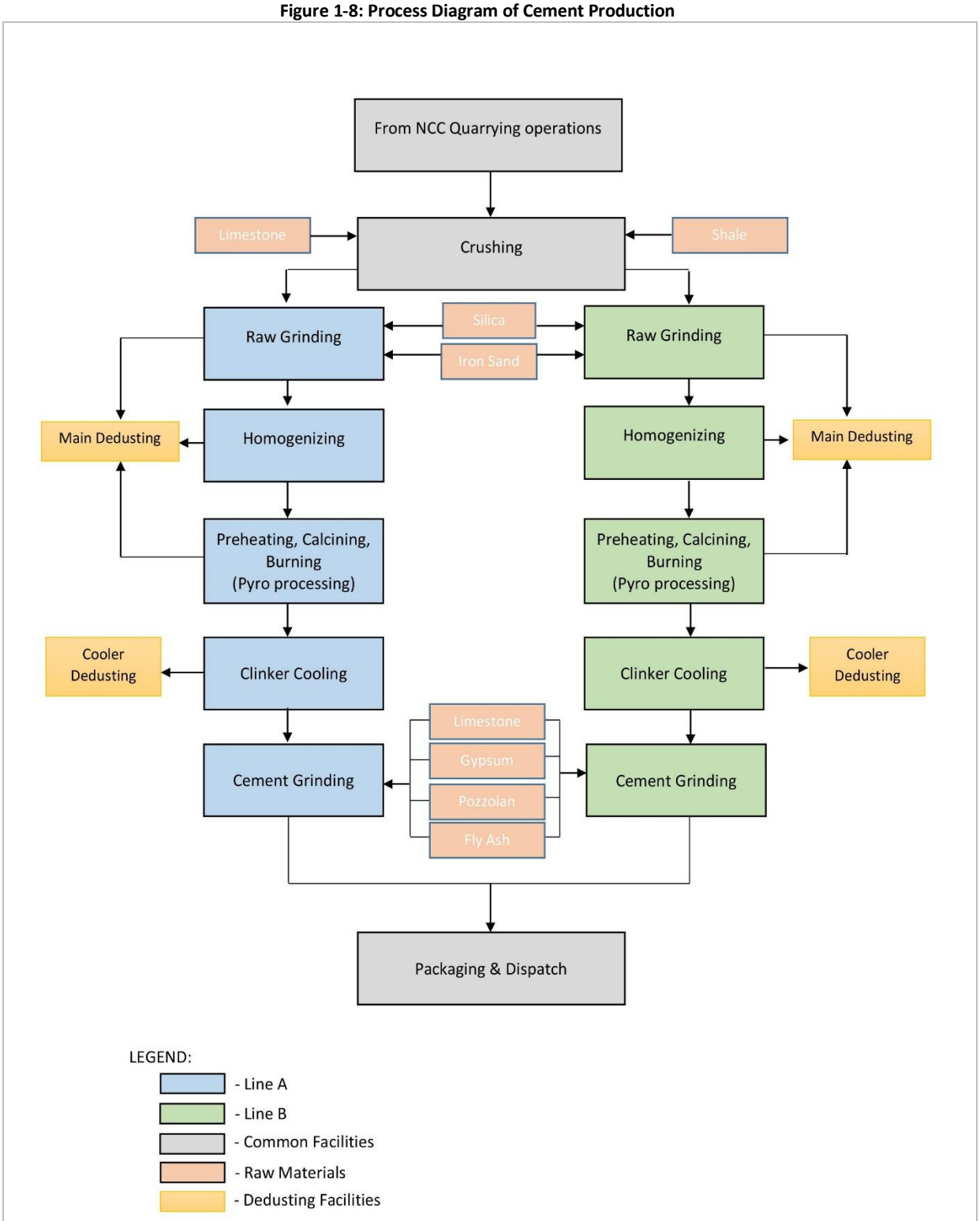
55 **Table 1-11** shows the annual raw materials required for the production per line of the SMNCI plant. 71.4% of the clinker produced is composed of limestone, while other materials are shale, silica, iron ore, and bottom ash.

56 The over-all material balance diagram for the SMNCI Line A and Line B is shown in **Figure 1-9** while the energy balance is shown in **Figure 1-10**.

Table 1-11: Annual Raw Material Requirement for SMNCI Cement Plant (per Line)

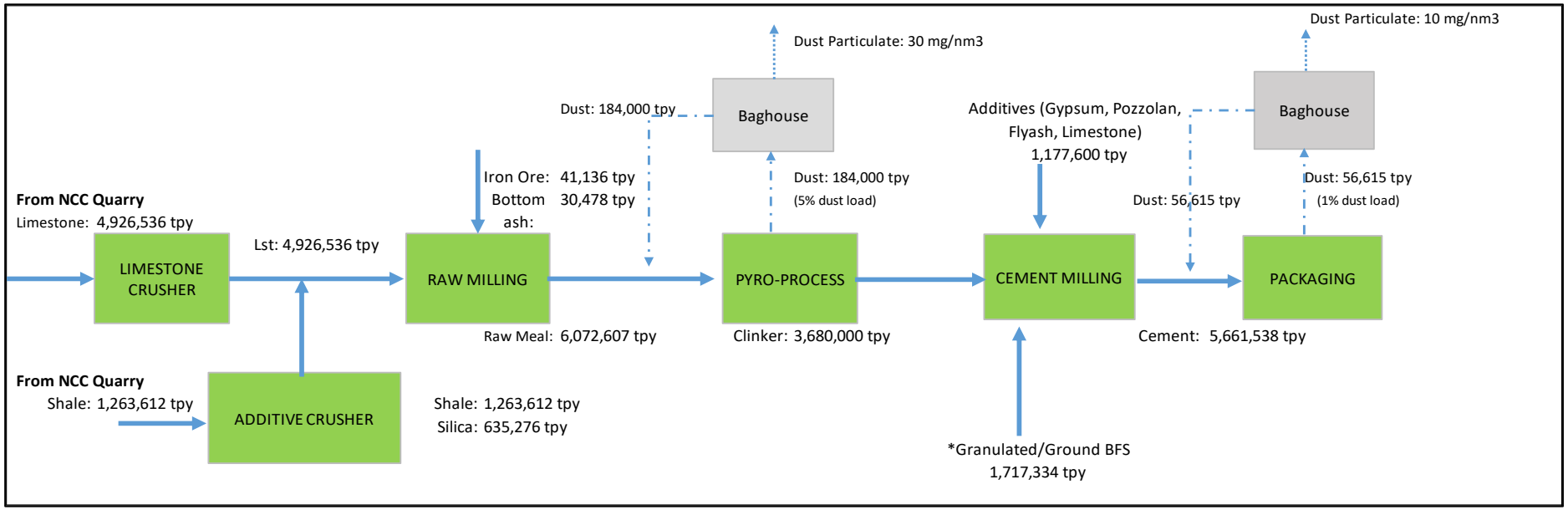
Material	Wet Weight (MT/yr)	Percentage	DRY BASIS	Lost in Ignition
Limestone	2,463,264	71.4%	2,391,827.2	2.9%
Shale	631,801.6	18.3%	549,667.2	13.0%
Silica	317,638.4	9.2%	271,580.8	14.5%
Iron Ore	20,572.8	0.6%	19,398.4	5.7%
Bottom Ash	15,235.2	0.4%	12,905.6	15.3%
Raw Meal (Dry Basis) to Clinker Ratio: 1.76				

Figure 1-8: Process Diagram of Cement Production



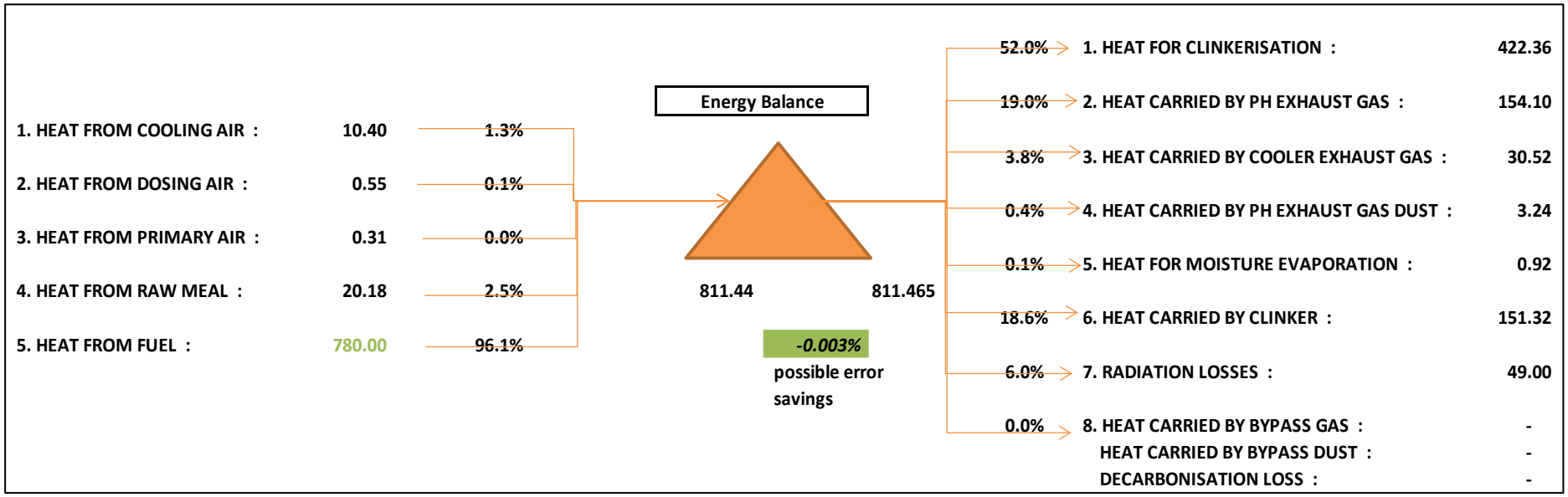
PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**PROCESS DIAGRAM OF CEMENT PRODUCTION**	**1-8**
EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	PROJECT PROPONENT

Figure 1-9: Material Balance for SMNCI Line A and Line B



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **MATERIAL BALANCE FOR SMNCI LINE A AND B**	FIGURE NO.: **1-9**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

Figure 1-10: Energy Balance for SMNCI Line A and Line B



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ENERGY BALANCE FOR SMNCI LINE A AND B**	FIGURE NO.: **1-10**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

1.5.2 Cement Plant Operation

1.5.2.1 Raw Material Preparation

57 The process starts with a series of size reduction of quarried raw material using jaw crushers and impact crushers/hammer crushers. Crushed materials will be separated using a vibrating screen to attain a size suitable for raw grinding. Iron sand is added in the raw mix preparation to correct the iron oxide Fe_2O_3 content of the resulting raw meal. Proportion for iron ore will be in the range of at least 1% of the total raw material. The iron sand from the storage, which has a capacity of 5,000 metric tons, will be transported with a series of conveyors to the processing bin. Crushed materials such as limestone, shale, silica and iron sand are then fed proportionately on apron weigh feeders and ground to powder in a vertical roller mill.

58 The raw mix will be conveyed to the Continuous Homogenizing Silo. The raw mix is stored and blended using adequate aeration system to fluidize the material and attain a consistent homogenizing efficiency ready for feeding to the kiln. The system will be equipped with modern quality control devices such as automatic on-line samplers and cross belt analyzers which will continuously monitor the composition and regulate the weigh feeders to adjust to the target kiln feed chemistry.

1.5.2.2 Pyro-processing

59 The pyro-processing process involves feeding the raw mix into a kiln system where it is gradually heated. Kiln feed (raw mix) are conveyed to the five stages preheater then to the rotary kiln. Typically, a peak temperature of 1400-1450 °C is required to complete the reactions and produce C3S (Alite), the characteristic constituent of Portland cement. Partial melting causes the material to aggregate into lumps or nodules known as clinker which is then cooled with air to 100-200°C. Waste heat from the kiln system is used for drying the raw materials in the raw grinding section of the production process. Approximately 1.60-1.65 MT of raw mix is required to produce 1 MT of clinker, due to the calcination of the limestone component of the raw mix. Clinker product is transported to clinker silo for storage.

1.5.2.3 Use of Alternative Fuels in Pyro-Processing

60 Diesel oil will be used for preheating the cement kiln. When temperature reach 1400-1450 °C, alternative fuel such as used oil and pet coke will be used in the pyro processing operations. Line A and B will utilize pet coke as 20% to 50% of the main fuel for pyro processing operations. Heavy fuels generate more particulate pollutants when combusted in lower temperate. Pollutants assimilated by previously used materials such as heavy metals and other impurities are fully destroyed and degenerate into ash, giving particulate filters a longer duty life and creating less opportunity for increased air pollution.

61 The storage area for pet coke has capacity of 10,000 metric tons. The storages of the fuel (pet coke & coal) with correct proportion will pass through the grinding mill for drying & grinding to meet the desired particle sizes then conveyed to the silo with a capacity of 150 tons. The ground fuel (coal & pet coke) will be used in the main & secondary burners. Finely ground solid fuel combusts easier and faster, attaining the desired heat in shorter time, resulting in better energy recovery and lower particulate emissions. The diagram for the entry point of the alternative fuels to the kiln is shown in **Figure 1-11**.

1.5.2.4 Clinker Cooling

62 Clinker is discharged red-hot from the lower end of the kiln and brought down to handling temperature in various types of coolers. Part of the air that is heated during the clinker cooling is recycled back to the rotary kiln, while the other portion is fed to the coal grinding machine. The waste energy recovered in the recycled air reduce the amount of fuel needed to heat up the raw materials fed into the kiln into the ideal temperature where calcination occurs, as well as clinker grinding is performed. The recycled energy also acts to control coal moisture for better material flow within the grinding subsystem and better coal combustion performance. With lesser fuel to burn per metric ton of clinker produced, gaseous pollutant emissions will also be reduced.

1.5.2.5 Cement Grinding

63 Clinker will be extracted from the bottom of the silos and conveyed to a feed bin from where it will be dosed by a weigh feeder and then further conveyed to an elevator then fed into the grinding mill.

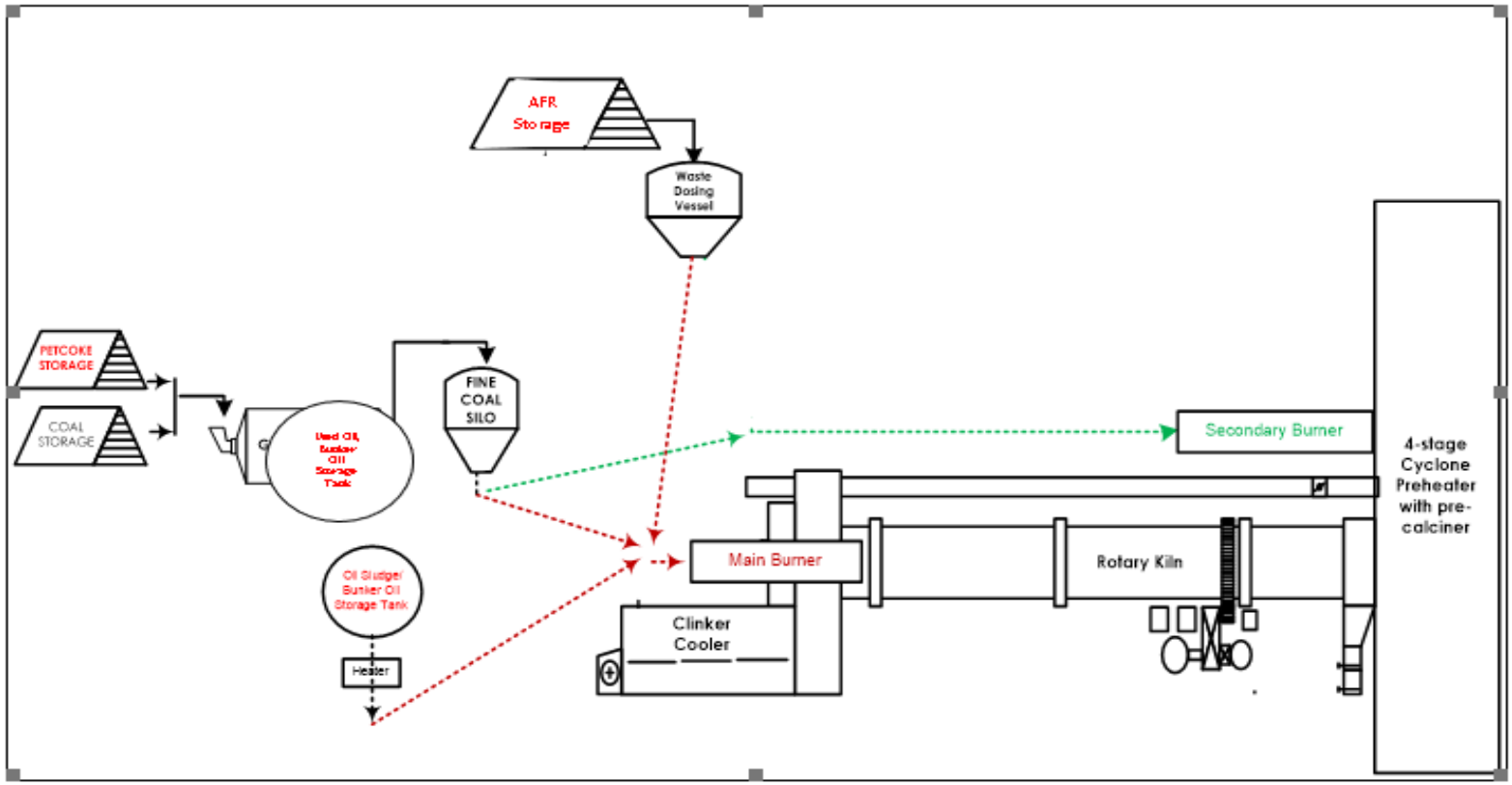
64 The other raw materials will be mechanically reclaimed by a reclaimer and conveyed to feed bins from where it will be dosed by weigh feeders for conveying and feeding into the grinding mill. Fine raw materials such as fly ash will pass thru a weigh feeder before feeding into the mill.

65 The materials will be ground in the vertical roller mills. Hot air is injected from underneath the nozzle ring outside the periphery of the rotating table. This jet of hot air dries the materials and the fine particles are entrained by the gases exiting thru a rotating classifier at the upper portion of the mill body. There is internal recirculation of the particles that could not pass through the internal classifier. The coarse particles are rejected out of the mill and are re-circulated into the mill for re-grinding. The finer particles pass thru the classifier and are carried by the exit gases that will pass thru a bag filter where the finished cement will be separated by the bags and collected at the bottom of the bag filter and subsequently conveyed into the cement silos. There is internal recirculation of the particles that could not pass thru the internal classifier.

1.5.2.6 Cement Storage and Dispatch

66 The product can be purchased either by bulk loading or by packed bags. After grinding, the cement is conveyed to the cement silo for storage prior to packing. The stored cement is then conveyed to the rotary packer that will pack the products into 40-kilo bags or one-tonner bags, depending on market requirements. The packed cement in bags are promptly brought to a temporary storage area or manually loaded onto awaiting delivery trucks. Another storage silo for bulk loading is available to feed cement into bulk carriers.

Figure 1-11: Entry Point of Alternative Fuel in Pyro-Processing



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ENTRY POINT OF ALTERNATIVE FUEL IN PYRO-PROCESSING**	FIGURE NO.: **1-11**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

1.6 Project Utilities

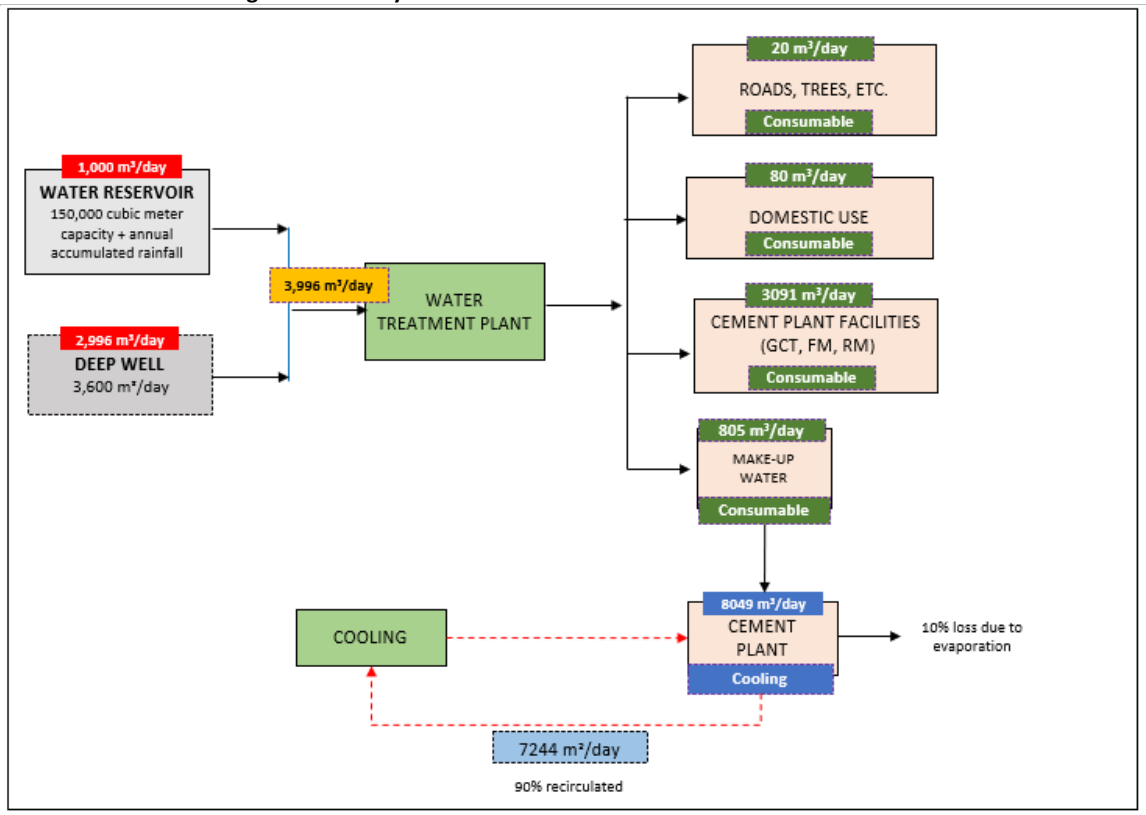
1.6.1 Water Supply and Demand

67 Average water requirement for Line A & B is estimated at 3,996 m^3/day (**Figure 1-12**). This includes make up for cooling water, (805 m^3/day), domestic use (100 m^3/day), and consumable water for cement plant operations (3,091 m^3/day). **Table 1-12** summarizes the anticipated water consumption of the cement plant.

68 The cement plant facilities operation will also be using recirculation cooling water. The operation will initially require 8,049 m^3/day of recirculating water. This cooling water after use is stored in the cooling ponds for recirculation. The make-up water is required to replace water loss due to evaporation.

69 New deep wells will be constructed as water source of the project. SMNCI has submitted water rights applications to NWRB for this purpose.

Figure 1-12: Daily Process Water Balance for SMNCI Lina A and Line B



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **DAILY PROCESS WATER BALANCE FOR SMNCI LINE A AND LINE B**	FIGURE NO.: **1-12**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

Table 1-12: Line A & B Water Requirement

	FACILITY	WATER CU.M/DAY		TOTAL REQUIREMENT CU.M/DAY
		Line A	Line B	Line A & B
CIRCULATING (Cooling)	Raw Mill	1,200	1,200	**8049**
	Coal Mill	384	384	
	Kiln	480	480	
	Clinker Cooler	91	91	
	Finish Mill	1128	1128	
	Preheater	742	742	
	Total	*4,024*	*4,024*	
CONSUMABLE	Spray Tower (GCT)	1,080	1,080	**3091**
	Raw Mill	240	240	
	Finish Mill	130	130	
	Coal Mill	96	96	
	Total Cement Plant Facilities	***1,546***	***1,546***	
	Make-up Water	402.4	402.4	**805**
	Domestic Use	80		**80**
	Road, Trees, Etc.	20		**20**

70 A 150,000 m^3 reservoir will be used to collect and filter sediments from mine run-off water and discharge from Bettac creek (**Figure 1-13**). This reservoir will be designed as a "pond" in the over-arching eco-tourism site development plan of the NCC final mine rehabilitation plan.

Figure 1-13: Water Reservoir Area with 150,000 m^3 Capacity

PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**WATER RESERVOIR AREA WITH 150,000 M^3 CAPACITY**	**1-13**
EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	PROJECT PROPONENT

1.6.2 Power Supply and Demand

71 The estimated power demand for the operation of the Line A and Line B is 58 MW. Power supply will be coming from NGCP San Manuel substation, an 18-km 69kV transmission line. An indoor substation with 2 units 40/50 KVA transformers will be provided to receive and step down the power from 69kV to 6.6kV that will cater the estimated load of 50 MW. There's also a plan to build a switch yard interconnecting the NGCP power lines to existing NCC substation.

1.7 Project Size

72 **San Miguel Northern Cement, Inc.** intends to construct lines A & B with a rated capacity of 5,750 metric tons per day (MTPD) clinker per line for an output of 3,680,000 tons per year or 150 million bags of cement per year. The breakdown of this production is presented in **Table 1-13**.

Table 1-13: Production Breakdown of SMNCI Cement Plant for Two Cement Lines

	Clinker (TPY)	Additives (TPY)	Total Cement Produced (TPY)	Cement Bags Produced
Line A	1,840,000 TPY	1,447,467 TPY	2,830,769 TPY	75 million
Line B	1,840,000 TPY	1,447,467 TPY	2,830,769 TPY	75 million
Total	3,680,000 TPY	2,894,934 TPY	5,661,538 TPY	150 million

1.8 Development Plan, Description of Project Phases and Corresponding Timeframes

1.8.1 Pre-Construction

73 The pre-construction includes geotechnical investigation, feasibility study preparation, detailed engineering design and permitting. As previously discussed, **SMNCI** is applying for the amendment of ECC 9909-106-108.

1.8.2 Construction

74 During this phase, the equipment to be will be purchased and assembled on site. Proper occupational safety and health procedures would be implemented to ensure the welfare of the workers. As the facility upgrade would proceed along with the operation of the existing facilities for a certain period, additional guidelines on work delineation and management would be implemented to avoid any delays and conflicts of both activities.

75 Line A entered construction phase on August 22, 2018. **Table 1-14** discusses the accomplishments and target completion of Line A construction under ECC 9909-106-108, while **Figure 1-14** shows the progress of the construction as of May 31, 2019. There are no construction activities yet for Line B because the ECC amendment is ongoing. Construction for the Line B will start by 2020.

Table 1-14: Line A Construction Progress as of 31 May 2019

Facilities	Accomplishment	Status/Target Completion
Clinker Silo 3 & 4	97.82%	Finished (31-May-19)
Clinker Cooler	54.22%	Finished (13-Jul-19)
Kiln	99.92%	Finished (23-Jan-19)
Preheater (Structural)	78.03%	Finished (13-May-19)
Preheater (Mechanical)	37.79%	
Homosilo	74.25%	Finished (10-Aug-19)
Powerhouse	45.79%	Finished (30-Jul-19)
Additive Storage	54.38%	Finished (1-Aug-19)
Coal Storage	43.24%	15-Oct-19

Facilities	Accomplishment	Status/Target Completion
Main Crushing	51.05%	15-Dec-19
Finish Mill Building	11.02%	15-Jan-20
Cement Silo	92.78%	Finished (6-Apr-19)
Raw Mill Bag Filter	78.57%	Finished (6-Apr-19)

1.8.3 Operations

76 Major activity of the plant will involve 24/7 operation of the clinker & cement production. Skilled workers will be employed. The same strict observation of occupational health and safety during construction would be followed.

77 Once the installation of equipment is done, commissioning activities will take place on June 2020 onwards. Operations will take place starting 1st quarter of 2021. **Table 1-15** shows the milestone of Line A & B operation.

Table 1-15: Milestones of Line A & B

Component	Start of Commissioning	Start of Commercial Operation
Finish Milling Line A	June 2020	3rd quarter 2020
Line A Clinker Production	December 2020	1st quarter 2021
Line B Clinker Production	December 2021	1st quarter 2022

78 **Table 1-16** shows the indicative timeline of the construction of Line A & B. The target commercial operation of Line A is in January 2021 while the target commercial operation of Line B is in January 2022.

Figure 1-14: Aerial Photo of the Project Area as of 31 May 2019

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **AERIAL PHOTO OF THE PROJECT AREA AS OF 31 MAY 2019**	FIGURE NO.: **1-13**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: Aerial Photography by SMNCI

1.8.4 Abandonment

Post-Construction Decommissioning

79 After the construction, the project site will be thoroughly cleaned as preparation for the operation. All the temporary facilities installed in the project site will be properly dismantled and removed including the equipment brought in the project site. Heavy equipment will be removed at the site during night time so that it will not affect the traffic in the project site. It will be ensured that there will be no oil spills during the decommissioning of the equipment.

80 All the wastes generated will be properly disposed or recycled. Construction debris and domestic wastes will be segregated, and all residual wastes will be hauled out by the Municipal waste collectors. All hazardous wastes will also be collected by DENR-registered haulers. Human wastes from the portable toilets will be properly siphoned by DENR-register desludgers. No wastes will be left in the project site.

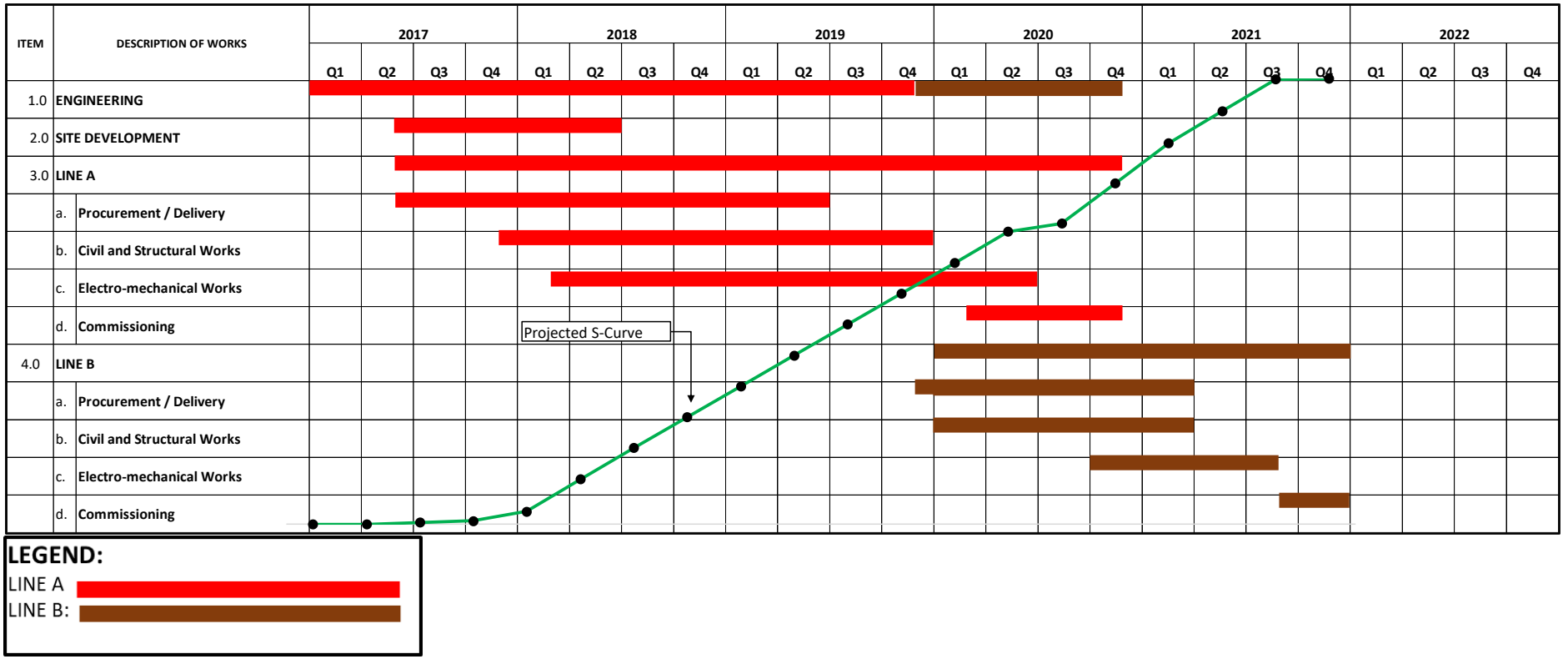
Project Abandonment

81 The abandonment scenarios being planned for are (a) scheduled closure; (b) temporary closure; and (c) sudden closure. If the cement plant operations shall cease, all plant equipment and machineries will be dis-assembled and hauled out and disposed of accordingly by the owners, as these are economic assets. All scrap materials will be re-used or sold to recyclers.

82 At the end of project economic life, in the transition period for other land uses, the plant decommissioning and abandonment plan will aim to meet the following criteria:

- Facilities such as Powerhouse, Water Treatment Plant, QA Lab & CCR building, Preheater building, Spray Tower and Baghouses, Storages, Warehouses, Concrete & Steel Silos, Packing Plant, conveying system facilities, Scale houses, Crushing, Milling & Pyro-processing equipment and auxiliaries are safely and carefully dismantled. Reusable or recoverable materials will be segregated through an accredited third-party material recovery group.
- The area will be cordoned off for public safety;
- Land and facilities are rendered free of chemical contamination and physical hazards
- Air, water and soil quality in the project environment shall conform to DENR standard
- Land slopes are stable against erosion-prone
- No flooding or unplanned water impounding persist in the project site
- The area does not cause flooding or excessive sedimentation of downstream locations
- All wastes have been hauled out and properly disposed
- The area presents a pleasant and aesthetic visual impression

Table 1-16: Indicative Timeline of Activities



1.9 Manpower

83 **Table 1-17** summarizes the manpower requirements throughout the development phases of the proposed project. As shown, around 1,200 workers will be employed for the construction of Line A and 600 will be employed for the construction of Line B. An estimate of 150 and 50 personnel, respectively, will be hired to run the cement plant on a 24/7 operation.

Table 1-17: Manpower Requirement

PROJECT PHASE	ESTIMATED MANPOWER REQUIREMENTS	TASKS TO BE PERFORMED	SKILLS REQUIREMENTS
Construction	Line A: 1,200 Line B: 600	• Civil works, architectural, and electro-mechanical works	• Engineers, project managers, skilled and non-skilled laborers
Operation	Line A: 150 Line B: 50	• Oversee the entire operations of the proposed project, including emergency situations; Ensuring the safety and welfare of its personnel • Maintain conformity of the proposed project to relevant government regulations, including tax payments, ECC compliance, etc. • Promote and uphold a harmonious relationship with the host community	• Management and administration skills; over-all knowledge on the operation including key environmental, labor, and local ordinances
Abandonment	~20	• Implement the abandonment plan	• As required

84 **San Miguel Northern Cement, Inc.** will prefer hiring of locals whose skills and experience match the specific needs of the project. The proponent will also provide the necessary training of locals for possible hiring as the need arises.

1.10 Project Cost

85 Indicative cost for the proposed project is estimated to be **Php 20,820,000,000.00**. These will include the following:

- Detailed engineering studies and designs, including the feasibility study (FS) and acquisition of necessary government permits and licenses;
- Site preparation;
- Construction of project components and facilities;
- Procurement of necessary equipment and materials;
- Environmental management and protection, air pollution devices, and water treatment facilities; and
- Environmental monitoring activities.

SECTION 2

ASSESSMENT OF ENVIRONMENTAL IMPACTS

2.1 The Land

86 This section presents the current baseline conditions of the project site to provide an overview of the existing environment. The key impacts are presented in relation to the current conditions.

2.1.1 Land Use and Classification

87 As indicated in **Section 1.1**, the proposed project site lies within the political jurisdiction of Brgy. Labayug and the Municipal Government of Sison in the Province of Pangasinan in Region 1 (ILOCOS REGION). The respective land area of region, province, municipality, and barangay that cover the proposed project site are presented in **Table 2-1**.

88 The Municipality of Sison is classified as 3rd class municipality. It is divided into 28 barangays, as shown in **Figure 2-1**. It is bounded by the Municipality of Tuba (Benguet Province) on the east, by the Municipality of Rosario (La Union Province) on the north and the Municipalities of Pozzorubio and San Fabian (Pangasinan Province) on the south and west respectively.

Table 2-1: Land Area of Region 1, Province of Pangasinan, Sison, and Brgy. Labayug

JURISDICTION	LAND AREA (HAS.)
Region 1 (ILOCOS REGION)	**1,296,462**
Province of Pangasinan	**545,059**
Municipality of Sison	**13,788**
Barangay Labayug	**330**
Sources: Philippine Statistics Authority 2015	

89 Half (6,936 hectares) of the land in the Municipality of Sison is classified as agricultural area. The agricultural lands are mainly found along the lowlands at the eastern and middle portions of the municipality. About 37.49% of the land on the municipality is used as forest areas. Only 3.1% is being used as built-up area. The distribution of land use in the Municipality of Sison is shown in **Table 2-2** while the general land use map is shown in **Figure 2-2**.

Table 2-2: Land Use Distribution, Municipality of Sison

Land Use	Area (hectares)	% Total
Built–up Area	**427.21**	**3.1**
Residential	*246.00*	*1.78*
Commercial	*28.00*	*2.20*
Institutional	*35.00*	*0.25*
Industrial	*98.00*	*0.71*
Parks & Playground	*0.65*	*0*
Special Uses	**19.56**	**0.13**
Cemetery	*7.73*	*0.06*
Tourism	*10.83*	*0.08*
Dumpsite/Landfill	*1.00*	*0.01*
Agricultural	**6,936.82**	**50.31**
Sand dunes/Quarry Pit	**219.00**	**1.59**
Pastureland/ Grassland	**204.00**	**1.48**
Forest	**5,168.97**	**37.49**
Roads	**118.76**	**0.81**

Land Use	Area (hectares)	% Total
Rivers/Creeks/Easement	**713.24**	**5.22**
Total	**13,788.00**	**100.00**

2.1.1.1 Impact in terms of compatibility with existing land use

90 As shown in **Figure 2-2,** the area where the SMNCI Line A and Line B cement plant is located is classified as industrial area.

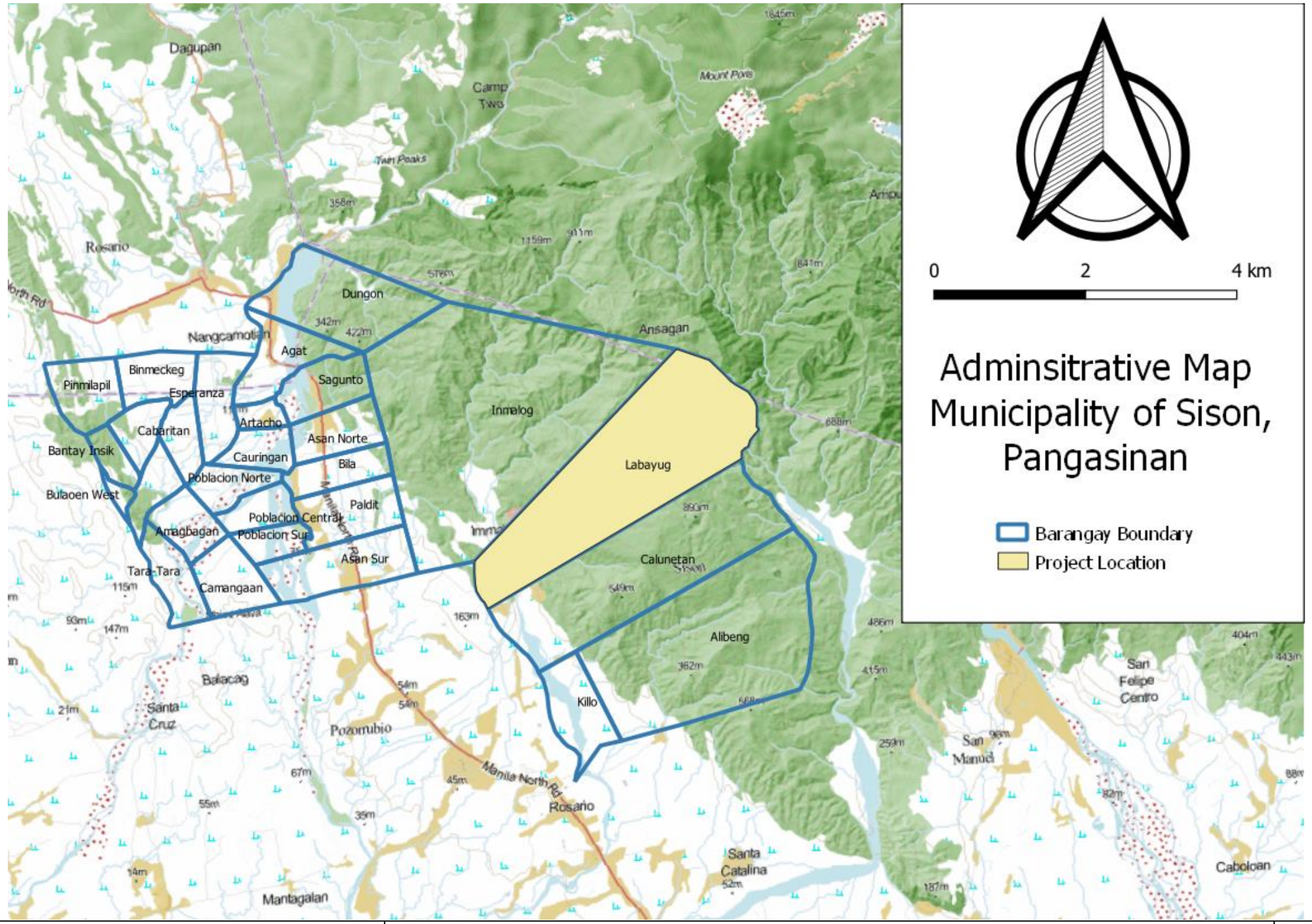
2.1.1.2 Impact on compatibility with classification as an Environmentally Critical Area (ECA)

91 The proposed project site does not fall within any declared environmentally critical area (ECA), defined in the DENR Administrative Order No. (DAO) 2017-15 as *"an area that is environmentally sensitive and is so listed under Presidential* Proclamation *No. 2146, Series of 1981, as well as other areas which the President of the Philippines may proclaim as environmentally critical in accordance with Section 4 of Presidential Decree No. 1586."*

2.1.1.3 Impact in existing land tenure issue/s

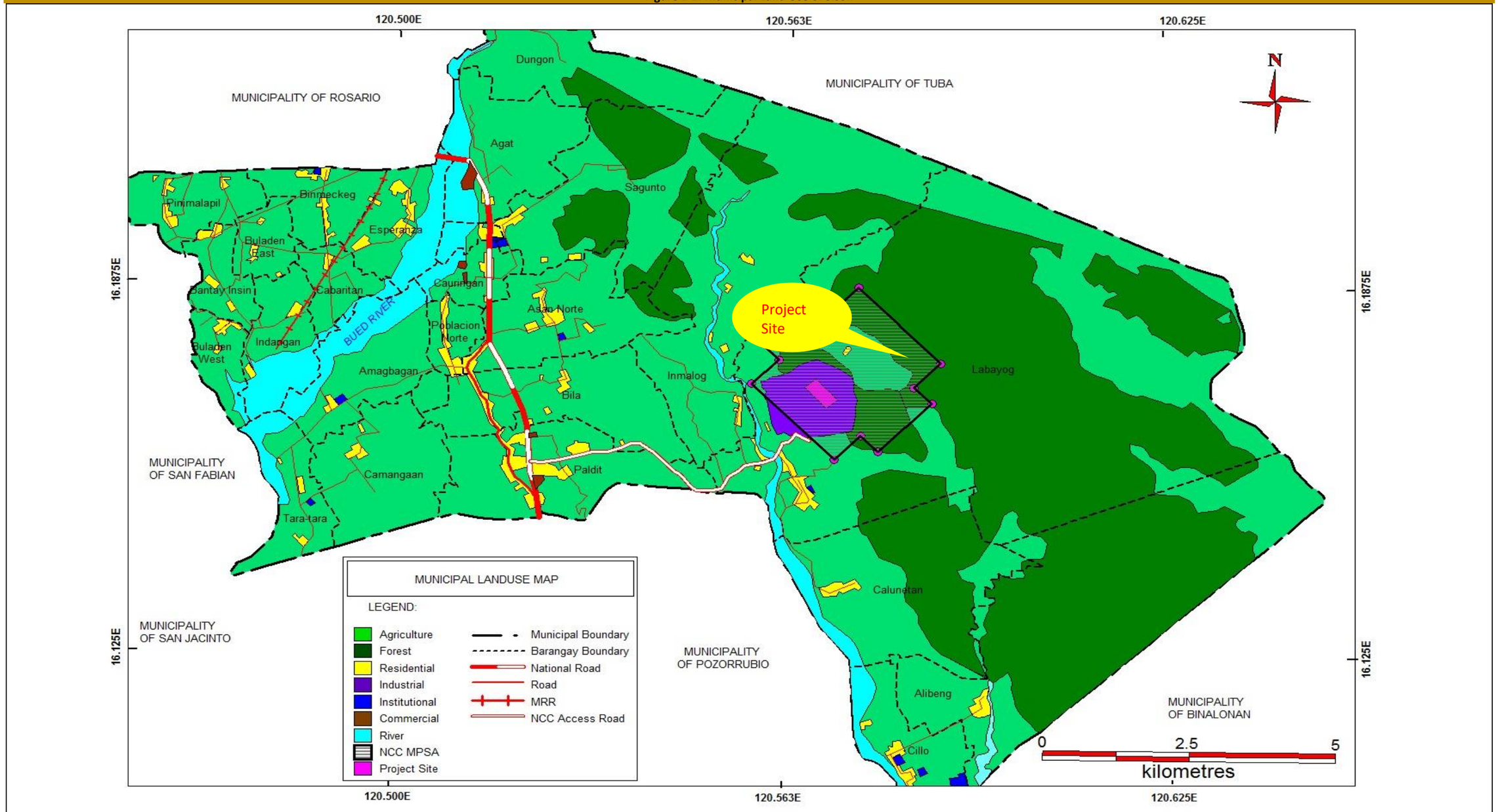
92 The proposed project site is not covered by the Comprehensive Agrarian Reform Program (CARP). It is also not subject to a Certificate of Ancestral Domain Claim (CADC), Certificate of Ancestral Domain Title (CADT), Certificate of Ancestral Land Claim (CALC), Certificate of Ancestral Land Title (CALT), Integrated Forest Management Agreement (IFMA), Community-Based Forest Management Agreement (CBFMA), or any other tenurial instrument.

Figure 2-1: Administrative Map of the Municipality of Sison



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ADMINISTRATIVE MAP OF MUNICIPALITY OF SISON**	FIGURE NO.: 2-1
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: NAMRIA PHILGIS

Figure 2-2: Municipal Land Use of Sison



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **MUNICIPAL LAND USE MAP OF SISON**	FIGURE NO.: 2-2
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: Sison Municipal Government

2.1.1.4 Impairment of Visual Aesthetics

93 There are no visually significant landforms, landscapes, or structures in the proposed project site that can potentially be affected by the project activities. Considerations are made in the proposed project design to preserve and enhance the visual aesthetics in the project area. For instance, vegetation in the perimeter of the project site will be maintained to serve as natural buffers and to also contribute in the mitigation of other perceived project impacts (i.e., air and noise).

2.1.1.5 Devaluation of Land Value as a Result of Improper Waste Disposal

94 Solid waste generation will be limited to construction debris during the construction phase and domestic wastes during the operational phase. Improper management of solid wastes may cause land pollution in the project site.

95 As a mitigation measure, a Solid Waste Management Plan will be strictly implemented based on the local disposal regulations and consistent with the Ecological Solid Waste Management Act of 2000 (Republic Act 9003). The proposed plan is discussed in Section 3 (Environmental Management Plan) of this document. SMNCI will coordinate with the local government for the regular collection and disposal of the solid wastes.

2.1.2 Geology/Geomorphology

96 Based from the Geology of the Philippines (2nd ed.) of the Mines and Geosciences Bureau (MGB), Ilocos Region belongs to Stratigraphic Grouping 1 (SG 1), the Ilocos-Central Luzon Basin. The stratigraphy of the Ilocos-Central Luzon Basin is subdivided into Ilocos, Central Luzon Basin- West Side and Central Luzon Basin- East Side. The Ilocos-Central Luzon Basin is structurally controlled by main branches of the northern segment of the Philippine Fault, notably the Vigan-Aggao Fault.

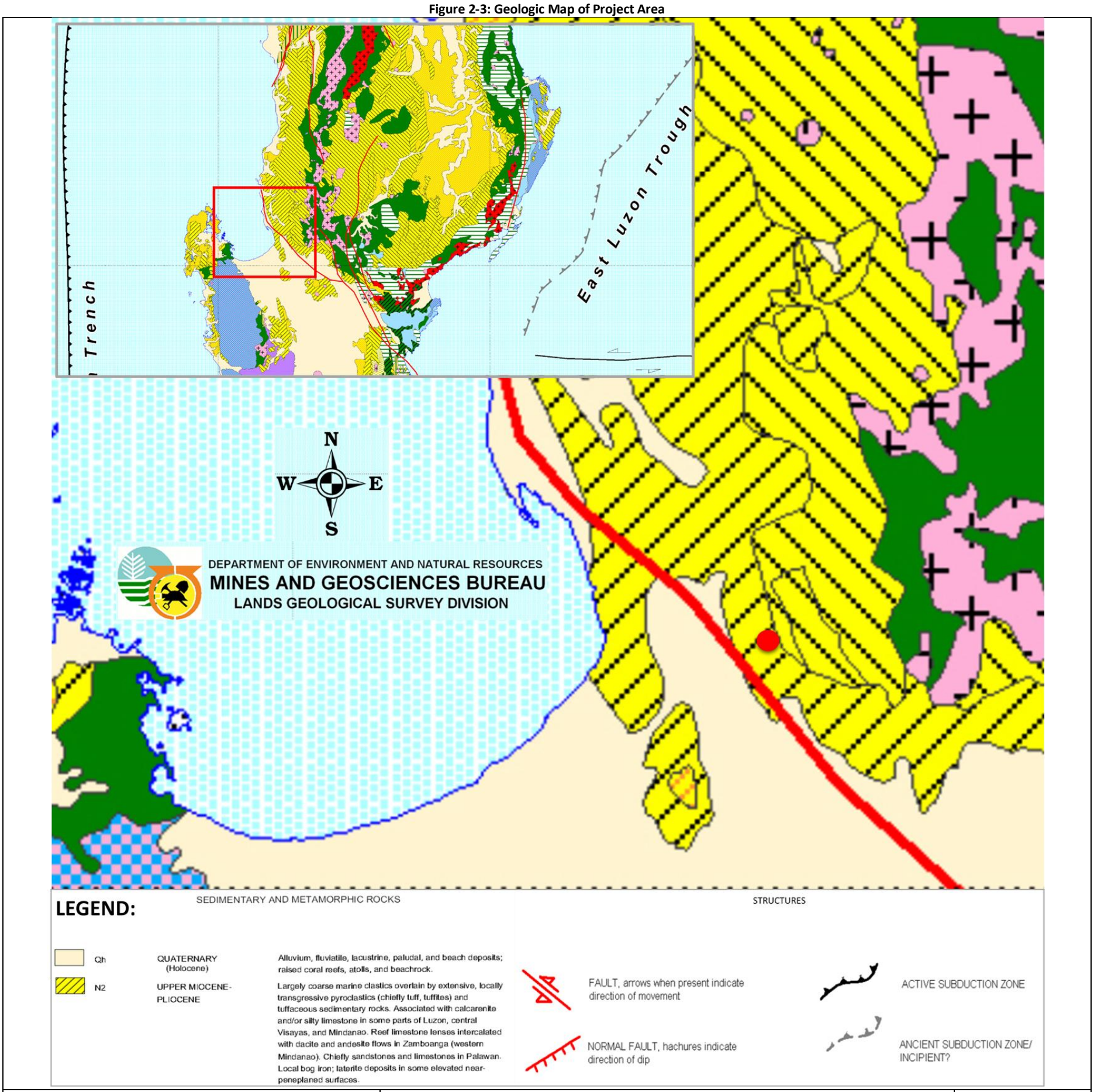
97 Sison belongs to the west side of the Central Luzon Basin and is underlain by three major formations; Amalang Formation, Klondyke Formation and Cataguintingan Formation.

98 Amalang Formation consists of turbiditic sandstones and shale with minor conglomerate. In terms of stratigraphic relations, Amalang Formation overlies the Klondyke Formation and is under the Cataguintingan Formation. Underlying also the Amalang Formation is the Labayug Limestone

99 Underlying the project site is Labayug Limestone. Its contact with the overlying Amlang Formation at Sapid Creek is gradational. The geologic map covering the Municipality of Sison is shown in **Figure 2-3.**

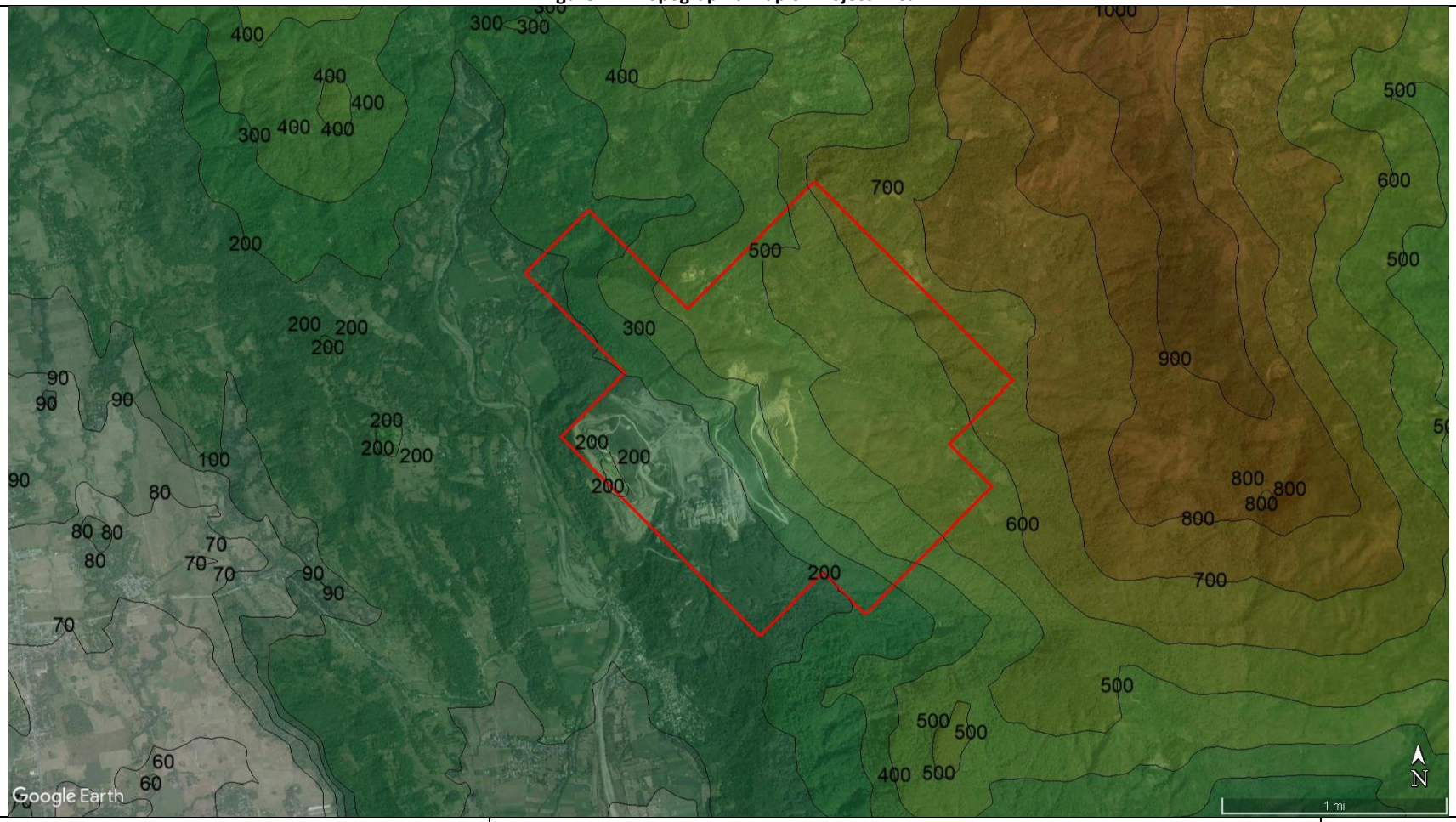
100 The project site has an elevation of 200 meters above sea level with 18 to 30% slope. Shown in **Figure 2-4** and **Figure 2-5** are the topographic and slope map of the area, respectively.

Figure 2-3: Geologic Map of Project Area



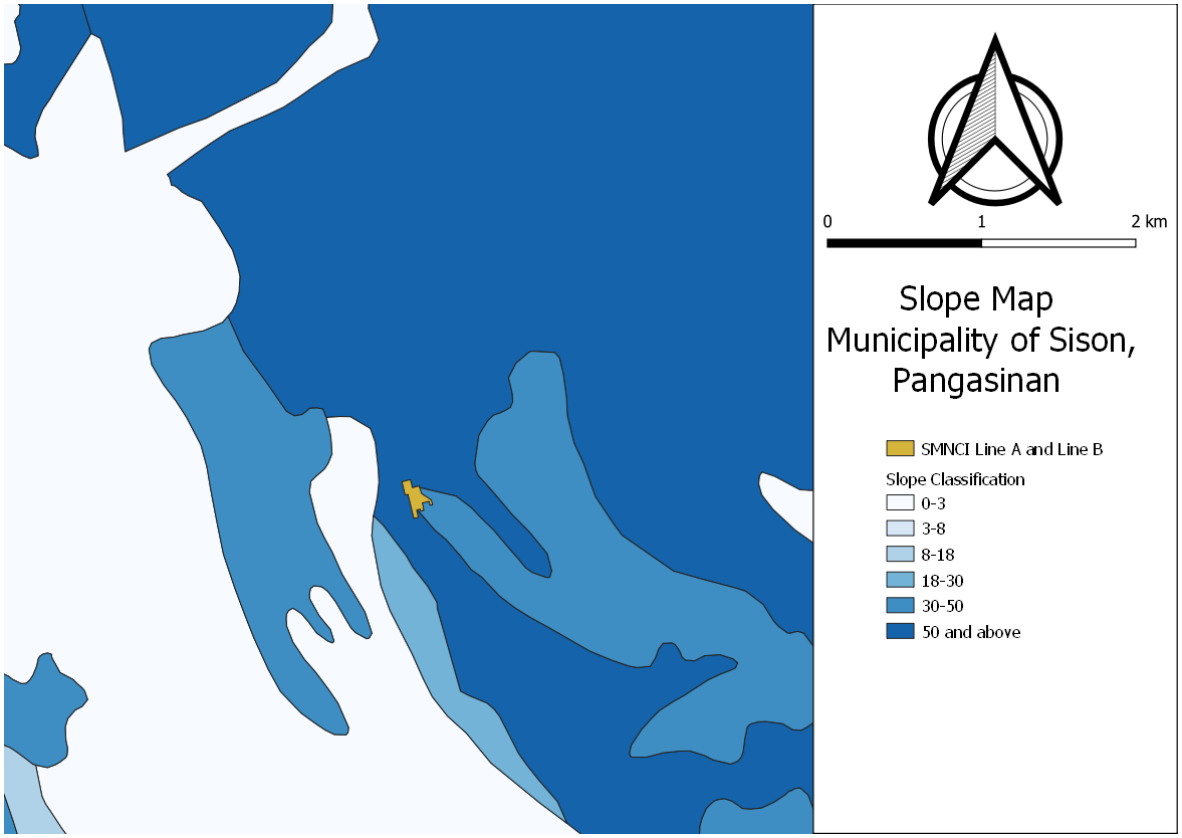
PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **GEOLOGIC MAP OF PROJECT AREA**	FIGURE NO.: 2-3
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: MGB

Figure 2-4: Topographic Map of Project Area



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **TOPOGRAPHIC MAP OF PROJECT AREA**	FIGURE NO.: 2-4
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE:

Figure 2-5: Slope Map of the Project Area



PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**SLOPE MAP OF PROJECT AREA**	2-5

EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	PHILGIS NAMRIA

Earthquakes

101 There are three fault lines near the location of the SMNCI Line A and Line B cement plant. The closest is the San Miguel Fault, located at the west of the cement plant. Located approximately 10 kilometers north-west of the cement plant is the Pugo Fault while approximately 7 kilometers north-east of the cement plant is the Mirador Fault.

102 Based from the Earthquake-induced Landslide Susceptibility Map of Region 1, the project is prone PEIS VIII earthquake which is characterized to be very destructive in terms of intensity. The project site has also medium susceptibility in terms of earthquake-induced landslide.

Liquefaction

103 The typical soil that is susceptible to liquefaction is loose sand located near the surface and with shallow groundwater table. During an earthquake, ground shaking causes loosely consolidated sand deposits to contract resulting to increase in pore water pressure and reduced grain to grain effective stress (Seed, 1970). This causes loss of soil bearing capacity and makes the soil behave like fluid. In the process, there is an upward flow of water to the ground surface where it emerges in the form of mud spouts or sand boils. Liquefaction is usually accompanied by differential settlement and lateral spreading because of withdrawal of materials beneath the ground surface. Areas where liquefaction is likely to occur include riverbeds, old or abandoned river beds and meanders, swamps and back swamps. Alluvial plains, pyroclastic plains and coastal plains with shallow groundwater and with silty to sandy soils are also possible sites for liquefaction.

104 As shown in **Figure 2-8,** the project site is not susceptible to liquefaction.

Landslide

105 Landslide is the general term for readily perceptible mass movements, slow or rapid. It includes, rockslide, rock fall, mudflow, slump, debris avalanche and many others. Areas with high risk to landslide are those with steep slopes, high precipitation, highly fractured rocks (sheared zone), scarce vegetation and location close to active faults.

106 Based from the Landslide Susceptibility Map of the Labayug Quadrangle shown in Figure 2-9, the project site has moderate susceptibility to landslide.

Flooding

107 Flooding in the country is often caused by prolonged rain. As such, majority of the flood occurrences are then associated with tropical cyclones or monsoon rains. In addition to this, anthropogenic activities such as accumulation of improperly disposed solid wastes, poor flood dynamics in public facilities and infrastructures, illegal or extreme logging without reforestation and inadequate preparedness for natural calamities may also cause or even worsen flooding events.

108 The project site is not located in a flood-prone area however, some parts of Brgy. Labayug, located at the south-west of the project site, has moderate to high susceptibility to flood.

Volcanic Events

109 Another geologic hazard is from volcanic events. The Philippine has about 220 volcanoes (PHIVOLCS). Of these, 22 have been recorded in history to have erupted, and five are considered to be the most active namely: Taal, Mayon, Bulusan, Canlaon and Hibok-Hibok. Volcanic hazards from volcanic activity and eruption include lava flow, debris flow, pyroclastic flow, debris avalanche, lahar, bombs and ballistics projectiles, ash fall, volcanic gases emission, flooding and volcanic quakes. This may cause health problems since ash fall may contaminate water sources and also cause respiratory illnesses.

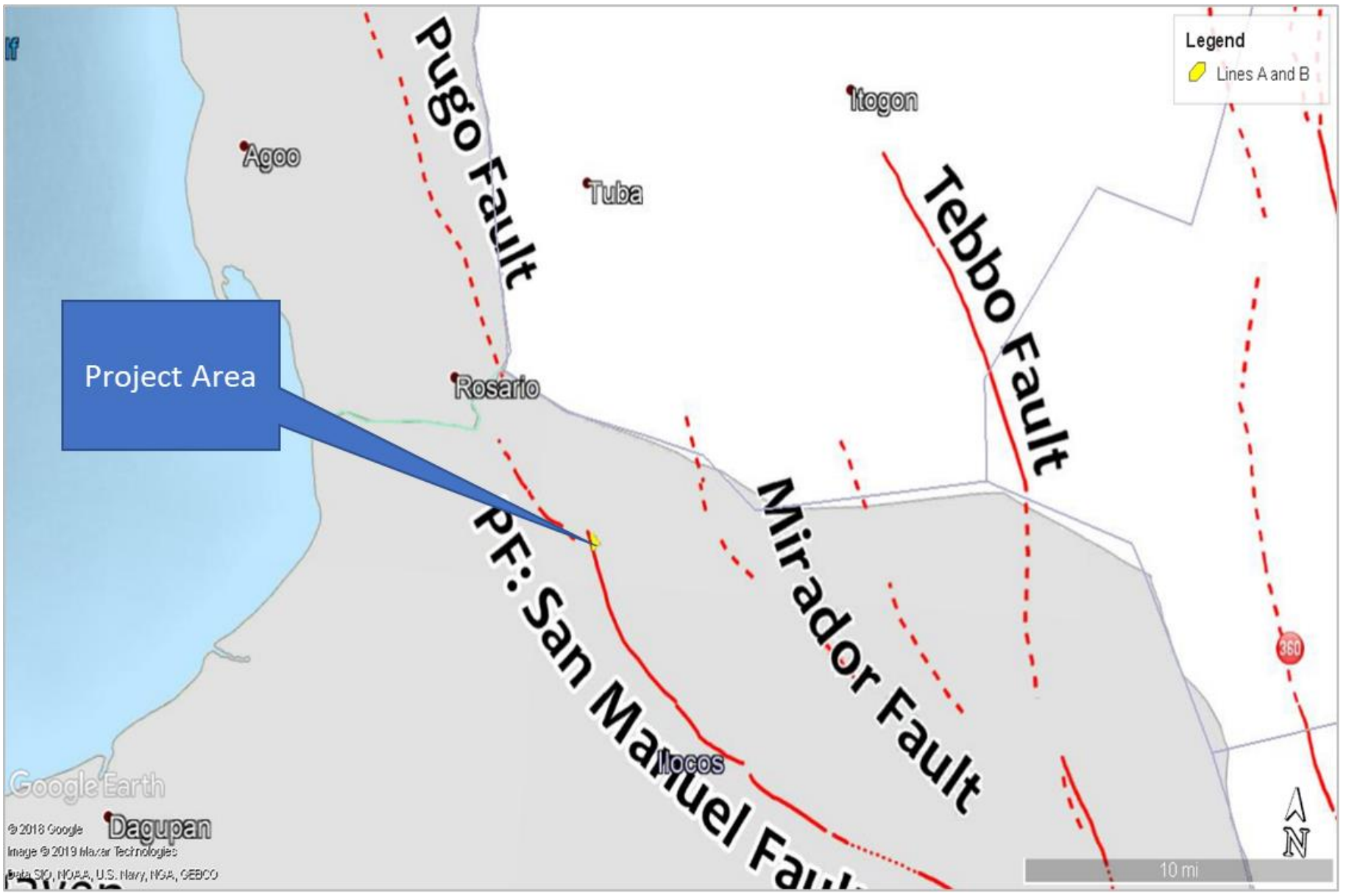
110 As shown in Figure 2-10, there are no active volcanoes near the project site.

Tsunami

111 Tsunamis occur when a large volume of water is displaced due to a seismic activity, volcanic eruption or other large water explosion or collision. This materializes as a series of tidal waves, which may occur for extended periods of time, with longer wavelengths.

112 Based from the Tsunami Hazard Map of Pangasinan (**Figure 2-11**), the project site is not prone to tsunami.

Figure 2-6: Distribution of Active Line Faults and Trenches of Region 1



Distribution of Active Faults and Trenches Region I

Map Source:

Earthquake Sources

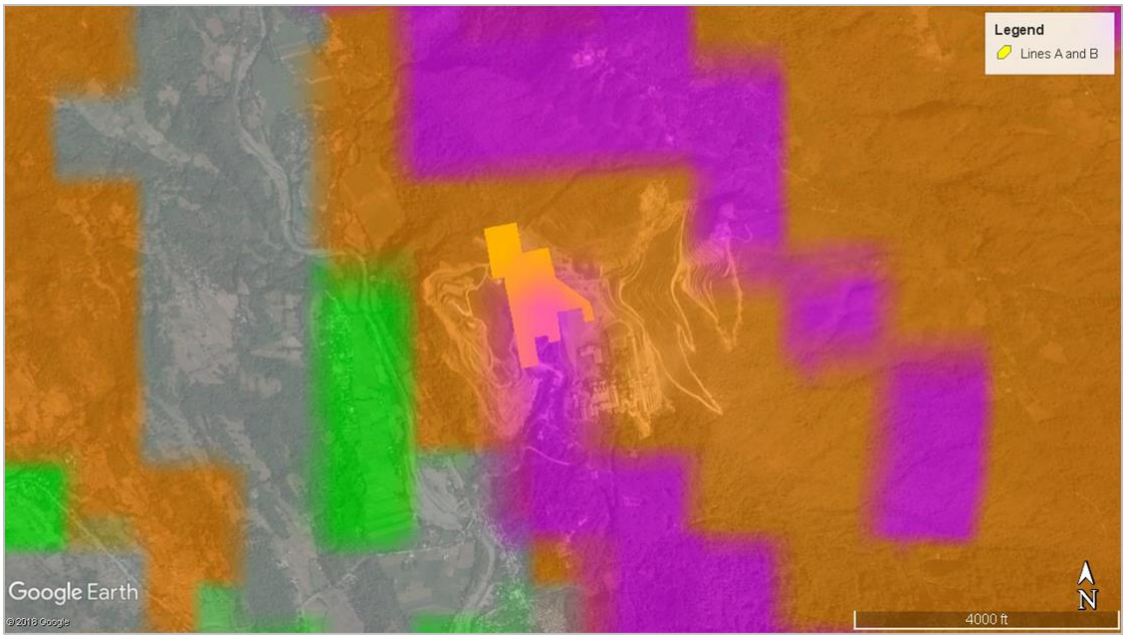
Active Faults

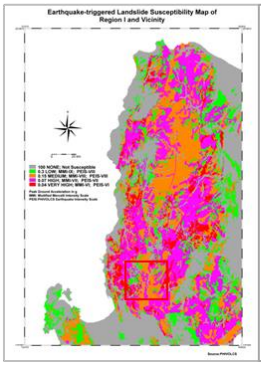
- Solid line - trace is certain
- Dashed line - trace is approximate
- Approximate offshore projection
- Trench
- ⊕ City/Municipality

Disclaimer:
Administrative Boundaries are approximate.
Some areas may not have hazard information yet.

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **DISTRIBUTION OF ACTIVE LINE FAULTS AND TRENCHES OF REGION 1**	FIGURE NO.: 2-6
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PHIVOLCS

Figure 2-7: Earthquake-induced Landslide Susceptibility Map of Region 1





Earthquake-triggered Landslide Susceptibility Map of Region I

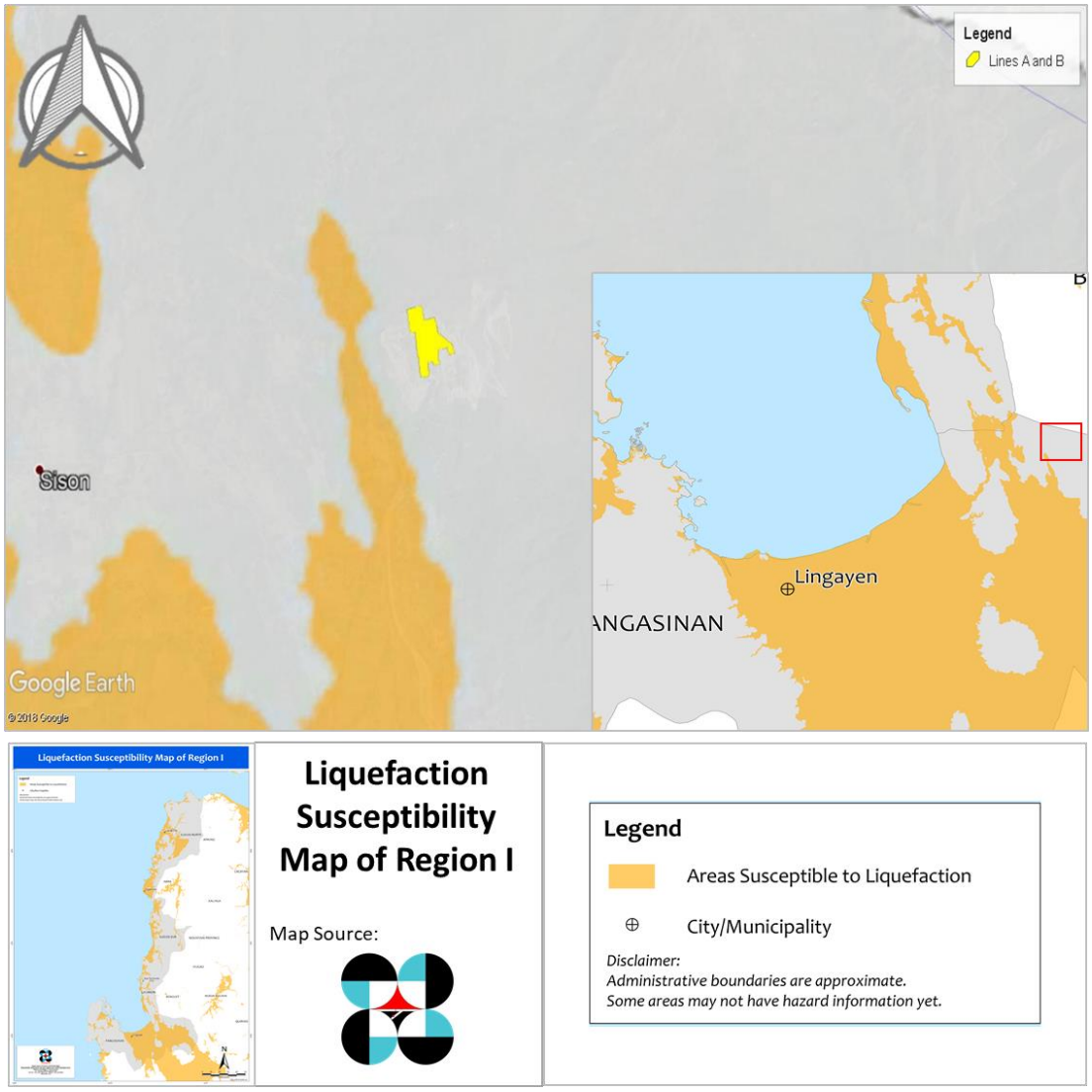
Map Source:

100 NONE; Not Susceptible
0.3 LOW; MMI-IX; PEIS-VIII
0.15 MEDIUM; MMI-VIII; PEIS-VIII
0.07 HIGH; MMI-VII; PEIS-VII
0.04 VERY HIGH; MMI-VI; PEIS-VI

Peak Ground Acceleration in g
MMI: Modified Mercalli Intensity Scale
PEIS:PHIVOLCS Earthquake Intensity Scale

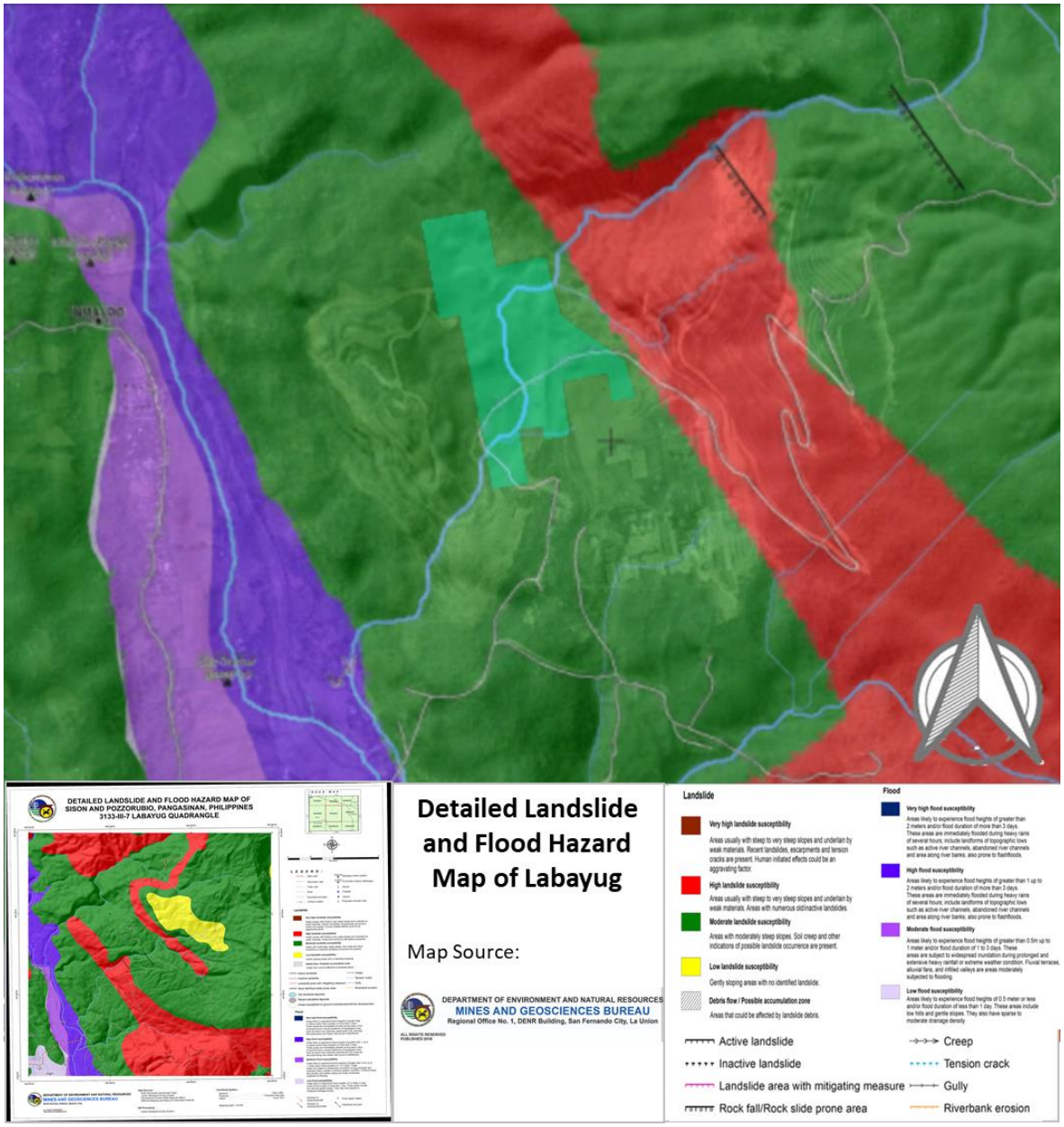
PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**EARTHQUAKE-INDUCED LANDSLIDE SUSCEPTIBILITY MAP OF REGION 1**	2-7
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PHIVOLCS

Figure 2-8: Liquefaction Hazard Map of Pangasinan



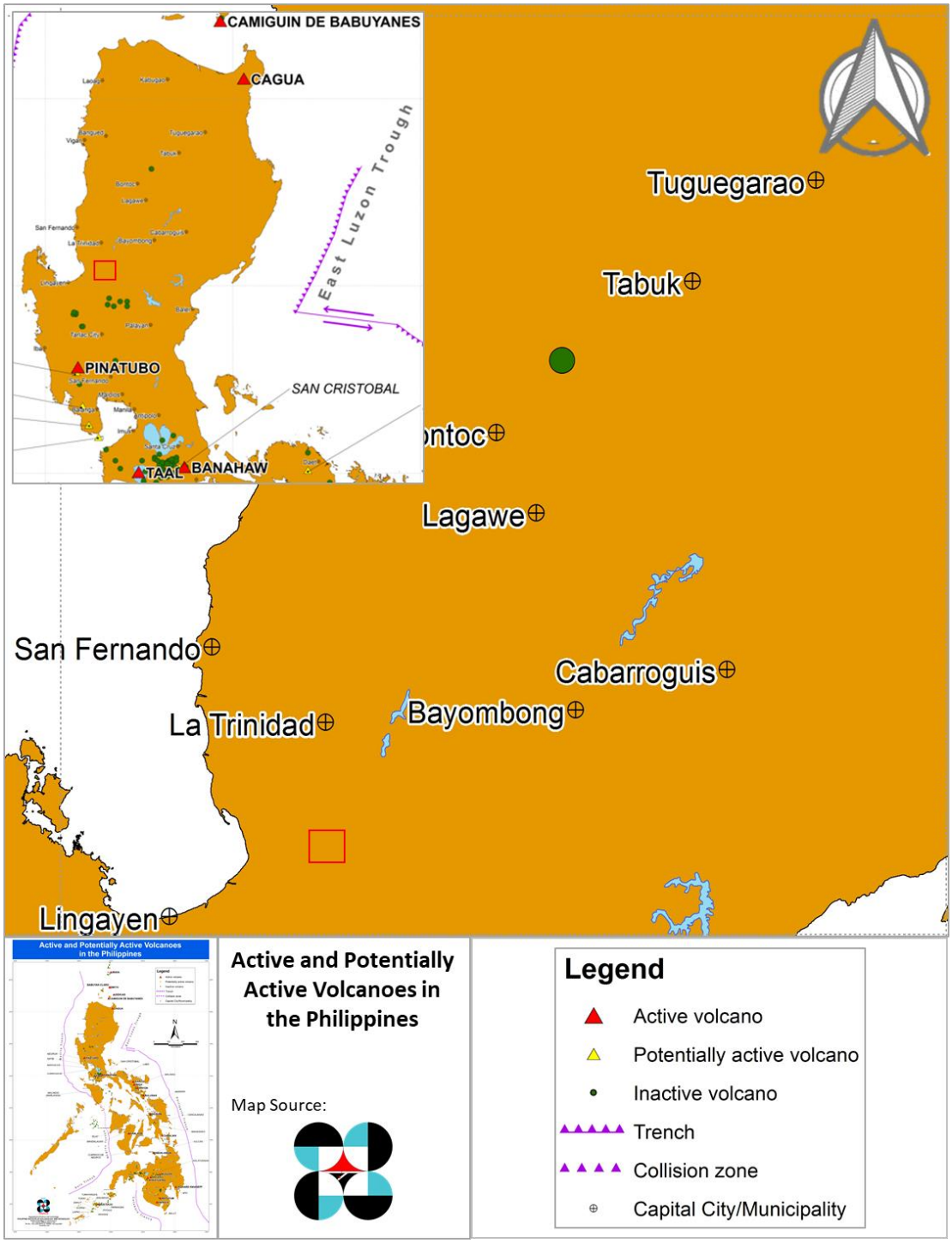
PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **LIQUEFACTION HAZARD OF PANGASINAN**	FIGURE NO.: 2-8
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PHIVOLCS

Figure 2-9: Landslide and Flood Hazard Map of Labayug Quadrangle



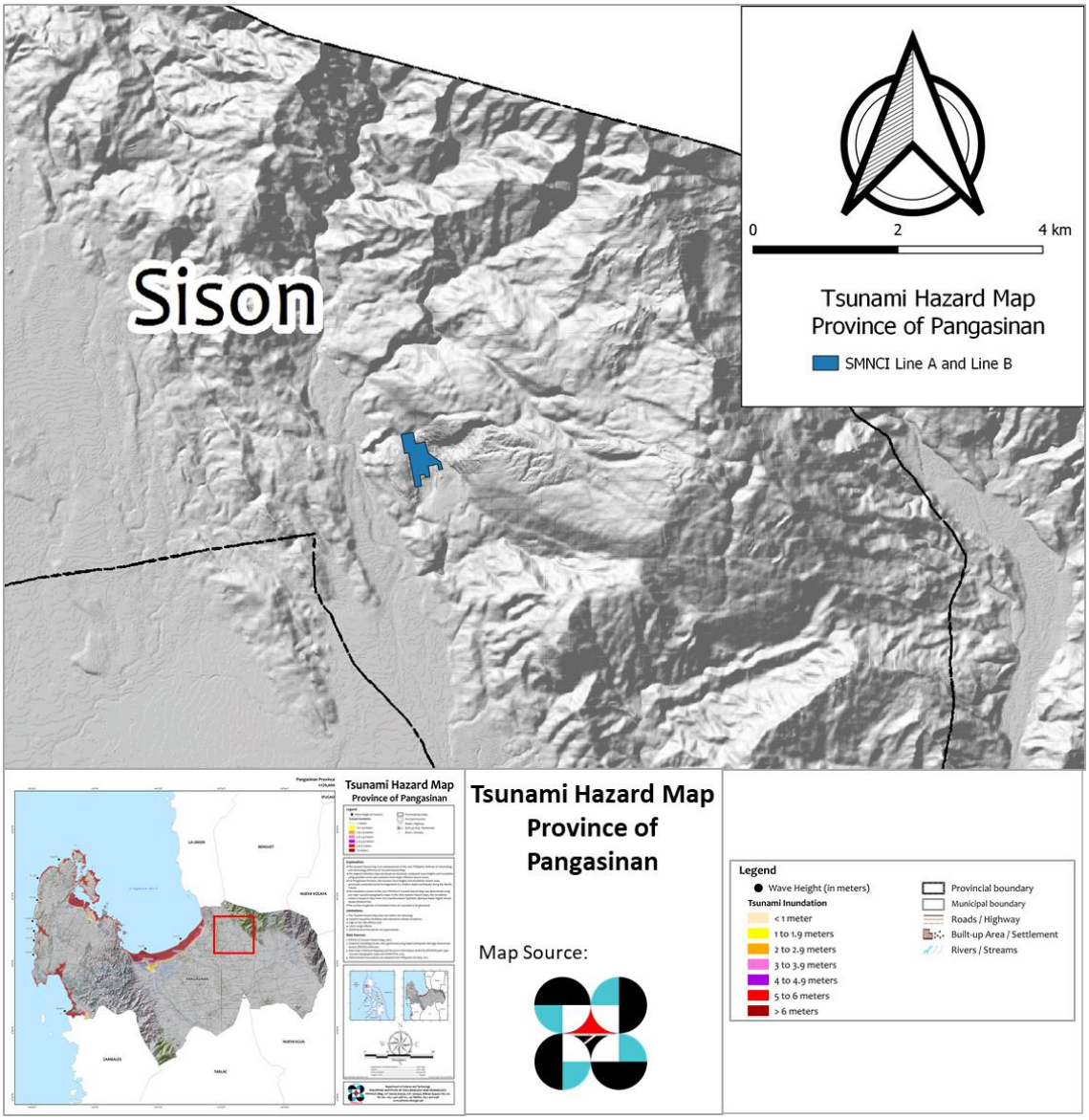
PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**LANDSLIDE AND FLOOD HAZARD MAP OF LABAYUG QUADRANGLE**	2-9
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PHIVOLCS

Figure 2-10: Active and Potentially Active Volcanoes in the Philippines



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ACTIVE AND POTENTIALLY ACTIVE VOLCANOES IN THE PHILIPPINES**	FIGURE NO.: 2-10
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PHIVOLCS

Figure 2-11: Tsunami Hazard Map of Pangasinan



PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**TSUNAMI HAZARD MAP OF PANGASINAN**	2-11
EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	PHIVOLCS

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

113 Significant changes on the surface landform, geomorphology, topography, terrain, and slope of the proposed project site are not expected given the proposed project design. The area where the cement plant will be constructed is already flat.

2.1.2.2 Change in subsurface geology/underground conditions

114 The operations of the project will not impact the subsurface geology since the cement manufacturing operations do not involve underground excavation.

2.1.2.3 Inducement of subsidence, liquefaction, landslides, mud, debris flow, etc.

115 The proposed project is not expected to induce or cause subsidence, liquefaction, mud/debris flow, landslide, and any other geological hazard.

2.1.3 Pedology/Soil

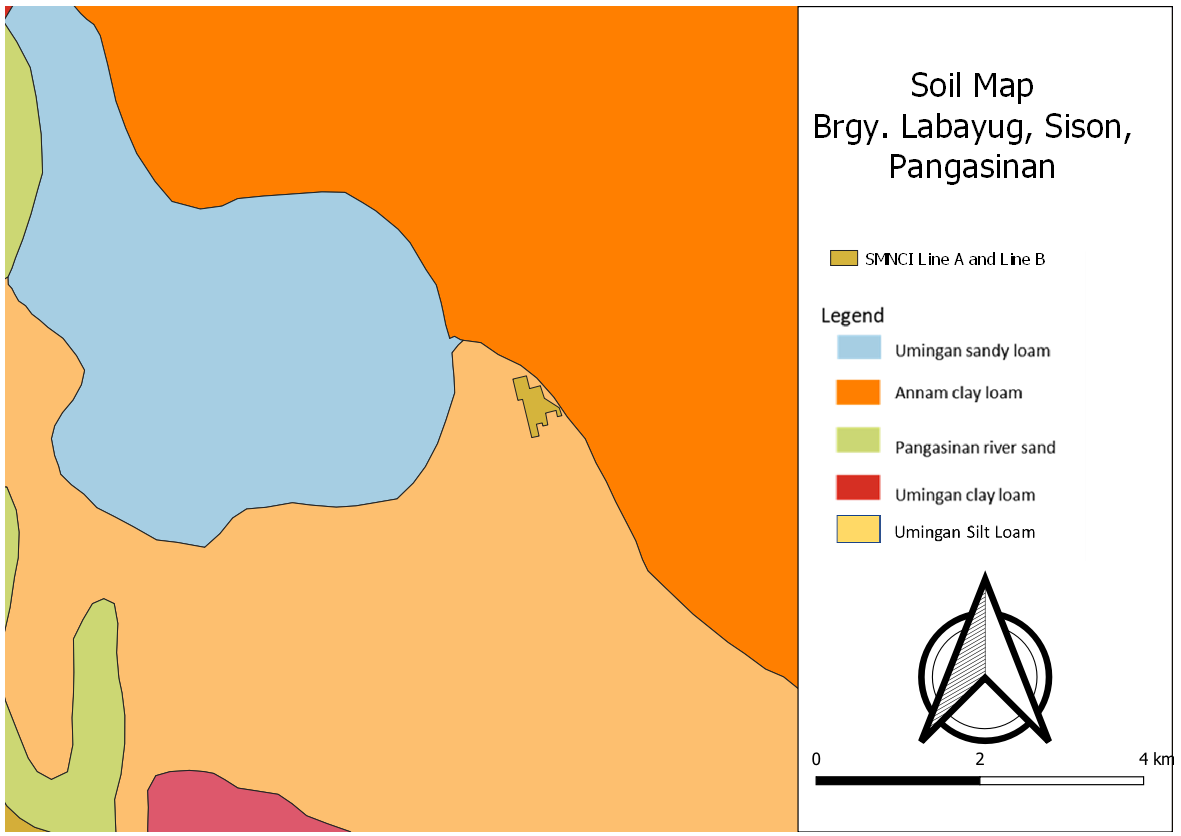
116 The soil map in the project area is shown in **Figure 2-12.** As shown in the map, the project is underlain by Umingan Silt Loam. The surface soil of Umingan Silt Loam is brown sandy loam and friable. The texture of this layer becomes finer as its depth increases. The substratum is yellowish brown silty clay loam.

2.1.3.1 Soil erosion/loss of topsoil/overburden

117 Landslides and erosions are caused by the sudden movement of soils within a slope of a hill or mountain. The operation of the cement plant is not expected to cause soil erosion in the area, however, during the construction, earth-moving activities may cause this event. Also, during heavy rains or strong winds, landslides and erosions can be triggered, thus putting significant threats to the low-lying communities.

118 However, erosion can be greatly minimized constructing erosion barriers, silt traps, etc. The exact location of the silt traps will depend on the strategy of the contractor on land clearing and the existing drainage. If the existing drainage will be used, a silt trap or siltation pond will be installed before discharge to nearby river.

Figure 2-12: Soil Map



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **SOIL MAP**	FIGURE NO.: 2-13
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PHILGIS NAMRIA

2.1.3.2 Change in Soil Quality/Fertility

119 To determine the organic properties of the soil within the project site, a soil sample was collected last June 16, 2017 and September 28, 2018. The soil sample was analyzed for its organic compounds in terms of total phosphorus, total nitrogen, potassium, oil and grease and pH and heavy metals. The summary of results of the laboratory analysis is shown in **Table 2-3**.

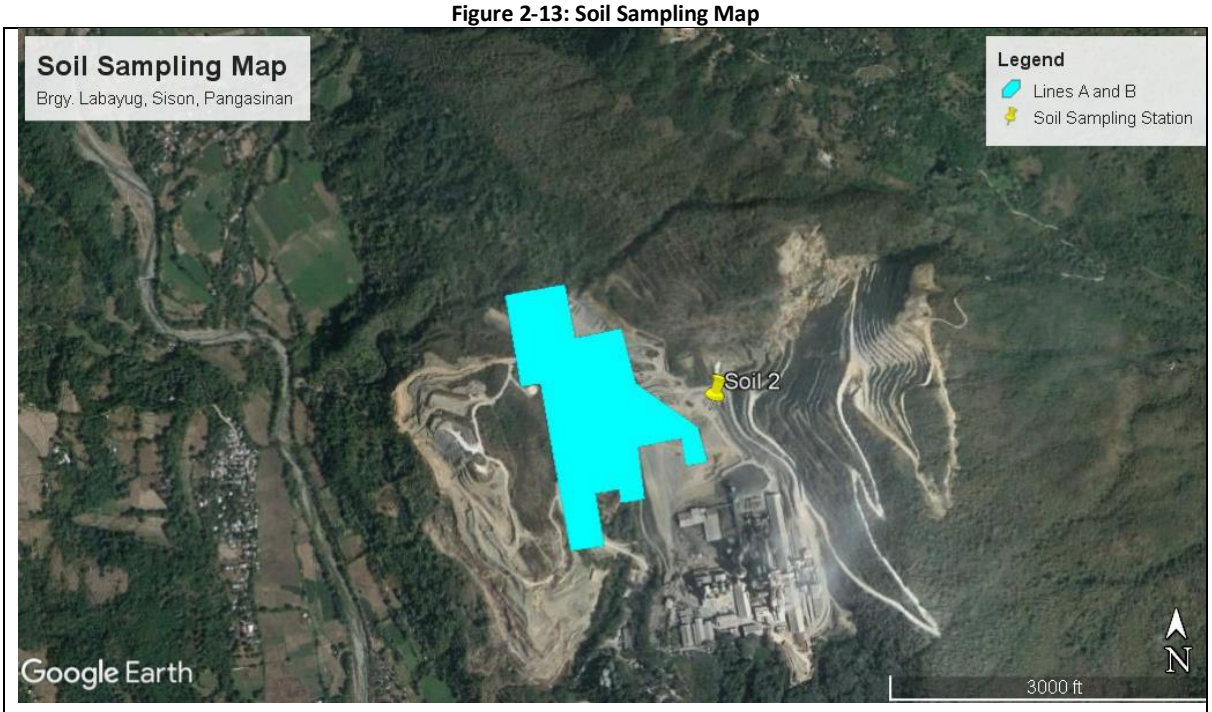
120 Since there are no established soil quality standards in the Philippines, the results were compared with the soil remediation intervention values specified in Annex 1 (Table 1) of the Dutch Soil Remediation Circular 2013 (version of 1 July 2013). The results show that the soil quality in the area is below the prescribed limits.

Table 2-3: Soil Analysis Results

PARAMETER	UNIT	DETECTED LEVEL AT THE SAMPLING POINTS BASED ON LABORATORY ANALYSIS		Dutch Intervention Value
		Soil 1	***Soil 2***	*Dutch Soil Remediation Circular 2013*
Total Nitrogen	mg/kg	**274**	-	-
Total Phosphorus	mg/kg	**639**	-	-

PARAMETER	UNIT	DETECTED LEVEL AT THE SAMPLING POINTS BASED ON LABORATORY ANALYSIS		Dutch Intervention Value
		Soil 1	***Soil 2***	*Dutch Soil Remediation Circular 2013*
Potassium	mg/kg	**856**	**-**	**-**
Oil and Grease	mg/kg	**532**	**-**	**-**
pH		7.4	-	-
Antimony	mg/kg	-	0.8	22
Arsenic	mg/kg	-	2.4	76
Cadmium	mg/kg	-	0.8	13
Lead	mg/kg	-	6.8	530
Thallium	mg/kg	-	8.0	15
Mercury	mg/kg	-	ND	-
Zinc	mg/kg	-	52	720
Potassium	mg/kg	-	2,170	-
Selenium	mg/kg	-	ND	100
NOTES: mg/kg = milligrams per kilogram **ND – Not Detected**				

Figure 2-13: Soil Sampling Map



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **SOIL MAP**	FIGURE NO.: 2-13
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE:

2.1.4 Terrestrial Ecology

121 A terrestrial assessment was conducted in the project site last September 2-5, 2015. The objective of the assessment was to identify existing vegetation cover and prevailing wildlife species in the watershed of the proposed project. This is undertaken to assess the biodiversity composition of the area and link the possible impacts of the project to the watershed. In addition, the study will provide recommendation on the possible mitigating measures to minimize impact of the project to the remaining flora and fauna species.

122 In the terrestrial assessment, plots were established in these particular sites to examine the tree and plant species for vegetational analysis. For faunal dimension, the study is limited on the observed species during the field survey, claims of the local and collected species on the established plots and through netting.

123 The species conservation status and endemicity were also determined. The International Union for Conservation of Nature (IUCN) Red List of Threatened Species 2016 and DENR-AO 2017-11 "Establishing the National List of Threatened Philippine Plant and Their Categories were employed in determining conservation status and endemicity of each species. This is to provide scientifically based information on the status of the species and subspecies at a global level; draw attention to the magnitude and importance of threatened biodiversity; influence national and international policy and decision-making; and provide information to guide actions to conserve biological diversity (Source: Convention on International Trade of Wild Flora and Fauna, Joint Meeting of the Animals and Plants Committee, Shepherds town, USA., December 2000, retrieved November 2012). The IUCN Red list is set upon precise criteria to evaluate the extinction of thousands of species and sub-species. The aim of the Red List is to convey the urgency of conservation issues to the public and policy-makers, as well as to help the international community to try to reduce species extinction. In addition, the DENR AO 2007-01 was also used pursuant to Section 22 of Republic Act 9147, otherwise known as the Wildlife Conservation and Protection Act of 2001. The following are the conservation categories and their description.

- **Critically Endangered (CR)** - A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered (EN)** - A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future.
- **Vulnerable (VU)** - A taxon is Vulnerable when it is not Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future.
- **Near threatened (NT)** - Taxa which do not qualify for Conservation Dependent, but which are close to qualifying for Vulnerable.
- **Least Concern (LC)** - Taxa which do not qualify for Conservation Dependent or Near Threatened.
- **Other Threatened Species (OTS)-** refers to a species or subspecies that is not critically endangered, endangered nor vulnerable but is under threat from adverse factors, such as over collection, throughout its range and is likely to move to the vulnerable category in the near future.
- **Not Evaluated (NE) -** A taxon is Not Evaluated when it is has not yet been assessed against the criteria.

2.1.4.1 Terrestrial Flora

Methodology

124 Quadrat sampling method was used during the assessment of the flora in the project site. Ten sampling plots were established in the Sapid Forest for the flora assessment to represent the vegetation cover of the project site. Plants were identified as well as patches of trees located within the project area. Other species of plants encountered outside the sampling plots were photo documented. The collected data were consolidated to form a species checklist indicating common name, scientific name and family name of the plants recorded.

125 Random sampling using 20m x 20m square plots were established. Inside the 20m x 20m square plots, nested 5m x 5m and 1m x 1m subplots were also established using tape measure and plastic twine. In the 20m x 20m plots, all trees with dbh (1.3m from the ground) greater than 10 cm were enumerated and identified. The dbh, and height of each tree were measured for the computation and analysis of species richness, evenness and distribution. Frequencies of shrubs, poles and saplings inside the 5m x 5m quadrant were counted to account for the understorey species while percent coverage of grasses and other ground cover inside the 1m x 1m quadrat were also determined. Tree saplings and seedlings, vines, grass etc. were identified, tallied and recorded. Error! Reference source not found. shows map for the established sampling plots.

126 The following formulas were used to compute the %IV.

$$\boldsymbol{Basal\ Area\ (m^2)} = 0.7854\ (\frac{DBH}{100})^2\ x\ 100$$

$$\boldsymbol{Relative\ Dominance}\ (\%) = \frac{\sum Basal\ area\ of\ species\ (m^2)}{Plot\ area\ (m^2)}\ x\ 100$$

$$\boldsymbol{Density} = \frac{No.\ of\ individuals\ of\ any\ species}{Area\ of\ samples}$$

$$\boldsymbol{Relative\ Density}\ (\%) = \frac{Density\ of\ a\ species}{Total\ density\ of\ all\ species} x\ 100$$

$$\boldsymbol{Frequency} = \frac{No.\ of\ plots\ in\ which\ species\ occur}{Total\ number\ of\ plots\ sampled}$$

$$\boldsymbol{Relative\ Frequency}\ (\%) = \frac{Frequency\ of\ a\ species}{Total\ frequency\ of\ all\ species} x\ 100$$

$$\boldsymbol{Importance\ Value}\ (\%) = Relative\ Dominance + Relative\ Density + Relatibe\ Frequency$$

Figure 2-14: Location of Flora Sampling Sites

Quadrant	Location	Elevation (m)	Coordinates	
			NORTH	EAST
1	Sapid Forest: Milagrosa Watershed	180	16° 09' 29.1"	120° 34' 17.2"
2	Sapid Forest: Demo Farm	172	16° 09' 32.0"	120° 34' 13.2"
3	Sapid Forest: Up Near Nursery	161	16° 09' 31.2"	120° 34' 21.6"
4	Sapid Forest: Down Near Dam	145	16° 09' 8.1"	120° 24' 14.4"
5	Sapid Forest: Down	149	16° 09' 28.2"	120° 34' 14.4"
6	Line Tree - Helipad 1	218	16° 10' 3.5"	120° 35' 41.9"
7	Sagitlang: Limestone Quarry 1	430	16° 10' 15.0"	120° 34' 18.9"

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **LOCATION OF FLORA SAMPLING SITES**	FIGURE NO.: 2-14
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE:

Floristic Composition

127 A total of 73 species were observed from the project area. Relative to the plant life-form, trees were the dominant group with 45 species (62%) while the remaining 18 species (38%) are composed of shrubs, palms, herbs, grasses and vines.

Importance Value (IV), Density (ρ), and Frequency (f)

128 Importance value (IV) is the sum of relative density, relative frequency and relative dominance. A high importance value indicates that species is well represented in the stand because of some combination of a) a large number of individuals of species compared with other species in the stand, or b) a smaller number of individuals of species, but the trees are large compared with others in the stand.

129 Ipil-ipil (Afzelia bijuga) has the highest computed IV of 19.27%, followed by rain tree (Samanea saman) with 17.34% IV, gmelina (Gmelina arborea) with 14.99% IV, aratiles (Muntingia calabura) with 12.98% IV and narra (Pterocarpus indicus) with 11.82% IV. Species with the highest %IV were considered to have the highest contribution/impact in the study area. Results of the computed %IV of the trees observed are shown in Table 2-4.

130 Density is defined as a measurement of the individuals' number in an area. This is computed by counting the numbers of any given species over the area of the sample of the sample plot. It is the degree of compactness of a species. It can be used for the thickness description of a particular vegetation, extent regeneration and the extent of standing biomass or ground cover.

131 All the tree species observed have computed relative density of below 10%. Aratiles (Muntingia calabura) and bamboo (Bambusa blumeana) have the highest relative density of 6.55%.

132 Frequency (f) is defined as the number of times the species occurs in a given number of small quadrants or sample points. It is expressed as a fraction of the total relative frequency (RF). It does not matter how many individuals of species occur in each quadrant since a single occurrence carries the same weight.

133 In the intermediate layer, kantutay (Lantana camara) has the highest relative frequency of 10% followed by ipil-ipil (Afzelia bijuga) with 9.35% RF and kakawate (Gliricidia sepium) with 7.19% RF. Table 2-5 presents the computed frequency of the species in the intermediate layer.

134 Nine (9) species of grasses and vines were recorded. Mikania, Imperata cylindrica (cogon) and Saccharum sponaneum (talahib) are invasive weed species in disturbed areas and form dense monocultures over croplands and pasturelands. They possess also allelopathic effects on other plants. These characteristics enabled these weed species to have high relative cover especially in the open marginal areas of the survey area. Computed frequency in the ground cover is shown in Table 2-6.

Table 2-4: Importance Value of the trees surveyed

Family Name	Scientific Name	Common Name	Abundance	Rf	Rp	Rd	IV
Fabaceae	*Acacia auricoliformis*	Acacia	18	4.09222	3.92972	4.09268	12.1146
Leguminaceae	*Bauhinia malabarica*	Alibangbang	19	4.09222	4.14858	2.46914	10.7099
Moraceae	*Streblus asper*	Aludig/sandpaper tree	8	0.80692	1.74722	0.91324	3.46738
Arecaceae	*Saribus rotundifolius*	Anahaw	13	2.47839	2.83786	1.08236	6.39861
Dipterocarpaceae	*Dipterocarpus grandiflorus*	Apitong	1	0.40346	0.21886	0.54118	1.1635
Muntingiaceae	*Muntingia calabura*	Aratiles	30	3.68876	6.54994	2.73973	12.9784
Annonaceae	*Annona squamosa*	Atis	4	1.67147	0.873	2.43531	4.97978
Moraceae	*Ficus benjamina*	Balite	21	4.55331	4.58508	2.50296	11.6414
Poaceae	*Bambusa blumeana*	Bamboo	30	3.2853	6.54994	1.15001	10.9853
Phyllanthaceae	*Antidesma bunius*	Bignay	18	4.09222	3.92972	4.66768	12.6896
Arecaceae	*Corypha elata Roxb.*	Buri	6	1.67147	1.3095	1.58972	4.57069
Malvaceae	*Theobroma cacao L.*	Cacao	3	1.21037	0.65536	0.74412	2.60986
Rutaceae	*Citrus microcarpa*	Calamansi	4	1.67147	0.873	3.34855	5.89302
Anacardiaceae	*Anacardium occidentale*	Cashew	2	0.80692	0.4365	0.77795	2.02136
Rutaceae	*Manilkara zapota*	Chico	1	0.40346	0.21886	2.16472	2.78704
Rubiaceae	*Coffea liberica*	Coffee	2	0.80692	0.4365	0.7103	1.95372
Myrtaceae	*Syzygium cumini*	Duhat	8	2.47839	1.74722	2.30002	6.52562
Lamiaceae	*Gmelina arborea*	Gmelina	23	4.55331	5.02158	5.4118	14.9867
Myrtaceae	*Psidium guajava*	Guava	9	2.47839	1.96486	1.15001	5.59325
Annonaceae	*annona muricata*	Guyabano	4	1.67147	0.873	1.4206	3.96507
Fabaceae	*Afzelia bijuga*	Ipil – ipil	50	3.68876	10.9174	4.66768	19.2738
Artocarpaceae	*Artocarpus heterophyllus*	Jackfruit	5	1.67147	1.09186	1.38677	4.15011
Moraceae	*Artocarpus altilis*	Kamansi	13	3.2853	2.83786	1.58972	7.71288
Fabaceae	*Parkia javanica (Lam.) Merr.*	Kupang	13	3.68876	2.83786	4.87062	11.3972
Ebenaceae	*Diospyros blancoi*	Mabolo	3	1.21037	0.65536	3.28091	5.14664
Myrtaceae	*Syzygium samarangense*	Macopa	1	0.80692	0.21886	0.7103	1.73608
Meliaceae	*Toona calantas*	Mahogany	29	4.95677	6.3323	2.87502	14.1641
Anacardiaceae	*Mangifera indica*	Mango	9	3.68876	1.96486	3.24708	8.9007

LAMIACEAE	*Vitex parviflora*	Molave	3	1.21037	0.65536	2.16472	4.03046
Dipterocarpaceae	*Pterocarpus indicus*	Narra	16	4.55331	3.49322	3.77135	11.8179
Rutaceae	*Citrus X sinensis*	Orange	1	0.40346	0.21886	0	0.62232
Dipterocarpaceae	*Shorea palosapis*	Palosapis	3	1.21037	0.65536	0.40589	2.27162
Caricaceae	*Carica papaya*	Papaya	11	2.07493	2.40136	1.4206	5.89689
Rutaceae	*Citrus maxima*	Pomelo	1	0.40346	0.21886	1.82648	2.4488
Fabaceae	*Samanea saman*	Raintree	27	4.55331	5.89458	6.90005	17.3479
Sapindaceae	*Nephelium lappaceum*	Rambutan	1	0.40346	0.21886	2.87502	3.49734
Dipterocarpaceae	*Shorea negrosensis*	Red lawaan	2	0.80692	0.4365	1.04854	2.29195
Meliaceae	*Sandoricum koetjape*	Santol	5	1.67147	1.09186	0	2.76333
Fabaceae	*Biancaea sappan*	Sappan	1	0.40346	0.21886	2.90884	3.53116
Sapotaceae	*Chrysophyllum cainito*	Star apple	8	2.47839	1.74722	1.89413	6.11974
Combretaceae	*Terminalia catappa*	Talisay	3	1.21037	0.65536	0.94707	2.8128
Fabaceae	*Tamarindus indica*	Tamarind	6	2.07493	1.3095	0.7103	4.09473
Lamiaceae	*Tectona grandis*	Teak	18	4.55331	3.92972	1.9956	10.4786
Dipterocarpaceae	*Shorea contorta*	White lawaan	1	0.40346	0.21886	3.04414	3.66646
Dipterocarpaceae	*Shorea astylosa*	Yakal	4	1.67147	0.873	3.24708	5.79155
		TOTAL	**457**	**100**	**100**	**100**	**300**

Table 2-5: Computed Frequency (f) in the Intermediate Layer

Scientific Name	Species Name	Common Name	f	Rf
Fabaceae	*Acacia auricoliformis*	Acacia	8	5.76%
Leguminaceae	*Bauhinia malabarica*	Alibangbang	8	5.76%
Moraceae	*Streblus asper*	Aludig	5	3.60%
Moraceae	*Ficus benjamina*	Balite	6	4.32%
Poaceae	*Dracaena braunii*	Chinese Bamboo	3	2.16%
Myrtaceae	*Syzygium cumini*	Duhat	7	5.04%
Lamiaceae	*Gmelina arborea*	Gmelina	9	6.47%
Poaceae	*Phyllostachys aurea*	Golden bamboo	5	3.60%
Asteraceae	*Chromolaena odorata*	Hagonoy	8	5.76%
Fabaceae	*Afzelia bijuga*	Ipil-Ipil	13	9.35%
Fabaceae	*Gliricidia sepium*	Kakawate	10	7.19%
Verbenaceae	*Stachytarpeta jamaicensis*	Kandikandilaan	7	5.04%
Verbenaceae	*Lantana camara*	Kantutay	14	10.07%
Poaceae	*Bambusa blumeana*	Kawayan Tinik	8	5.76%
Meliaceae	*Toona calantas*	Mahogany	7	5.04%
Anacardiaceae	*Mangifera indica*	Mango	9	6.47%
Myrtaceae	*Syzygium polycephaloides*	Panglumbuyen	2	1.44%
Caricaceae	*Carica papaya*	Papaya	4	2.88%
Lamiaceae	*Hyptis suaveolens*	Suob Kabayo	6	4.32%

Table 2-6: Computed Frequency in the Ground Cover

Family Name	Species	Common Name	Rf	Relative Cover (%)
Amaranthacea	*Amaranthus spinosus*	Uray	8.3	20
Fabaceae	*Mimosa pudica*	Makahiya	5.0	34
Poaceae	*Eleusine indica*	Paragis	10.7	18
Asteraceae	*Mikania mikania*		31.1	24
	Oxales sp.		2.5	18
Portulacaceae	*Portulaca oleracea*	Kolasiman	3.2	7
Poaceae	*Saccharum spontaneum*	Talahib	8.3	52
Asteraceae	*Ageratum conyzoides*	Bulak-manok	6.1	44
Poaceae	*Imperata cylindrica*	Kogon	16.3	61
	Litter		8.5	32

Biodiversity Index

135 Species richness and evenness are the important factors in determining biodiversity of an area. Richness is defined as the total number of species present in a sample while evenness is the relative abundance of the species in a sample. Richness' takes on diversity is - the more different the species in a community, the more diverse the area. Evenness considers the number of the individual belonging to the same species (www.countrysideinfo.co.uk). It expresses how evenly the individuals in the community are distributed over the different species.

136 Based from the assessment conducted, the project area has moderate diversity with the computed average Shannon H' of 2.83 for all the transects. Transects 1 and 2 have high biodiversity while only Transect 6 has low diversity.

137 Majority of the trees, bamboos and shrubs were observed in Transects 1 and 2. Moreover, transect 1 and 2 (Sapid Forest) are the site for reforestation of forest and fruit bearing trees. Transects 6 and 7 are located near the helipad and the NCC limestone and shale quarry where the soil condition is infertile, and majority of the vegetation is composed of invasive vines and allelopathic grasses and bushes resulting to less plant diversity in the said transects

138 Please see **Table 2-7** for the results of the computed biodiversity indexes per transect.

Table 2-7: Biodiversity Indexes based from Shannon-Wiener diversity H'

Transect	Shannon (H')	Remarks
T1	3.058	High
T2	3.181	High
T3	2.688	Moderate
T4	2.994	Moderate
T5	2.729	Moderate
T6	2.353	Low
T7	2.803	Moderate

Flora Conservation Status and Endemicity

139 **Table 2-8** shows the conservation status and endemicity of the observed species. According to the The IUCN Red List of Threatened Species version 2019-1, two species are under endangered (EN), one species is vulnerable (VU) and three species are considered critically endangered (CR). Based on the DAO 2017-11, there is one species considered as critically endangered (CR), one species is under endangered (EN) and five species are vulnerable (VU).

140 There were also three species that were observed to be endemic as shown in the table below.

Table 2-8: List of Flora Species and its corresponding Conservation Status

FAMILY NAME	SPECIES NAME		CONSERVATION STATUS		ENDEMI-CITY
	SCIENTIFIC NAME	COMMON NAME	IUCN (version 2019-1)	DAO 2017-11	
DIPTEROCARPACEAE	*Shorea contorta*	White lawaan	**CR**	**VU**	Endemic
DIPTEROCARPACEAE	*Shorea astylosa*	Yakal	**CR**	**CR**	Endemic
FABACEAE	*Pterocarpus indicus*	Narra	**EN**	**VU**	-
DIPTEROCARPACEAE	*Shorea negrosensis*	Red lawaan	**CR**	**VU**	Endemic
DIPTEROCARPACEAE	*Dipterocarpus grandiflorus*	Apitong	**EN**	**VU**	-
MELIACEAE	*Toona calantas*	Kalantas	**DD**	**VU**	-
VERBENACEAE	*Vitex parviflora*	Molave	**VU**	**EN**	-

Economic Importance

141 Majority of the plant species that were identified in study area have commercial and aesthetic/ornamental values while some have food, commercial and medicinal properties. Most of the large tree species can be utilized for lumber, furniture, heavy construction uses, and light construction purposes. Although many of the lower species are considered weeds, they can be utilized for medicinal purposes, construction materials and ornamental plants. Others can be utilized for handicrafts, agricultural implements, fibers, ground cover, dyes and forage.

2.1.4.2 Terrestrial Fauna

Methodology

142 The fauna survey was conducted last September 2-5, 2015. The survey covers the four groups of wildlife-vertebrates which include the avi-fauna and herpetofauna species. Rapid survey was employed in the conduct of faunal assessment within the project area. Species not encountered during the period of field assessment is generated through ethnobiological interview with local informants to obtain other important information on the presence of other wildlife species not encountered throughout the survey. Photo documentation of observed wildlife was also undertaken for further species verification when necessary.

143 A total of five (5) observation sites was selected within the study area representing different ecosystem types and elevations. This is to be able to determine faunal composition and diversity in each ecosystem and in relation to elevation. Figure 2-15 shows the locations of faunal sampling sites while summarized in Table 2-9 are the corresponding habitat types and geographical coordinates of the five observation sites.

Table 2-9: Description and geographic location of selected observation sites

Transect	Location	Elevation (m)	Coordinates	
			North	East
1	Sapid Forest: Milagrosa Watershed	180	16° 09’ 29.1”	120° 34’ 17.2”
2	Sapid Forest: Demo Farm	172	16° 09’ 32.0”	120° 34’ 13.2”
3	Sapid forest: Up near nursery	161	16° 09’ 31.2”	120° 34’ 21.6”
4	NCC Limestone & Shale Quarry Area- Helipad	218	16 10 3.5	120 33 41.9
5	Saguitlang Area	430	16 10 15	120 34 19

144 *Birds*. Transect lines were established along existing roads/trails at 1-kilometer survey distance per transect. Techniques employed during the survey includes ocular and aural observation, identification through wildlife calls, foot prints and droppings, if any. All the bird species seen and heard by the observer at the sampling site.

145 Reptiles and Amphibians. Active search for reptiles and amphibians was done systematically within the 5 transect lines and in its immediate vicinity especially in areas with the presence of suitable habitats like underneath of decaying logs, uprooted trees and bamboos. For each species observed and heard, the name of the species, number of individuals and the type of habitat where it was found were recorded. Double counting of the individuals of the same species was definitely avoided. Photos of species encountered at the sampling sites was also undertaken.

146 Mammals. For non-volant mammals such as rodents, cage traps (10) was employed baited with dried fish as alternative for coconut meat with peanut butter. Cage traps are laid on strategic sites within the observation sites. Interview with local informants was also undertaken to generate significant information relative to the presence/absence of mammal species in the area. Mist nets were used to sample bat species and were set across river/creek, parallel to trails, and potential flyways.

Biodiversity Measurement

147 Biodiversity measurements were computed and analyzed using the Shannon-Wiener Diversity with formula illustrated below:

Shannon-Wiener Diversity = $H' = -\sum p_i \ln (p_i)$, where,

"H'"- represents the symbol for the amount of diversity in ecosystem (species diversity)

"p_i"- represents the proportion or relative abundance of each individual species to the total (measured from 0 to 1)

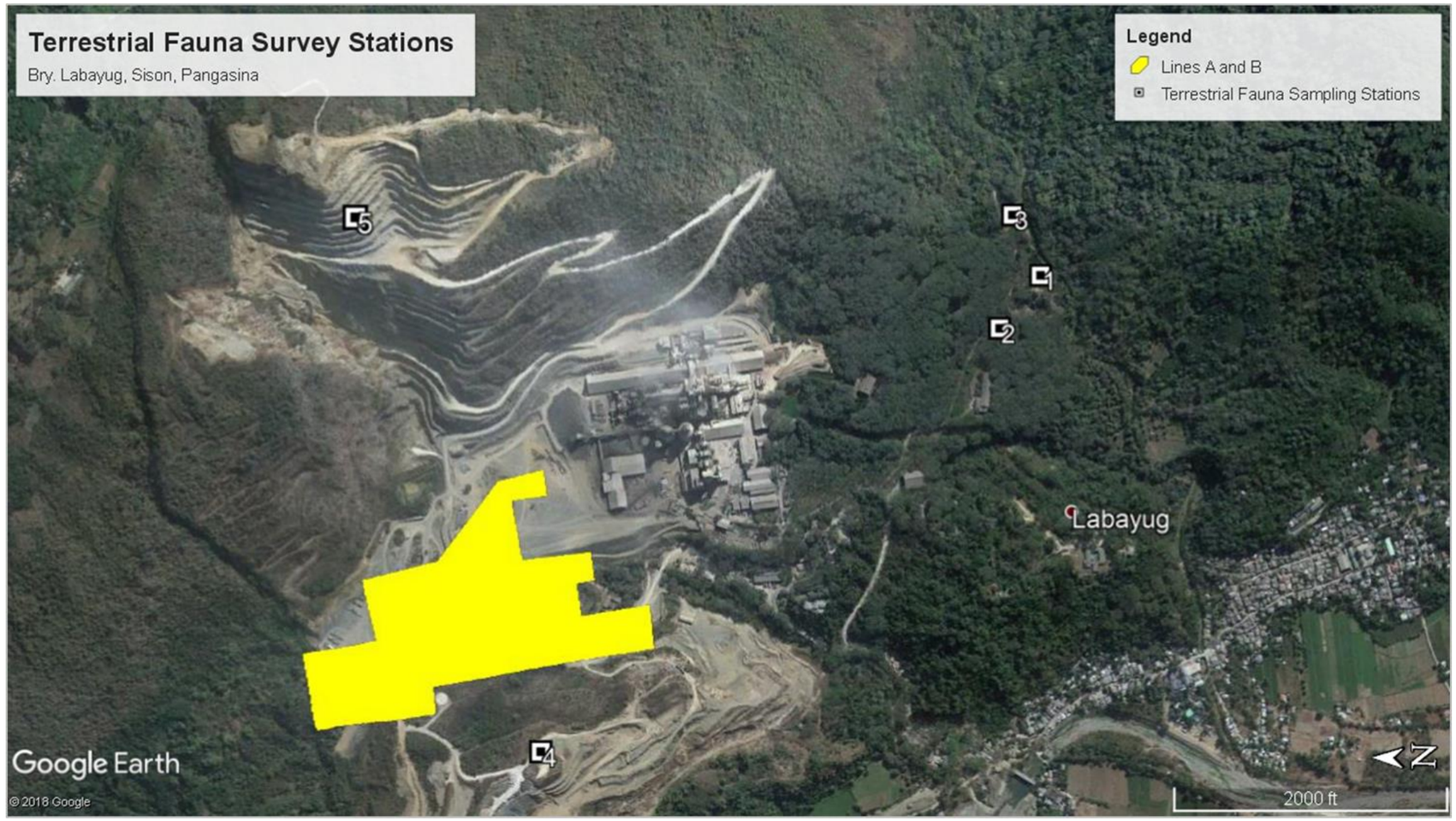
"ln p_i" - represents the natural logarithm of p_i

148 The interpretation of the values obtained using the above formulas will be based on the Fernando Biodiversity Scale (1998) shown in the table below.

Table 2-10: The Fernando Biodiversity Scale (1998)

Relative Values	Shannon –Wiener Biodiversity (H') Index
Very High	3.5 and above
High	3.0 – 3.49
Moderate	2.5 – 2.99
Low	2.0 – 2.49
Very Low	1.9 and below

Figure 2-15: Locations of Faunal Sampling Sites



Transect	Location	Elevation (m)	Coordinates	
			North	East
1	Sapid Forest: Milagrosa Watershed	180	16° 09' 29.1"	120° 34' 17.2"
2	Sapid Forest: Demo Farm	172	16° 09' 32.0"	120° 34' 13.2"
3	Sapid forest: Up near nursery	161	16° 09' 31.2"	120° 34' 21.6"
4	Limestone & Shale Quarry Area- Helipad	218	16° 10' 3.5"	120° 33' 41.9"
5	Saguitlang Area	430	16° 10' 15"	120° 34' 19"

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **LOCATION OF FAUNAL SAMPLING SITES**	FIGURE NO.: 2-15
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE:

Fauna Composition and Richness

Birds

149 A total of 13 species belonging to 12 avi-fauna families and a total of 70 individuals were recorded during the fauna survey. Some of the observed bird species were known to thrive in open areas or grassland, agricultural areas while majority subsist on the fruits, macroinvertebrates and other food source that abound in the riparian vegetation of Sapid Forest.

150 Among the bird species observed, the Eurasian tree sparrow (Passer montanus) has the highest relative abundance with 34% followed by Philippine maya (Lonchura articapilla) and yellow–vented bulbul (Pycnonotus goiavier) with relative abundance of 24% and 13%, respectively. They are commonly found in household and agricultural areas feeding on grains. Other species have relatively low abundance and are known to occur in patches of forested and riverbank areas in Sapid Forest.

151 List of the bird species observed, and their corresponding abundance and relative abundance are summarized in **Table 2-11**.

Table 2-11: Abundance and Frequency of Bird Species observed within the Sampling Sites

FAMILY	SCIENTIFIC NAME	SPECIES NAME	TOTAL ABUNDANCE	RELATIVE ABUNDANCE
PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow-vented bulbul	9	0.128
RALLIDAE	*Gallirrallus torquatus*	Barred rail	7	0.100
COLUMBIDAE	*Loriculus philippensis*	Parakeet	1	0.014
COLUMBIDAE	*Treron vernans*	Pink necked green pigeon	1	0.014
HALCYONIDAE	*Halcyon chloris*	White collared ear kingfisher	1	0.014
LOCUSTELLIDAE	*Megalurus palustris*	Striated grassbird	1	0.014
ACCIPITRIDAE	*Haliastur indus*	Brahminy kite	1	0.014
PYCNONOTIDAE	*Hypsipetes p. philippinus*	Philippine bulbul	2	0.028
CUCULIDAE	*Centropus bengalensis*	Lesser coucal	1	0.014
ESTRELDIDA	*Lonchura atricapilla jagori*	Philippine Maya	17	0.242
APODIDAE	*Collocalia troglodytes*	Swallow/ Pygmy swiftlet	4	0.057
PASSERIFORMIDAE	*Passer montanus*	Eurasian Tree sparrow	24	0.342
LANIIDAE	*Lanius cristatus*	Brown Shrike	1	0.014

Mammal

152 Only *Rattus exulans* (Polynesia rat) was observed in the project site. There were no volant mammals (bats) observed or captured during the survey. According to the local guides, the roosting and nesting sites of fruit bats are currently situated outside the NCC mining area. Their nesting sites were located above the Saguitlang area (430masl) near Tuba, Benguet. Noise

disturbance generated by blasting and heavy equipment operation can affect their foraging activities and nesting sites.

Amphibian and Reptiles

153 Only *Rhinella marinus* (cane toad) was observed during the assessment along the creek's vegetation in Transect 3. *Gekko gecko* (tuko) was observed in Transect 1.

154 According to the local guides, they sighted 3 species of snakes within the Sapid Forest. These are the Elaphe erythrura (Philippine rat snake), *Python reticulatus* (Reticulated python) and viper. Two of these snakes are endemic to the Philippines.

Fauna Endemism and Conservation Status

Birds

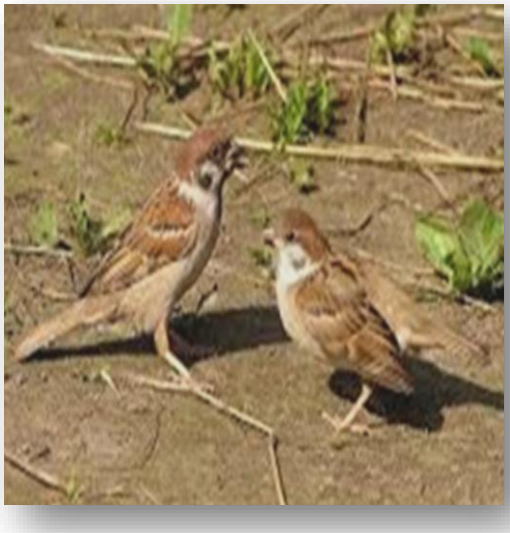
155 Endemism of recorded bird species showed that 5 species or 38% are endemic in the country and the rest are non-endemic species. Photos of the observed avi fauna species were presented in **Figure 2-16**.

156 Based on the International Union for Conservation of Nature (IUCN) (2019), all the recorded bird species are under least concern (LC) category. However according to the list of threatened species of DAO 2004-15, there are two endangered species (EN) namely Loriculus philippensis (Parakeet) and Haliastur indus (Brahminy kite).

Table 2-12: Conservation Status and Endemicity of Observed Birds

FAMILY	SCIENTIFIC NAME	SPECIES NAME	Endemicity	Conservation Status (IUCN)
PYCNONOTIDAE	*Pycnonotus goiavier*	Yellow-vented bulbul	-	LC
RALLIDAE	*Gallirallus torquatus*	Barred rail	Endemic	LC
COLUMBIDAE	*Loriculus philippensis*	Parakeet	Endemic	LC EN (DAO 2004-15)
COLUMBIDAE	*Treron vernans*	Pink necked green pigeon	-	LC
HALCYONIDAE	*Halcyon chloris*	White collared ear kingfisher	-	LC
LOCUSTELLIDAE	*Megalurus palustris*	Striated grassbird	-	LC
ACCIPITRIDAE	*Haliastur indus*	Brahminy kite	-	LC EN (DAO 2004-15)
PYCNONOTIDAE	*Hypsipetes philippinus*	Philippine bulbul	Endemic	LC
CUCULIDAE	*Centropus bengalensis*	Lesser coucal	-	LC
ESTRELDIDA	*Lonchura atricapilla jagori*	Philippine Maya	Endemic	LC
APODIDAE	*Collocalia troglodytes*	Swallow/ Pygmy swiftlet	Endemic	LC
PASSERIFORMIDAE	*Passer montanus*	Eurasian Tree sparrow	-	LC
LANIIDAE	*Lanius cristatus*	Brown Shrike	-	LC

Figure 2-16: Photos of Avifauna Species Observed within the Project Area



Passer montanus

Lonchura articapilla

Treron vernans

Haliastur indus Brahmini

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **PHOTO OF AVIFAUNA SPECIES OBSERVED WITHIN THE PROJECT AREA**	FIGURE NO.: 2-16
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: Envitecch Environmental Management Consultancy Services, Inc.

Mammal

157 Based on the International Union for Conservation of Nature (IUCN) (2019), the mammal species observed were under least concern (LC) and none were listed under the DAO 2004-15. There were also no endemic mammal species observed during the survey.

Table 2-13: List of Mammal Species observed within the Study Area

Family	Scientific Name	Species Name	Conservation Status (IUCN)	Endemicity
Pteropodidae		Fruit bat	LC	-
Muridae	*Rattus exulans*	Polynesian Rat	LC	-

Amphibian and Reptiles

158 All the amphibian and reptile species recorded were considered as least concern (LC) by the IUCN 2019 and only the *Python reticulatus* (Reticulated phyton) was listed in the DAO 2004-15 as other threatened species (OTS). Three of the amphibian and reptile species observed are endemic.

Table 2-14: List of Herpetofauna Species observed within the Study Area

Family	Scientific Name	Species Name	Conservation Status (IUCN)	Endemicity
Amphibian				
Bufonidae	*Rhinella marina*	Cane Toad	LC	Endemic
Reptiles				
Boidae	*Python reticulatus*	Reticulated phyton	LC OTS (DAO 2004-15)	Endemic
Pythonidae	*Elaphe erythrura*	Philippine rat snake	LC	Endemic
Gekkonidae	*Gekko gecko*	Tokay gecko	LC	

Computed Biodiversity Index

159 Shannon-Wiener Diversity Index (H') was computed for this survey using the bird sampling data. The overall computed biodiversity index of the project site by getting the average biodiversity index of the 5 sampling sites has a computed value of 1.351 which means that the biodiversity in the area is very low. All the sampling sites have very low biodiversity with computed Shanon-Wiener Biodiversity index of below 1.9.

Table 2-15: Computed Biodiversity Index of Each Sampling Sites

Transects	Abundance	Shannon-Wiener Biodiversity index (H')	Fernando's Biodiversity Scale (1998)
TRANSECT 1	11	1.799	**Very Low**
TRANSECT 2	6	1.561	**Very Low**
TRANSECT 3	13	1.22	**Very Low**
TRANSECT 4	20	1.094	**Very Low**
TRANSECT 5	20	1.132	**Very Low**

2.1.4.3 Vegetation removal and loss of habitat

160 The expansion project will not require removal of vegetation since the area where it will be constructed is already developed. The surrounding vegetation will be preserved to act as natural air and noise buffers.

161 The project will promote its protection and enhancement to maintain its natural function to the ecosystem as home to remaining flora and fauna species, carbon sink, and as natural buffer to extreme climate variabilities.

2.1.4.4 Threat to existence and/or loss of important local species

162 The proposed project will not require land clearing and removal of vegetation. Therefore, the proposed project will not cause disturbance of wildlife, loss of habitats and reduction to biodiversity composition of the area.

2.1.4.5 Threat to abundance, frequency and distribution of important species

163 As mentioned, the proposed project will be constructed in a developed area and will not require land clearing thus, the project will not affect the abundance, frequency and distribution of important species.

2.1.4.6 Hindrance to wildlife access

164 Wildlife disturbance due to noise generated during construction brought about by the operation of heavy equipment's will force faunal species to migrate in other or nearby areas/habitat where disturbance is less.

165 Wildlife may find habitat to the erected structures recognized by species within and around built structures and or canals in the long run. Animals sighted within and around the facilities may be allowed to habituate unless they pose danger, damage and/or malfunction to the structure.

2.1.5 Summary of Baseline Findings, Impacts and Mitigation on Land

166 The following table summarizes the impacts and mitigating measures on Land.

Table 2-16: Summary of Significant Baseline Findings and Potential Impacts and Mitigation on Land

SUMMARY OF BASELINE FINDINGS ON LAND

- **Land Use and Classification**
  - The area where the proposed project is situated is designated as industrial zone.
  - The proposed project site does not fall within any declared ECA and is not covered by any tenurial instrument.
- **Geology and Geomorphology**
  - There are three fault lines near the location of the proposed SMNCI cement plant.
  - The project site has medium susceptibility in terms of earthquake-induced landslide.
  - The project site is not susceptible to liquefaction.
  - The project site has moderate susceptibility to landslide.
  - The project site is not a flood-prone area.
  - There are no active volcanoes near the project site.
  - The project site is not prone to tsunami**.**
- **Pedology**
  - The project is underlain by Umingan Silt Loam.
- **Terrestrial Ecology**
  - From the terrestrial flora survey, 2 species are considered as endangered, one species is vulnerable, and 3 species are critically endangered according to the IUCN Red List of Threatened Species. On the other hand, based from the DAO 2017-11, there are one species that is endangered, one species is critically endangered and five are vulnerable.
  - There are no critically endangered fauna species found in the project site based from the IUCN list. However, only the *Python reticulatus* (Reticulated phyton) was listed in the DAO 2004-15 as other threatened species (OTS).

POTENTIAL IMPACTS	PROJECT PHASES	FINDINGS/OBSERVATIONS	MITIGATING MEASURES
Geology and Geomorphology			
Devaluation of land value a result of improper solid waste management	Construction, Operation, Abandonment	Generation of construction spoils and debris and solid wastes from operations	• Provision of disposal area • Segregation of debris according to recyclable and non-recyclables • Hauling of debris items by duly-licensed traders • Implementation of a solid waste management plan
PEDOLOGY			
Change in soil quality/fertility	Construction, Operation, Abandonment	There is a risk of soil contamination due to the maintenance of heavy equipment	• Collect, store and dispose wastes in safe and sealed containers • Treatment and dispose wastes through accredited treaters • Use sawdust, rice hulls, or coir dusts to absorb the oil spills
Soil erosion / loss of topsoil	Construction	Erosion and siltation of the nearby surface water may occur due to occasional rains and during movement of heavy equipment passing over unpaved roads and soil stockpile area.	• Establish buffer zones with vegetation • Avoid unnecessary earth movement and removal of vegetation

2.2 The Water

2.2.1 Hydrology/Hydrogeology

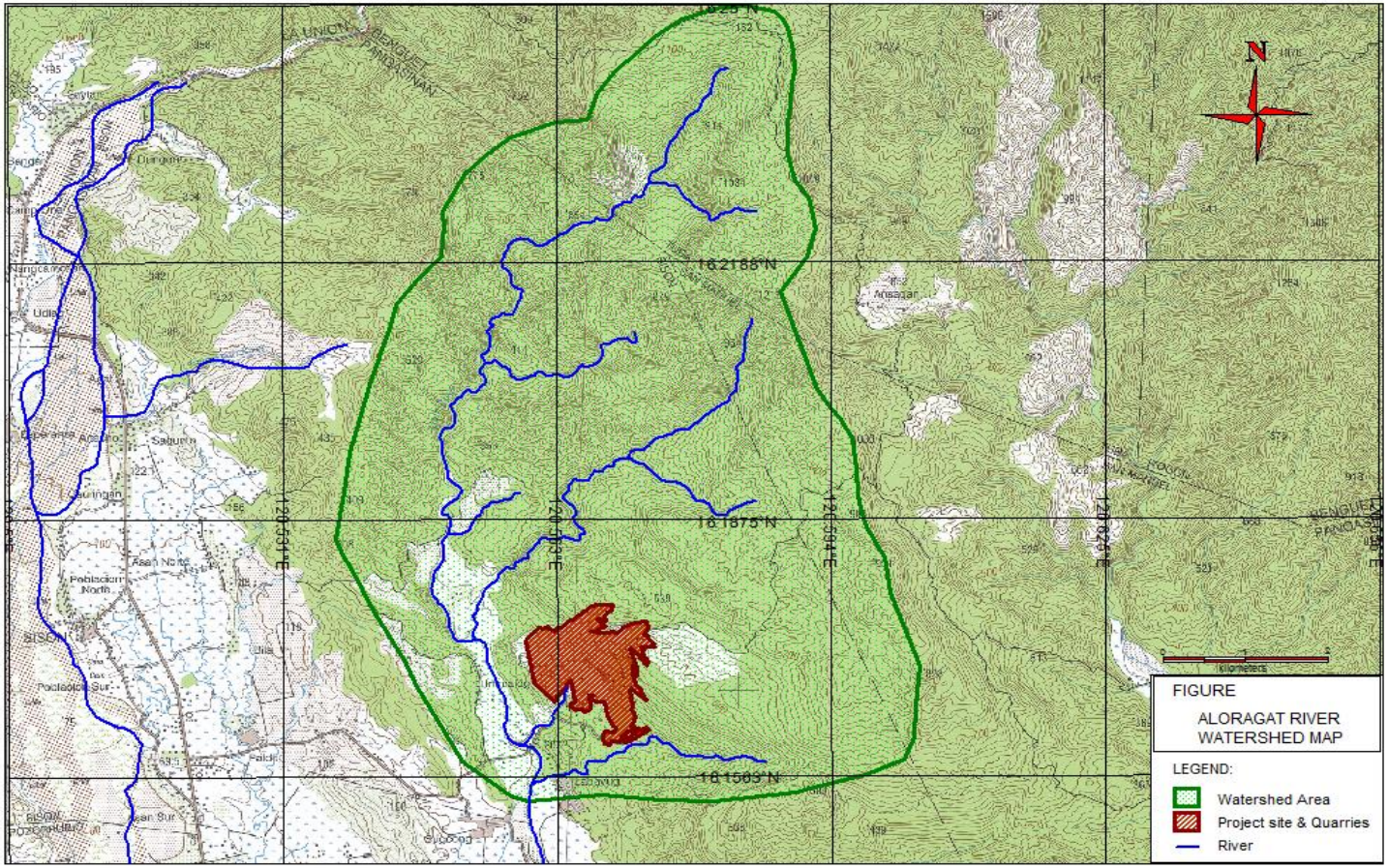
168 There are two rivers that passes the Municipality of Sison, the Bued river and Aloragat river. Brgy. Labayug, where the SMNCI cement plant will be located, is within the catchment area of Aloragat river.

169 Bued river is formed at the southeastern portion of Baguio City then transverses the Municipality of Tuba, Sison, down to the Municipality of Mangaldan where it merges with the Angalacan River and discharges to the Lingayen Gulf.

170 The catchment area of Aloragat river has a total area of 5,217 hectares. Its headwaters are formed from the Lipit River, in the upper slopes of the southern Cordillera mountain range in the Municipality of Tuba. Aloragat River traverses Barangay Labayug and is the major receiving water body near the proposed SMNCI cement plant.

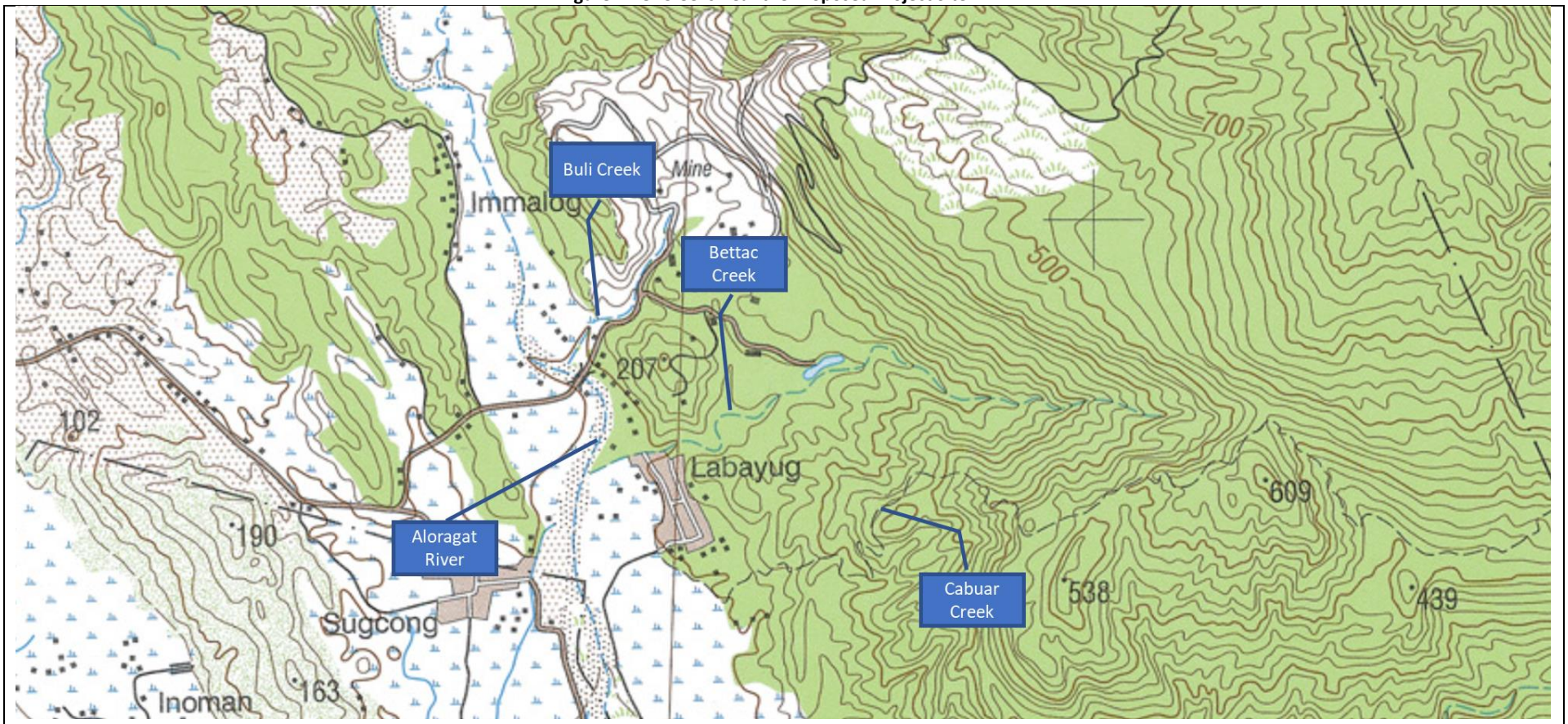
171 There are four creeks that are near the proposed project site. Bettac creek transverses inside the the site. Buli creek is located at the far north of the project site while the Sapid creek and Cabuar creek are at the south portion. All these creeks discharges to the Aloragat River

Figure 2-17: Watershed Catchment Area of Aloragat River



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **WATERSHED CATCHMENT AREA OF ALORAGAT RIVER**	FIGURE NO.: 2-17
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: Envitecch Environmental Management Consultancy Services, Inc.

Figure 2-18: Creeks near the Proposed Project Site



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **CREEKS NEAR THE PROPOSED PROJECT SITE**	FIGURE NO.: 2-18
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT**	SOURCE: NAMRIA

2.2.1.1 Change in drainage morphology/inducement of flooding/reduction in stream volumetric flow

172 The proposed project will not alter the drainage morphology of the area.

173 The proposed project will not also induce flooding in the area. Stormwater drainage system will be constructed in the cement plant. Retention pond will also be constructed to catch rainwater.

2.2.1.2 Change in stream flow/ depth

174 The nature of cement manufacturing activities does not involve discharge of large volume of loose sediments that cause river siltation and shallowing.

2.2.1.3 Depletion of water resources/competition in water use

175 Water requirement during the operation of the proposed project will be supplied by deep wells that will be developed within the project site. The proponent will secure NWRB permits for the operation of the deep wells. The proponent will also construct a water reservoir for rainwater collection which will also be used to supply the water requirement of the proposed project.

176 The existing operation of the NCC cement plant in Brgy. Labayug did not cause depletion or competition of water resources within the area. Thus, the operation of the SMNCI cement plant is not also expected to affect the current water supply within the barangay. Also, the proponent will observe reusing of water to decrease the water that will be sourced from the deep wells.

177 Furthermore, there were no recorded complaints from the community specifically on water resource competition. In fact, according to a geo-resistivity study commissioned last July 2019, several deep wells in the vicinity, specifically in Brgy. Calunetan, Brgy. Inmalog, Brgy. Labayug, Brgy. Sugcong and Brgy. Paldit can be constructed[4].

2.2.2 Oceanography

178 Since there will be no jetty/port and/or subsea structures component of the project that can change the bathymetry in the area, this section is not applicable

2.2.3 Water Quality

2.2.3.1 Degradation of groundwater quality

179 Five groundwater samples were collected last July and September 2019 at the deep wells of NCC and at the groundwater sources of Brgy. Labayug. The samples were sent to the laboratory of CRL Environmental Corporation for the analysis. The results were then compared to the Philippine National Standards for Drinking Water (PNSDW) based on the DOH Administrative Order No. 2017-01 and to the ambient water quality for Class A water body according to the DENR AO No. 2016-08.

180 As shown in **Table 2-17,** only the fecal coliform of the all the water samples exceeded the standard limits. The contamination of the groundwater sample can be due to the seepage from the septic tanks of the households in the community.

[4] Gatdula A.R. "Geo-resistivity Survey to Detect Aquifers at Six Barangays in the Municipality Sison Province of Pangasinan" July 2019

181 The ground water quality may be affected by accidental oil spills due to the influx of heavy equipment during the construction phase. Maintenance of these equipment must be limited in an area lined with cement.

182 Accidental oil spills may also happen during the operation phase since there will be trucks that will deliver the products. The trucks shall not have access to areas that are not lined with cement. The proponent has a truck marshalling area within the project site.

183 Diesel oil will also be stored in the area. Storage of fuel in the area increases the risk of accidental oil spills. Bund walls and secondary containment areas are part of the design of the fuel storage.

184 Another aspect that may affect ground water quality is the influx of workers in the area. Ground water quality may be affected by domestic wastewater.

Table 2-17: Results of Ground Water Quality Analysis

PARAMETER	UNIT	DETECTED LEVEL AT THE SAMPLING POINTS BASED ON LABORATORY ANALYSIS (values in RED exceed the reference standard/s)					GUIDELINE VALUE FOR DRINKING WATER QUALITY	GUIDELINE VALUE FOR CLASS A WATER BODY
		GW 1	*GW 2*	*GW 3*	*GW 4*	*GW 5*	*(DOH AO No. 2017-10)*	*(DENR AO No. 2016-08)*
Total Suspended Solids	mg/L	**<2.5**	**<2.5**	**<2.5**	**<2.5**	**<2.5**	*	**50**
Oil & Grease	mg/L	**<0.41**	**0.63**	**0.63**	**0.43**	**0.44**	*	**1**
Total Coliform		**>8.0**	**8.0**	**8.0**	**>8.0**	**4.6**	*	*
Fecal Coliform	MPN/100mL	**>8.0**	**8.0**	**8.0**	**4.6**	**4.6**	**<1.1**	**<1.1**
Arsenic	mg/L	**<0.008**	**<0.008**	**<0.008**	**<0.008**	**<0.008**	**0.01**	**0.01**
Cadmium	mg/L	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**0.003**	**0.003**
Chromium	mg/L	**<0.005**	**<0.005**	**<0.005**	**<0.005**	**<0.005**	**0.05**	**0.01**
Lead	mg/L	**<0.005**	**<0.005**	**<0.005**	**<0.005**	**<0.005**	**0.01**	**0.01**
Mercury	mg/L	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**0.001**	**0.001**

NOTES: mg/L = Milligrams per liter | MPN/100mL = Most probable number per 100 milliliters
(*) No guideline value at present

Figure 2-19: Location Map of Ground Water Sampling Points

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **LOCATION MAP OF GROUND WATER SAMPLING POINTS**	FIGURE NO.: 2-19
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: GOOGLE EARTH

2.2.3.2 Degradation of surface quality

185 Three water samples were collected from the creeks within the project site last August 11, 2015, April 25, 2016 and July 10, 2019. The water samples were analyzed by the CRL Environmental Corporation. Details of the location of the surface water sampling site are shown in **Figure 2-20.**

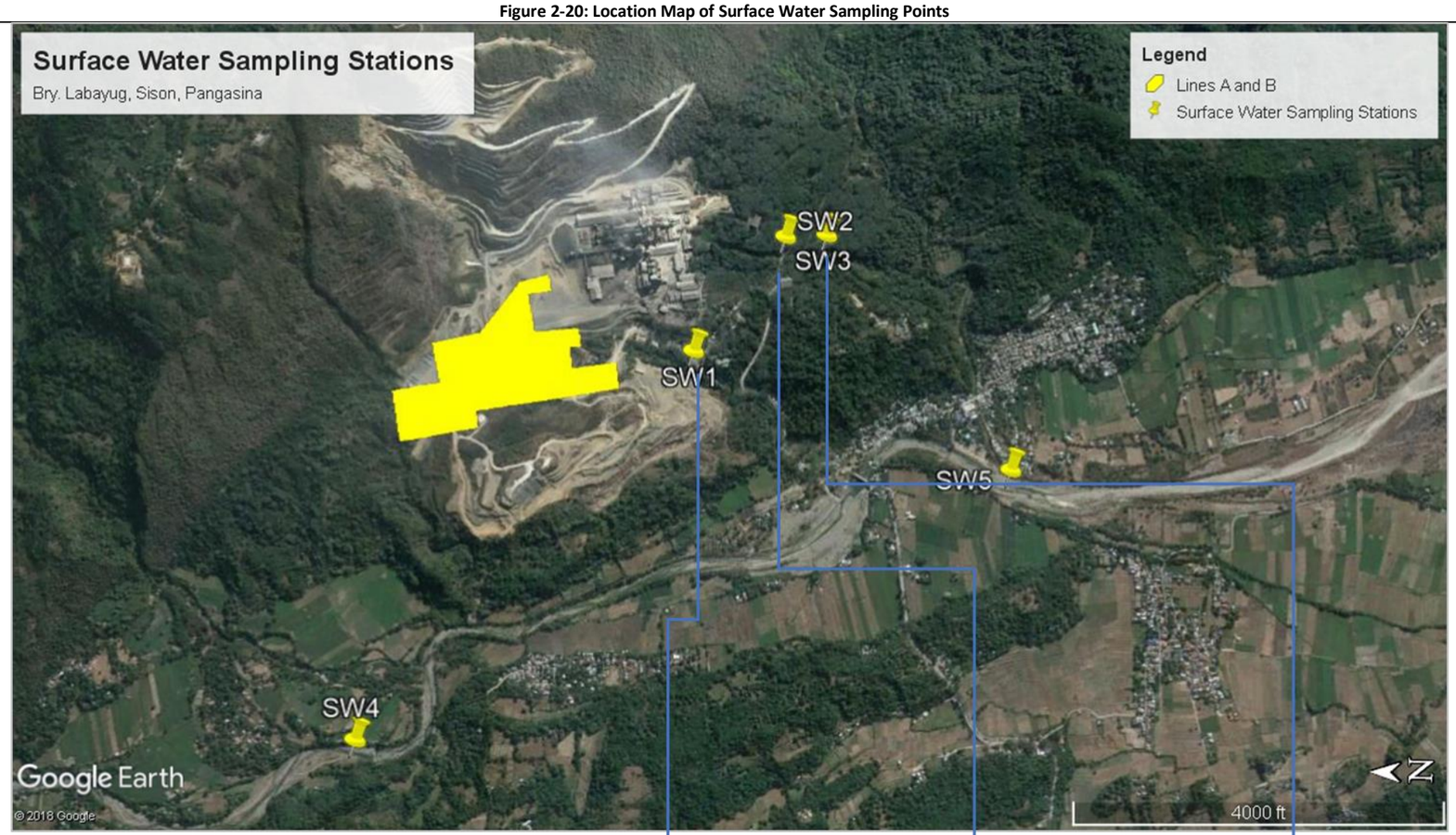
186 The results of the laboratory analysis were compared to the ambient water quality for Class C water based on DAO 2016-08. As shown in Error! Not a valid bookmark self-reference., all the parameters are within the standards except for the fecal coliform at SW1, SW3, SW4 and SW5. Also, all the five stations have high total coliform content. This can be due to the disposal of untreated domestic wastewater to the creeks.

Table 2-18: Results of Surface Water Quality Analysis

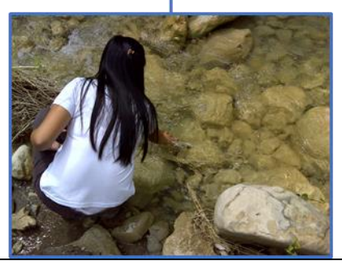
PARAMETER	UNIT	DETECTED LEVEL AT THE SAMPLING POINTS BASED ON LABORATORY ANALYSIS (values in RED exceed the reference standard/s)					GUIDELINE VALUE FOR CLASS C WATER BODY
		SW1	*SW 2*	*SW 3*	*SW 4*	*SW 5*	*(DENR AO No. 2016-08)*
pH	pH	**7**	**7.2**	**7.4**	**-**	**-**	**6.5 – 9.0**
BOD_5	mg/L	**1**	**1**	**1**	**1**	**<1**	**7**
COD	mg/L	**18**	**10**	**814**	**20**	**18**	**-**
DO	mg/L	**1**	**9**	**8.5**	**8**	**8**	**5**
Oil & Grease	mg/L	**0.4**	**0.5**	**0.4**	**0.93**	**0.60**	**2**
Total Suspended Solids	mg/L	**33**	**84**	**2.5**	**-**	**-**	**80**
Total Coliform	MPN/100mL	**24,000**	**2,400**	**1,600**	**9,200**	**16,000**	**-**
Fecal Coliform	MPN/100mL	**2,400**	**78**	**920**	**3,500**	**16,000**	**200**
Mercury	mg/L	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**<0.0002**	**0.002**
Lead	mg/L	**<0.05**	**<0.05**	**<0.05**	**<0.005**	**<0.005**	**0.05**
Cadmium	mg/L	**<0.006**	**<0.006**	**<0.006**	**<0.001**	**<0.001**	**0.005**
Arsenic	mg/L	**<0.01**	**<0.01**	**<0.01**	**<0.008**	**<0.008**	**0.02**
Chromium	mg/L	**<0.003**	**<0.003**	**<0.003**	**<0.005**	**<0.005**	**0.01**

NOTES: mg/L = Milligrams per liter | MPN/100mL = Most probable number per 100 milliliters

Figure 2-20: Location Map of Surface Water Sampling Points



LOCATION		COORDINATES	
		NORTH	EAST
SW1	Bagutan Creek	16° 9'48.51"N	120°33'51.72"E
SW2	Cabuar Creek	16° 9'35.03"N	120°34'5.69"E
SW3	Sapid Creek	16° 9'28.99"N	120°34'5.48"E
SW4	Upper Aloragat River	16°10'23.80"N	120°33'7.26"E
SW5	Lower Aloragat River	16° 9'13.41"N	120°33'38.96"E



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **LOCATION MAP OF SURFACEWATER SAMPLING POINTS**	FIGURE NO.: 2-20
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: Envitecch Environmental Management Consultancy Services, Inc

2.2.4 Freshwater Ecology

187 Four stations within the Sapid creek were established for the assessment of the freshwater ecology in 2016. Benthos were sampled using a surber sampler laid along the streambed. The substrate was agitated while rocks and stones are washed to dislodge the benthos and captured in the net. All samples were stored in polyethylene bottles and preserved with Ethyl Alcohol. Samples are bought to the laboratory for analysis. Location of the stations are is shown in **Figure 2-21**.

188 Sampling for benthic organisms in Cabuar and Bagutan were not pursued due to steep and unsafe access to the streams and unfavorable initial assessment. Cabuar creek is structurally limited with very shallow water not expected to host a healthy benthic community. Bagutan creek was dry during the time of sampling.

189 A total of 190 individuals belonging to 9 orders and 16 families (taxa) were recorded during the survey. Among the 4 stations, Station 1 and Station 2 have the highest number of macroinvertebrate individuals observed with 63 and 50 individuals, respectively. These transects in Sapid creek are located near the spring pond where riparian vegetation thrives like bamboo, figs and other shade trees favorable for macroinvertebrates growth and survival. The list of the macroinvertebrate individuals observed in the stations is shown in **Table 2-19.**

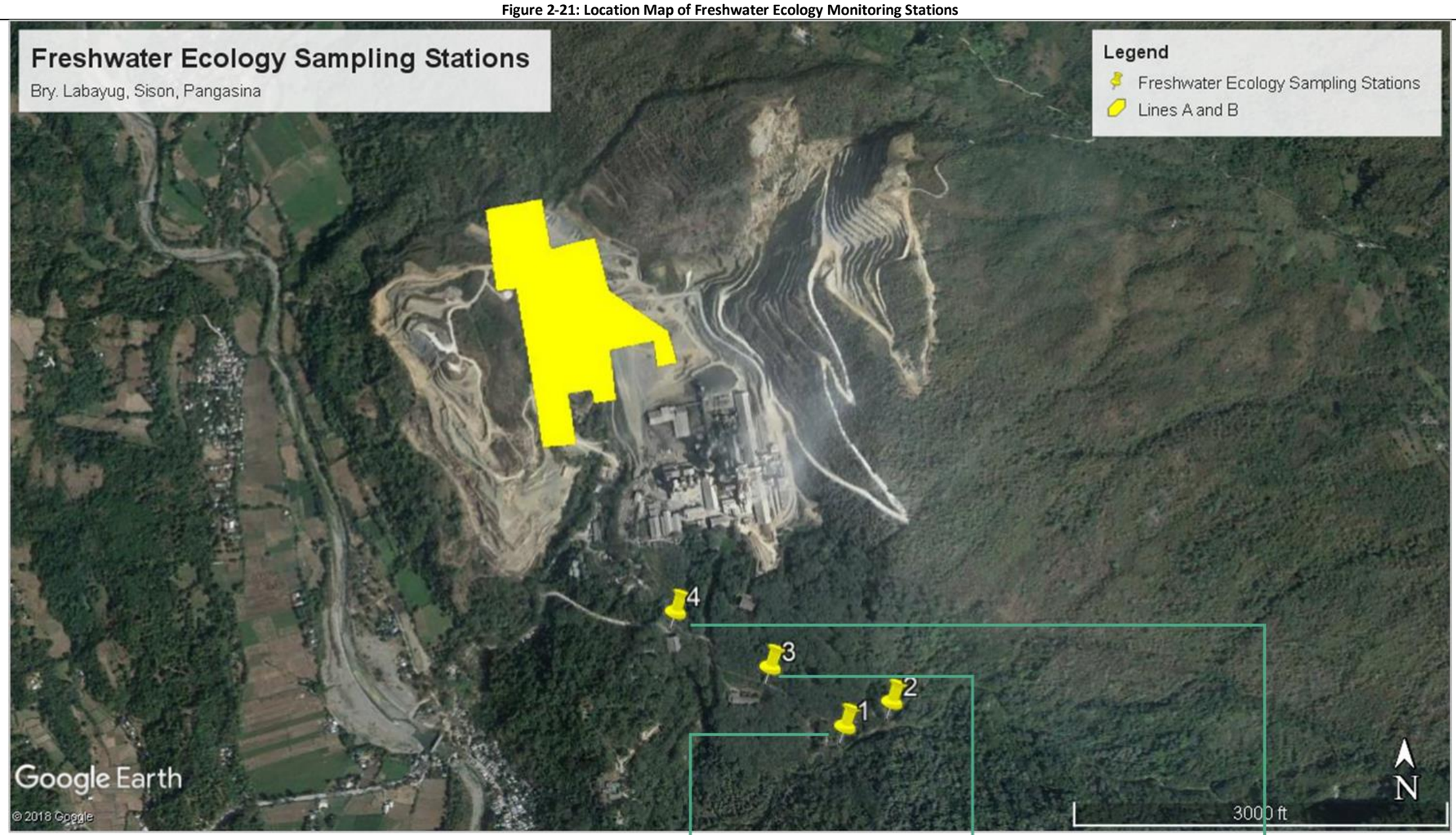
190 In terms of %relative abundance, Family Culicidae with 29% is the highest followed by Family Ampulariidae and Family Gyrinidae with both 20% relative abundance. **Error! Reference source not found.** shows the relative abundance of the macroinvertebrates.

Table 2-19: Taxonomic Listing, Abundance and Distribution of Freshwater Benthic Macroinvertebrates

Freshwater Benthos Taxa	Sampling Station				TOTAL ABUNDANCE
	1	2	3	4	
Phylum Arthropoda					
Class Insecta					
Order Trichoptera- caddisflies					
Family Hydropsychidae	12	5	-	-	17
Order Ephemeroptera-mayflies					
Family Baetidae	5	8	-	2	15
Family Caenidae	10	2	1	1	14
Family Leptophlebiidae	1	-	-	-	1
Family Heptageniidae	3	1	-	1	5
Order Odonata-dragonfly;damselfy					
Family Libellulidae	3	1	-	1	5
Family Coenagrionidae	1	2	1	-	4
Order Coleoptera-water beetles					
Family Gyrinidae	2	8	3	7	20
Family Dytiscjdae	1	-	-	-	1
Order Hemiptera-water bugs					
Family Mesoveliidae	1	2	1	5	9
Family Gerridae	2	1	5	3	11
Order Diptera-flies, gnats					
Family Chironomidae	1	-	2	5	8

Freshwater Benthos Taxa	Sampling Station				TOTAL ABUNDANCE
	1	2	3	4	
Family Simuliidae	3	8	-	-	11
Family Culicidae	7	5	10	4	26
Class Malacostracea					
Order Decapoda-crabs	11	7	-	1	19
PHYLUM ANNELIDA					
Class Oligochaeta-bloodworms	-	-	2	2	4
PHYLUM MOLLUSCA- snails					
Family Ampulariidae	-	-	7	13	20
GRAND TOTAL	63	50	32	45	190

Figure 2-21: Location Map of Freshwater Ecology Monitoring Stations

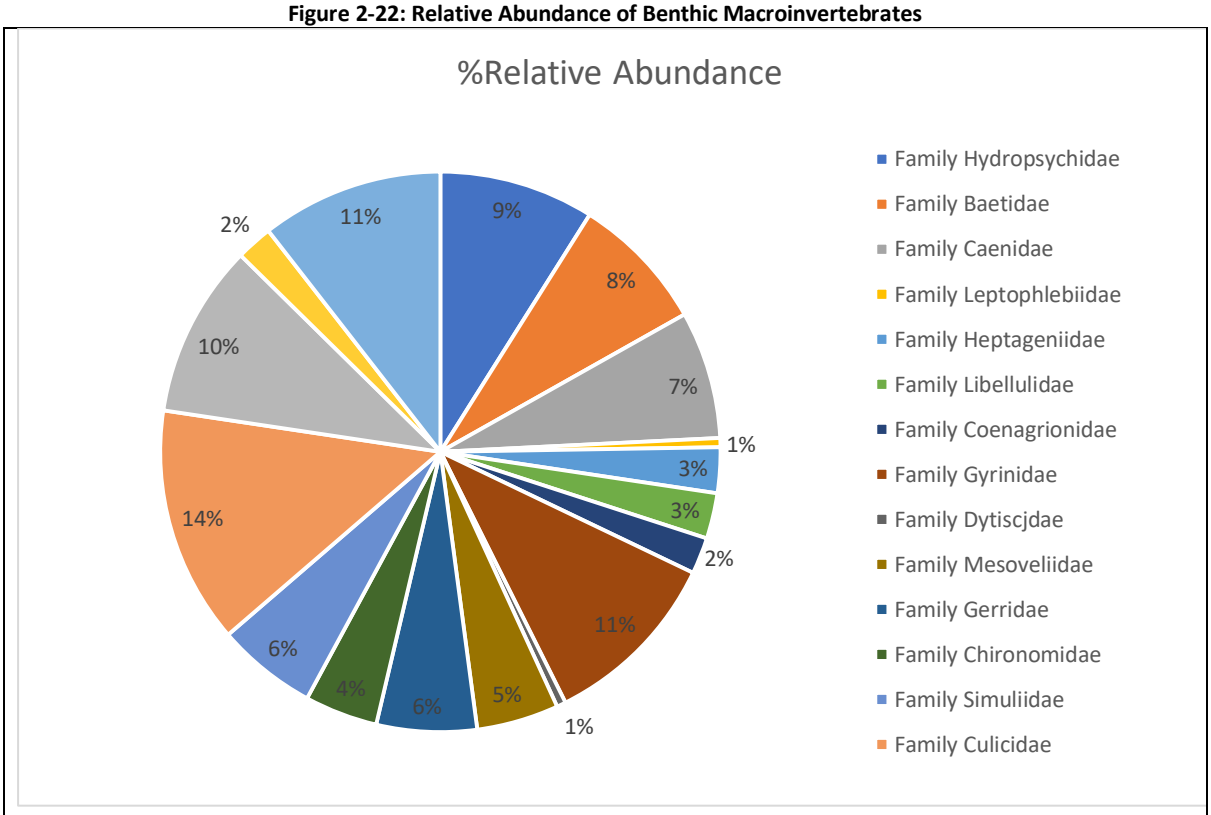


Station	Location	Elevation (m)	Coordinates	
			North	East
1	Sapid Forest: Milagrosa Watershed	180	16° 09' 29.1"	120° 34' 17.2"
2	Sapid Forest: Up near nursery	161	16° 09' 31.2"	120° 34' 21.6"
3	Sapid forest: Down near dam	145	16° 09' 8.1"	120° 34' 14.4"
4	Sapid forest: Down	149	10° 09' 28.2"	120° 34' 14.4"



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **LOCATION MAP OF FRESHWATER ECOLOGY MONITORING STATIONS**	FIGURE NO.: 2-21
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: Envitecch Environmental Management Consultancy Services, Inc

Figure 2-22: Relative Abundance of Benthic Macroinvertebrates



PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**RELATIVE ABUNDANCE OF BENTHIC MACROINVERTEBRATES**	2-22
EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT PROJECT** Brgy. Labayug, Sison, Pangasinan	Envitecch Environmental Management Consultancy Services, Inc

2.2.4.1 Threats to existence and or loss of important local species

191 Activities in the watershed can impact populations of biotic macroinvertebrate in the study area. Cutting of vegetation eliminates leaves and woody debris which are important primary food sources of the species.

192 Domestic wastewater will also be generated during the construction and operation of the proposed project. Discharge of untreated domestic wastewater in the creeks may cause deterioration of its water quality making it unsuitable habitat for aquatic species.

2.2.4.2 Threat to abundance, frequency and distribution of important species

193 Impact of the construction activities within the project area is the expected increased siltation/sedimentation (water turbidity) in the nearby creeks resulting from earth -moving activities (clearing or removal of groundcover and vegetation, excavation, leveling, and filling). Turbidity would tend to limit light penetration in the water column, which is essential in photosynthesis, a vital process in the ecosystem.

194 The proposed project is expected to have a minimal effect the abundance, frequency and distribution of species in the nearby creeks. Siltation ponds are installed in the project area to catch the surface run-off from the project area.

2.2.5 Marine Ecology

195 The project site is located far from any marine or coastal area.

2.2.6 Summary of Baseline Findings, Impacts and Mitigation on Water

196 The following table lists the impacts and mitigation on Water:

Table 2-20: Summary of Significant Baseline Findings and Potential Impacts and Mitigation on Water

Summary of Baseline Findings on Water:

- **Hydrology/Hydrogeology**
  - The project site is located within the catchment area of Aloragat River. There are four creeks near the project site; Buli Creek, Bettac Creek, Sapid Creek and Cabuar Creek.
- **Groundwater Quality**
  - All the groundwater samples collected exceeded the standard limit for fecal coliform.
- **Surface Water Quality**
  - SW1, SW3, SW4 and SW5 exceeded the standard for fecal coliform.
  - All the stations have high total coliform content.
- **Freshwater Ecology**
  - Station 1 and Station 2 have the highest number of macroinvertebrate individuals observed with 63 and 50 individuals, respectively. These transects in Sapid creek are located near the spring pond where riparian vegetation thrives like bamboo, figs and other shade trees favorable for macroinvertebrates growth and survival.
  - Family Culicidae, Family Ampulariidae and Family Gyrinidae are the most abundant species.

POTENTIAL IMPACTS	PROJECT PHASES	DESCRIPTION	MITIGATING MEASURES
WATER QUALITY			
Degradation of ground water / surface water quality	Construction	Accidental oil spills from heavy equipment	Use sawdust, rice hulls, or coir dusts to absorb the oil spills. Maintain canal in the maintenance and repair area of vehicles and equipment.
	Operation	Accidental oil spill from delivery trucks	Maintain canal in the maintenance and repair area of vehicles and equipment. Oil Spill Management Plan
	Construction/ Operation	Ground and surface water contamination from improper disposal of wastes, percolated wastewater, sludge and fecal matter	Provision of sanitation facilities for workers (e.g. toilets, showers, etc.) Provision of Sewage Treatment Plant
Degradation of surface water quality	Construction/ Operation	Possible siltation and surface runoff	Establishment of sediment traps and erosion barriers

POTENTIAL IMPACTS	PROJECT PHASES	DESCRIPTION	MITIGATING MEASURES
		Increase in turbidity of surface water	Regular removal of silt and sediments Installation and maintenance of drainage system within the plant
HYDROLOGY/HYDROGEOLOGY			
Competition in water use	Construction/ Operation	Construction and operation activities of the project may cause water competition with the communities	NWRB permits will be secured for the operation of deep wells. Water reuse and conservation practices will be observed.
FRESHWATER ECOLOGY			
Threat to existence and/or loss of important local species and habitat	Construction/ Operation	Possible siltation that may disturb species	Installation of silt curtain Establishment of sediment traps and erosion barriers Regular removal of silt and sediments.

2.3 The Air

2.3.1 Meteorology/Climatology

197 The coverage of the EIA study on Air Module includes the host barangay Labayug, particularly the residential areas in the vicinity. It is important to consider in this study the cumulative impacts of the current and future operations of NCC and SMNCI on air quality.

2.3.1.1 Change in the local micro-climate

198 Climate pertains to the average long-term weather of an area and is typically determined over a period of at least 30 years. It is an essential environmental factor as it affects general growth and development. In the Philippines, climate is classified into 4 types based on the rainfall distribution and pattern.

199 The Municipality of Sison falls under the Type I Climate under the Modified Coronas Climate Classification System. Type 1 Climate is characterized as having two (2) pronounced seasons: dry from November to April and wet the rest of the year **Figure 2-23**.

Temperature

200 April is the hottest month of the year, with a recorded mean temperature of 29.5 degrees Celsius (°C), while January is the coldest month, with an average temperature of 25.8°C (**Table 2-21**).

201 According to the climatological extremes (**Table 2-22**), the highest temperature recorded in the area is 39.9°C on April 12, 1915, while the lowest recorded temperature is 14.3°C on January 8, 1907.

Rainfall

202 According to the Climatological Normals in Dagupan City, the area may experience about 2,380.9mm of rainfall annually, with 119 rainy days. The highest amount of rainfall is experienced in August (581.3mm), while the lowest amount of rainfall is experienced in January (6.7mm).

203 The climatological extremes is presented in Error! Reference source not found.. According to the d ata, the greatest daily rainfall experienced in the area was on May 27, 2003 at 722.6 millimeters.

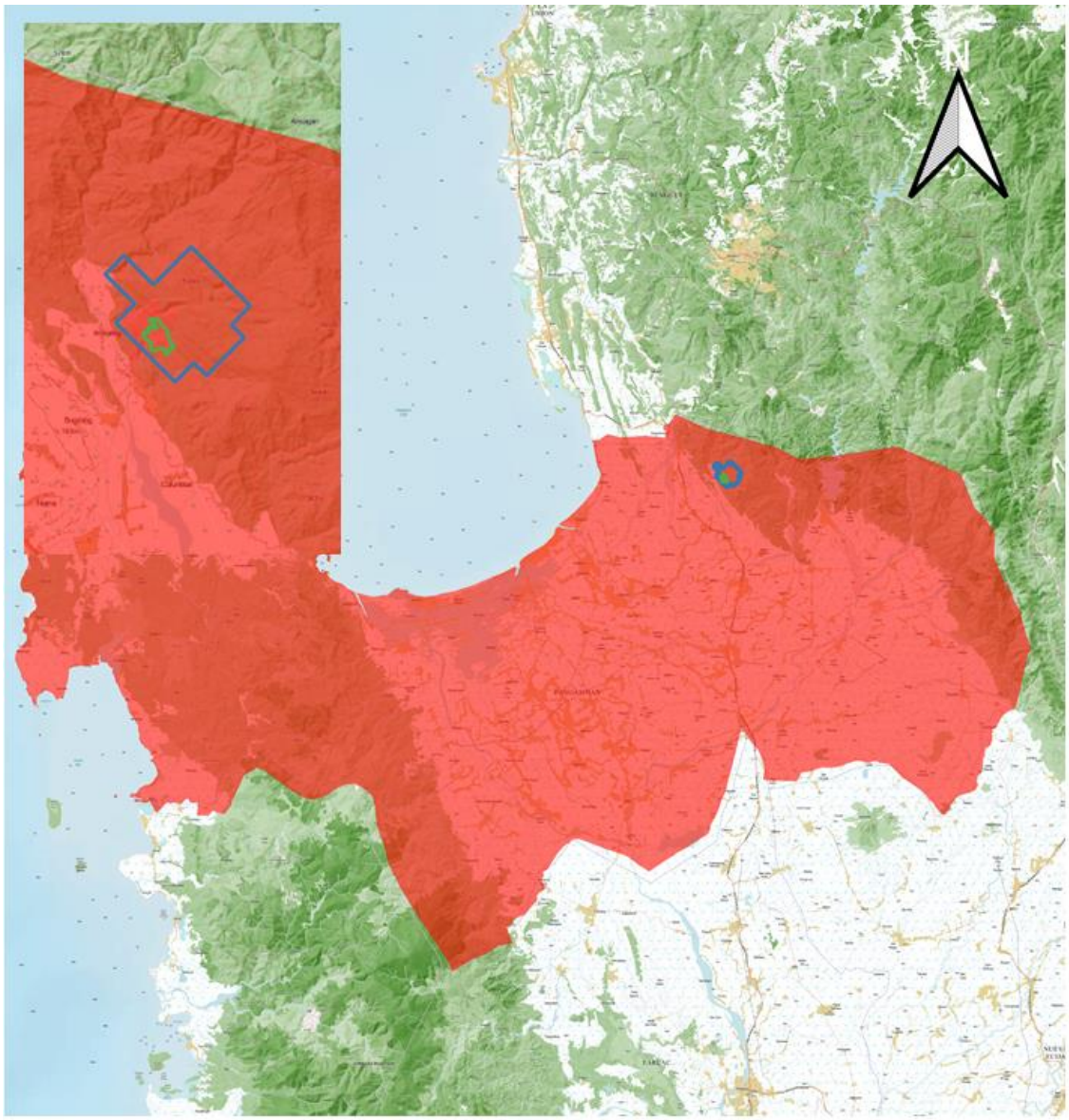
Surface Wind

204 Wind directions in Pangasinan are southward from October to June and southeastward July to September.

Tropical Cyclones

205 Tropical cyclones or typhoons are the most influential factors that bring considerable rainfall in the Philippines. Typhoons usually occur in the country from June to December, with highest frequencies during the months of July and August. The mean annual number of typhoons that pass through the Philippine Area of Responsibility (PAR) is about 20. As shown in **Figure 2-24**, an average of five cyclones pass by Pangasinan every 3 years.

Figure 2-23: Climate Map of the Philippines



Climate Map of the Philippines based on the Modified Coronas Classification

Map Source:

Legend	
Type I	Two pronounced season, dry from November to April and wet during the rest of the year. Maximum rain period is from June to September.
Type II	No dry season with a very pronounced maximum rain period from December to February. There is not a single dry month. Minimum monthly rainfall occurs during the period from March to May.
Type III	No very pronounced maximum rain period with a dry season lasting only from one to three months, either during the period from December to February or from March to May. This type resemble Type I since it has a short dry season.
Type IV	Rainfall is more or less evenly distributed throughout the year. This type resembles type 2 since it has no dry season.

PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**CLIMATE MAP OF THE PHILIPPINES**	**2-23**
EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	Basemap: NAMRIA Climate Map: DOST

Table 2-21: Mean Historical Monthly Temperature and Rainfall Data (1981-2010)

STATION: **DAGUPAN CITY, PANGASINAN**
PERIOD: **1981 - 2010**

LATITUDE: **16º05'12.75"N**
LONGITUDE: **120º21'08.10E**
ELEVATION: **2m**

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16a)	(16b)
	RAINFALL		TEMPERATURE									WIND			NO. OF DAYS W/	
MONTH	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
JAN	6.7	1	30.8	20.7	25.8	25.7	23	21.9	26.2	79	1012	S	2	4	0	0
FEB	10.7	1	31.8	21.2	26.5	26.4	23.5	22.4	26.9	78	1012	S	3	3	0	0
MAR	22.2	2	33.2	22.6	27.9	27.6	24.5	23.4	28.6	77	1011	S	3	3	1	1
APR	60.4	5	34.7	24.4	29.5	29.1	25.8	24.7	30.9	77	1010	S	3	4	5	6
MAY	209.8	10	34.1	24.8	29.4	29.1	26.2	25.3	32	79	1008	S	3	5	14	17
JUN	337.9	17	33.1	24.7	28.9	28.4	26.1	25.3	32.2	83	1008	S	2	6	17	15
JUL	499.6	21	32	24.4	28.2	27.8	25.9	25.3	32.1	86	1007	SE	2	6	17	15
AUG	581.3	22	31.3	24.3	27.8	27.4	25.7	25.1	31.8	87	1007	SE	2	7	14	12
SEP	368.4	20	31.6	24.2	27.9	27.6	25.7	25	31.7	86	1008	SE	2	6	14	14
OCT	215.9	11	31.9	24	27.9	27.8	25.6	24.8	31.3	84	1009	S	2	5	8	9
NOV	53.9	5	31.8	23	27.4	27.3	24.9	24.1	29.8	82	1010	S	2	4	2	2
DEC	14.1	2	30.9	21.4	26.2	26.2	23.6	22.6	27.3	80	1012	S	2	4	1	1
ANNUAL	**2380.9**	**119**	**32.3**	**23.3**	**27.8**	**27.5**	**25.1**	**24.2**	**30.1**	**82**	**1009**	**S**	**2**	**5**	**93**	**92**

Definition of Terms:

Climatological Normals - Period averages computed for a uniform and relative long period comprising at least three (3) consecutive10-year period.
Rainfall Amount (column 2) - The amount of precipitation (rain, hail, etc.) expressed in millimeters depth of the layer of the water which has fallen.
Number of Rainy Days (column 3) - A rainy day is defined as a period of 24 hours beginning at 8AM to 8 AM of the next day during which at least 0.1 mm of rain is recorded.
Maximum Temperature (column 4) - The maximum temperature in °C recorded for the day, usually occurring in the early afternoon.
Minimum Temperature (column 5) - The minimum temperature in °C recorded for the day, usually occurring during early hours of the morning (before sunrise).
Mean Temperature (column 6) - The average of the maximum and minimum temperature in °C recorded for the day. Mean Temperature = Maximum + Minimum / 2
Dry Bulb Temperature (column 7) - It gives the air temperature in °C at the time of observation.
Wet Bulb Temperature (column 8) - It gives the temperature in °C that an air parcel would have if cooled adiabatically to saturation at constant pressure by evaporating water in it.
Dew Point Temperature (column 9) - The temperature in °C at a given pressure, to which the air must be cooled to become saturated. It is the temperature when atmospheric moisture begins to condense to liquid forming "dew" upon objects.
Vapor Pressure (column10) - Denotes the partial pressure of water vapor in atmosphere in millibars (mbs). As the water evaporates, additional water vapor is introduced into space above and pressure increases slightly as the new vapor is added. The increasing pressure is due to an increase in the partial pressure of water vapor.
Relative Humidity (column 11) - The ratio of the amount of water vapor actually in the air to the maximum amount the air can hold at that temperature.
Mean Sea Level Pressure (column 12) - The force exerted by the weight of the atmosphere on a unit area at the mean sea level. It is also the atmospheric pressure at mean sea leve measured in millibars (mbs).
Prevailing Winds (column 13 & 14) - The prevailing wind direction expressed using the 16 compass points which is most frequently observed during a given period while the average wind speed in meters per second is the arithmetic average of the observed wind speed.
Cloud Amount (column 15) - The amount of cloud present in the sky, expressed in oktas of the sky cover. Okta is the function used in denoting cloud amount and is equal to 1/8 of the whole sky.
Days with Thunderstorm (column 16a) - A thunderstorm day is defined as an observational day during which thunder is recorded at the station.
Days with Lightning (column 16b) - A day with lightning is reported whenever lightning is observed.

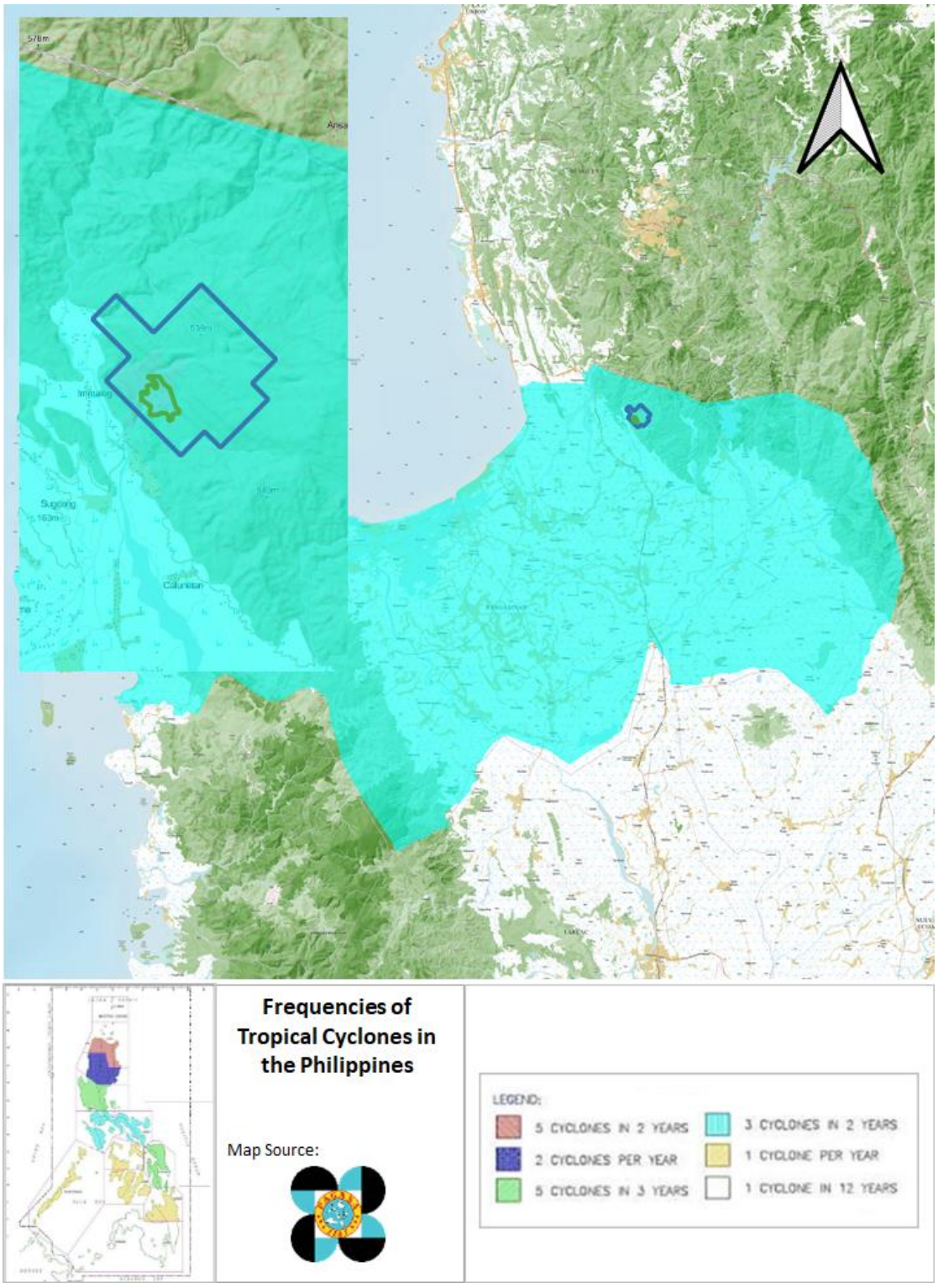
Table 2-22: Climatological Extremes Dagupan City, Pangasinan (as of 2018)

STATION: **DAGUPAN CITY, PANGASINAN**
YEAR: **AS OF 2018**

LATITUDE: **16º05'12.75"N**
LONGITUDE: **120º21'08.10E**
ELEVATION: **2m**

MONTH	TEMPERATURE (ºC)				GREATEST DAILY RAINFALL (mm)		STRONGEST WINDS (mps)			SEA LEVEL PRESSURES (mbs)			
	HIGH	DATE	LOW	DATE	AMOUNT	DATE	SPD	DIR	DATE	HIGH	DATE	LOW	DATE
JAN	36.0	01-14-1989	14.3	01-08-1907	78.0	01-25-2006	18	S	01-24-2000	1022.2	01-18-1959	1001.3	01-01-1950
FEB	37.0	02-25-1927	16.3	02-07-1971	64.8	02-19-2009	18	NNW	02-11-1993	1022.0	02-01-1962	1003.2	02-07-2000
MAR	38.7	03-24-1921	16.7	03-05-1971	71.9	03-29-1938	19	NNW	03-20-1981	1020.8	03-30-1958	1002.0	03-13-1949
APR	39.9	04-12-1915	19.7	04-01-1973	195.0	04-18-1998	23	SE	04-21-1979	1019.0	04-07-1968	999.4	04-21-1956
MAY	39.6	05-12-1924	19.0	05-25-2004	722.6	05-27-2003	35	E	05-17-2008	1015.5	05-12-1960	986.9	05-23-1976
JUNE	38.7	06-05-1987	20.2	06-30-1978	306.0	06-21-1990	27	SE	06-22-2008	1016.0	06-06-1966	987.3	06-29-1964
JULY	38.2	07-07-1915	20.4	07-14-1911	376.8	07-08-1986	33	W	07-04-2001	1016.7	07-05-1951	984.6	07-22-2003
AUG	36.4	08-10-1906	19.0	08-03-1999	342.0	08-22-2003	35	SSE	08-24-1982	1016.0	08-18-1963	991.2	08-24-1982
SEP	36.6	09-21-1983	20.5	09-06-1984	374.3	09-14-2014	30	ESE	09-18-1998	1016.2	09-01-1971	985.7	09-14-1998
OCT	37.2	10-22-1990	19.5	10-26-1990	443.5	10-08-2009	56	WNW	10-11-1974	1017.7	10-27-1968	978.3	10-26-1978
NOV	36.9	11-20-2000	17.2	11-13-1905	229.1	11-17-1935	41	NNW	11-24-1981	1019.3	11-04-1958	983.4	11-24-1981
DEC	36.9	12-30-1978	15.2	12-14-1988	69.4	12-04-1936	27	N	12-02-2004	1021.0	12-08-1960	989.0	12-02-2004
ANNUAL	**39.9**	**04-12-1915**	**14.3**	**01-08-1907**	**722.6**	**05-27-2003**	**56**	**WNW**	**10-11-1974**	**1022.2**	**01-18-1959**	**978.3**	**10-26-1978**
Period of Record	**1903 - 2018**				**1903 - 2018**		**1966 - 2018**			**1949 - 2018**			

Figure 2-24: Frequencies of Tropical Cyclones in the Philippines



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **FREQUENCIES OF TROPICAL CYCLONES IN THE PHILIPPINES**	FIGURE NO.: **2-24**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: Basemap: NAMRIA Climate Map: DOST

PAG-ASA Climate Projection

206 In November 2011, Department of Environment and Natural Resources - Environmental 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 **Figure 2-25** and **Table 2-23.**

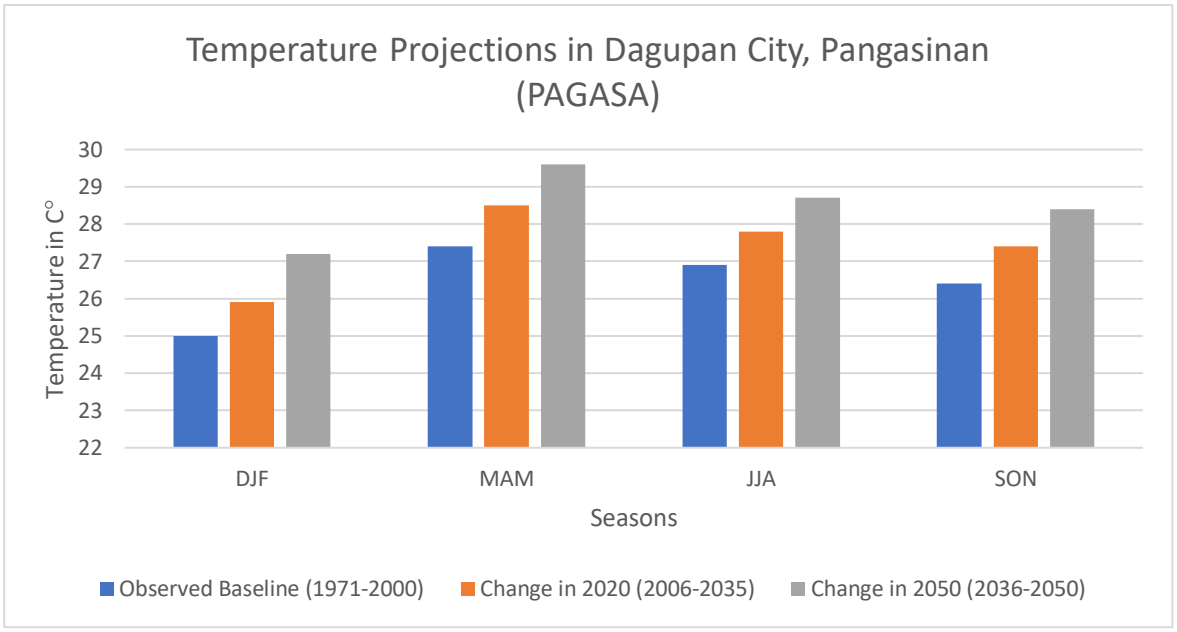
207 According to the PAGASA 2020 and 2050 projections, Region 1 will experience higher temperatures throughout the year. Higher temperatures will be experienced during the months of March, April, and May, according to the 2020 and 2050 projections, which is consistent with the observed baseline (1971-2000).

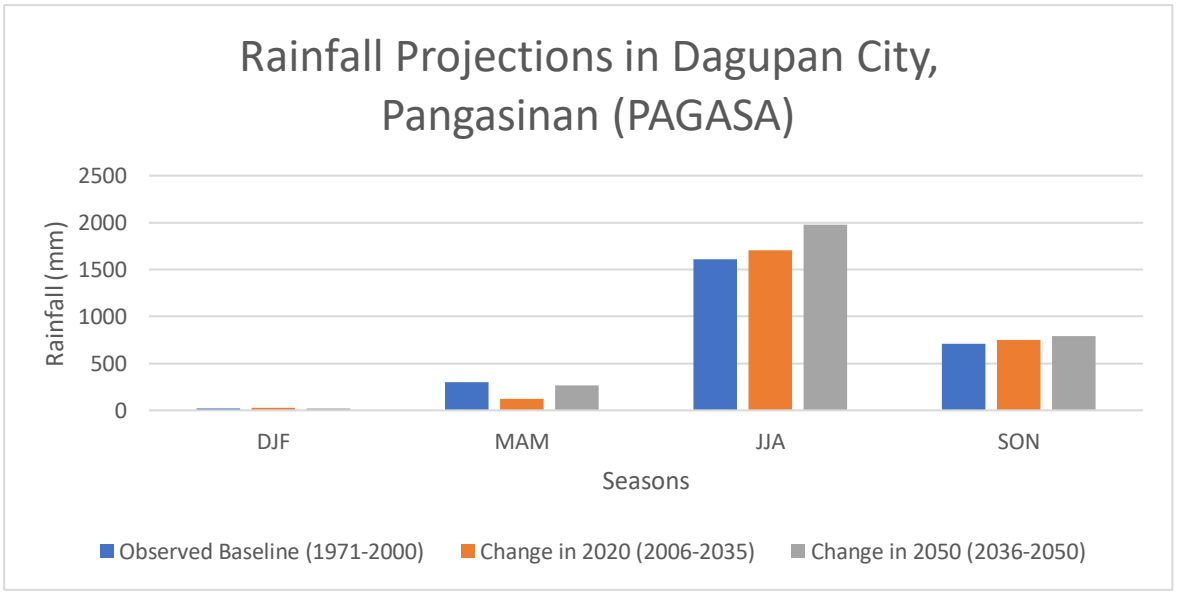
208 PAGASA also projects the amount of rainfall change in 2020 and 2050. The data shows that Pangasinan will experience greater rainfall from June to February, while less rainfall will be experienced in the remaining months.

209 Frequency of extreme events under medium-range emission scenario will increase in 2020 and 2050. The number of days with temperatures above 35°C will increase from 1,280 days (1971-2000) to 2,265 days (2020 projections), and 3,728 days (2050 projections). Although there will be a rise in temperature, the number of dry days is anticipated to decrease from 8,303 days (1971-2000), to 6,443 (2020 projections), and 6,419 (2050 projections). Days with rainfall greater than 150mm is expected to increase from 2 days (1971-2000), to 13 days (2020 projections), and 20 days (2050 projections).

210 Considering these figures, water shortages may be the main impact of less rainfall and higher temperature. Appropriate measures such as tree planting and water conservation shall be employed during the construction and operation phases of the project to avoid any complications in the long run.

Figure 2-25: PAGASA Climate Projection for 2020 and 2050





PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **PAGASA CLIMATE PROJECTION FOR 2020 AND 2050**	FIGURE NO.: **2-25**
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PAGASA

Table 2-23: PAGASA Climate Projection for 2020 and 2050

Pangasinan	Observed Baseline (1971-2000)				Change in 2020 (2006-2035)				Change in 2050 (2036-2050)			
	DJF	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**	**SON**
Temperature (C°)	25	27.4	26.9	26.4	0.9	1.1	0.9	1	2.2	2.2	1.8	2
Rainfall (mm)	19.4	298	1608.9	707.8	0.543	-0.6	0.061	0.059	0.011	-0.112	0.229	0.119
No. of days with max temperature >35 C°	1,280				2,265				3,728			
No of dry days	8,303				6,443				6,419			
No. of days with rainfall > 200 mm	2				13				20			

2.3.1.2 Contribution to greenhouse gas emissions

211 Volumes 2 and 3 of the Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories was used to quantify the greenhouse gas emissions of the proposed project.

212 To consider all potential GHG emission sources, the following emission scopes were considered:

- Scope 1 Emission Sources: CO_2 emissions from clinker production
- Scope 2 Emission Sources: Power requirement (to be purchased)
- Scope 3 Emission Sources: Delivery Trucks, Heavy Equipment for Quarrying

213 The Tier 1 equation was used to compute for the potential Scope 1 CO_2 emissions due to the clinker production. **Table 2-24** shows the input data, as well as the potential CO_2 emissions (Tons CO_2/year). The cement plant will produce 6,133,334 tons of cement per year, 60% of which is clinker. The emission factor of 0.52 ton CO_2/ton clinker was taken from Chapter 2, Volume 3 of the IPCC Guidelines. An estimated 1,913,600 tons of CO_2 will be emitted by the clinker production per year.

Tier 1 Equation for Greenhouse Gas Emissions from Cement Production

$$Emissions_{CO_2} = Mass\ of\ Cement\ Produced\ x\ Clinker\ Fraction\ of\ Cement\ Type\ x\ Emission\ Factor\ for\ Clinker$$

Table 2-24: Scope 1 Potential Emission Data

Input Data			Potential Emissions (ton CO_2 per year)
Mass of Cement Produced[1] (Ton cement/year)	**Clinker Fraction of Cement Type[1] (Ton clinker/ton cement)**	**Emission Factor for Clinker[2] (ton CO_2/ton clinker)**	
6,133,334	0.6	0.52	1,913,600
[1] – Data provided by SMNCI [2] – Default Emission factor taken from Chapter 2, Volume 3 of Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas			

214 The emission factor from the World Bank Greenhouse Gas Emissions Inventory Management Plan for Internal Business Operations (2010) was used to compute for the Scope 2 Emission Sources. The given country-based emission factor for the Philippines is 989.34 lb CO_2/MWh, which is equal to 0.45 kg CO_2/kWh. According to NCC, the power requirement of the upgraded cement facility is 445,400,000 kWh per year. Given these data, the Scope 2 CO_2 emissions from the cement grinding facility is 200,448,000 kg CO_2 per year

Equation for Estimating Potential Scope 2 Emissions

$$Emissions_{CO_2\ Purchased\ Electricity} = Power\ Requirement\ x\ Emission\ Factor$$

Table 2-25: Scope 2 Potential Emissions

Input Data		Potential Emissions per year (kg CO_2/year)
Power Requirement[1] (kWh) per year	**Emission Factor[2] (kg CO_2/kWh)**	
445,440,000	0.45	200,448,000
[1] – Data provided by NCC [2] – Emission Factor taken from taken from World Bank Greenhouse Gas Emissions Inventory Management Plan for Internal Business Operations (2010)		

215 Volume 2, Chapter 3 of the IPCC Guidelines was used to estimate Scope 3 emissions. Tier 1 equation for road transportation was used to estimate emissions from the delivery trucks. The estimated fuel consumption of 100 delivery trucks was 0.13 TJ/day. The data shows that the project may potentially emit an estimated 3,526,045 kg of CO_2 per year.

Equation for Estimating CO_2 Emissions from Road Transport

$$Emissions_{CO_2} = Fuel\ Consumed\ x\ Emission\ Factor$$

Table 2-26: Phase 1, Scope 3 Potential Emission Data

POTENTIAL EMISSION SOURCE	INPUT DATA		POTENTIAL EMISSIONS PER YEAR (kg CO_2/year)
	Fuel Consumed[1] (TJ/day)	**Emission Factor[2] (kg CO_2/TJ)**	
100 Delivery Trucks	0.13	74,100	3,526,045

[1] – Power consumption data provided by NCC
[2] – Emission factor taken from Chapter 2, Volume 2 of Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas

2.3.1.3 Emission Inventory

216 Chapter 11.6 of the Fifth Edition of US EPA AP-42 Compilation of Air Pollutant Emission Factors was used to estimate the particulate and gaseous emissions from the SMNCI cement plant.

217 **Table 2-27** lists the particulate emission sources from the cement plant, as well as the corresponding US EPA AP-42 emission factors (kg/ton) and the estimated emissions (kg/year). The highest possible estimated particulate emissions is 1,442,089 kg/year.

218 The cement plant will also produce gaseous emissions from the kiln and the preheater/precalciner (**Table 2-28**). It is expected that the cement plant will produce 19,872,000 kg SO_2, 11,040,000 kg NO_x, and 404,800 kg CO per year.

Table 2-27: Estimated Particulate Emissions

	Emission Factor (kg/ton)	Total Output (tons/year)	Estimated Emissions (kg/year)
Primary limestone crushing with fabric filter	0.0005	4,926,536	2,463
Primary limestone screening with fabric filter	0.0001	4,926,536	493
Limestone transfer with fabric filter	0.000002	4,926,536	7
Secondary limestone screening and crushing	0.0002	4,926,536	788
Raw mill with fabric filter	0.0062	6,072,607	37,650
Raw mill feed belt with fabric filter	0.0016	6,072,607	9,716
Raw mill weigh hopper with fabric filter	0.0100	6,072,607	60,726
Raw mill air separator with fabric filter	0.0160	6,072,607	97,162
Dry process kiln with fabric filter	0.1000	3,680,000	368,000
Preheater kiln with fabric filter	0.1300	3,680,000	478,400

	Emission Factor (kg/ton)	Total Output (tons/year)	Estimated Emissions (kg/year)
Clinker cooler with fabric filter	0.0680	3,680,000	250,240
Finish grinding mill with fabric filter	0.0042	5,661,538	23,778
Finish grinding mill feed belt fabric filter	0.0012	5,661,538	6,794
Finish grinding mill weigh hopper fabric filter	0.0047	5,661,538	26,609
Finish grinding mill air separator fabric filter	0.0140	5,661,538	79,262
			1,442,089

Table 2-28: Estimated Gaseous Emissions

	Output (tons/year)	SO2		NOx		CO	
		EF (kg/ton)	EE (kg/year)	EF (kg/ton)	EE (kg/year)	EF (kg/ton)	EE (kg/year)
Kiln	3,680,000	4.9	18,032,000	3.0	11,040,000	0.11	404,800
Preheater/ precalciner with spray tower	3,680,000	0.5	1,840,000	ND	-	ND	-
Total			19,872,000		11,040,000		404,800
EF - Emission Factor							
EE - Estimated Emissions							

2.3.2 Air Quality (& Noise)

2.3.2.1 Degradation of air quality

Ambient Air Quality

219 Presented in the following are the results of the ambient air quality monitoring done by NCC over the last 4 years (2015-2018), until the first quarter of 2019. They are currently monitoring total suspended solids (TSP) in Barangay Labayug, Barangay Inmalog, and Sitio Saguitlang (**Figure 2-26**). As shown in **Figure 2-27**, the TSP in the area is consistently below the DENR standard of 300 µg/Ncm.

220 Ambient air quality sampling was also conducted last September 19-21, 2016 and July 25, 2019 in the monitoring stations. The results of the ambient air quality test are shown in **Table 2-29.** All parameters measured from the three monitoring stations are within the national ambient air quality standards.

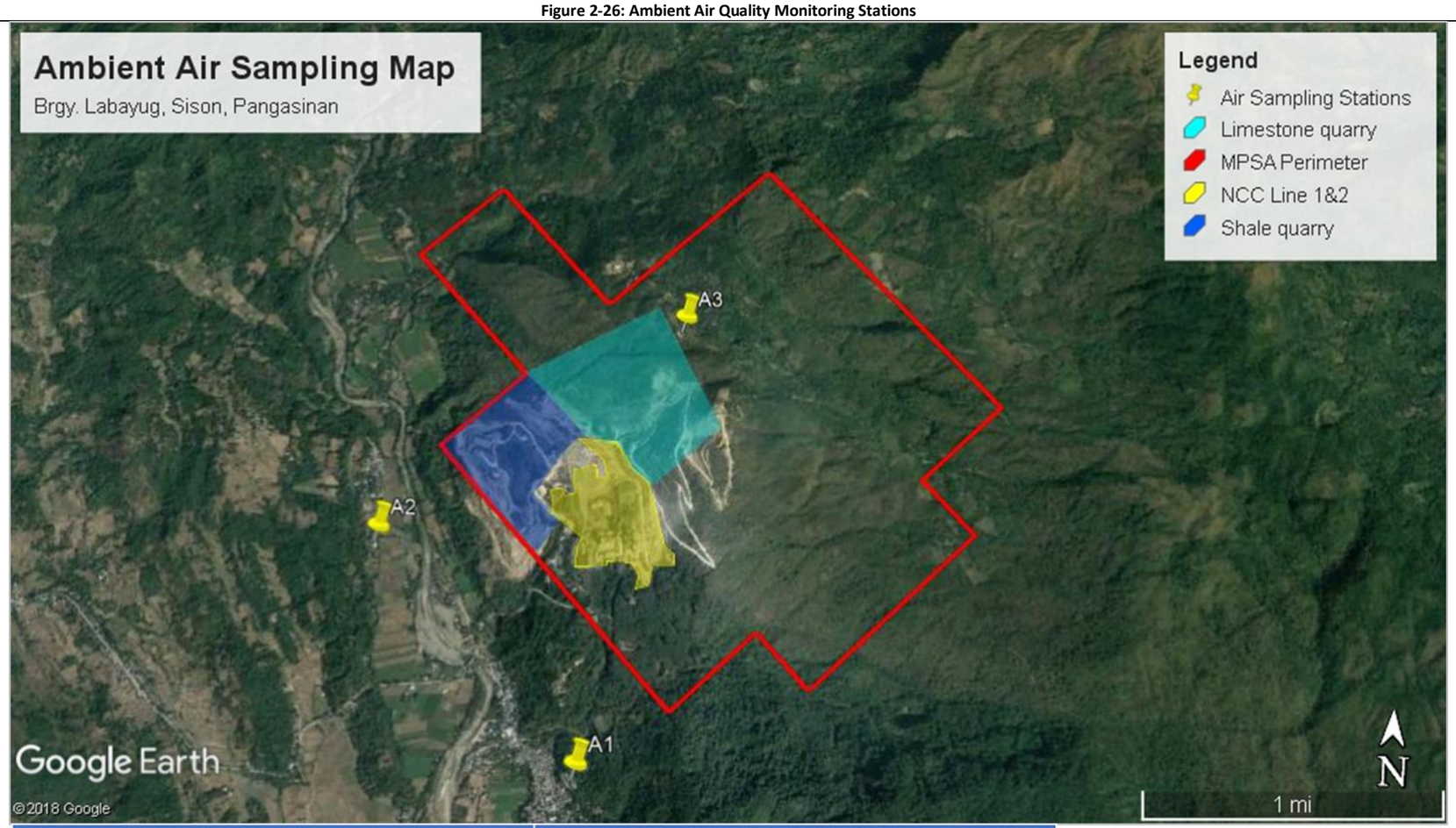
Table 2-29: Ambient Air Quality Laboratory Results (2016, 2019)

	Location	Date of Sampling	TSP	As	Cd	Cr^{+6}	Hg
A1	Labayug National Highschool	Sept 19,2016	85.5	ND	ND	ND	0.00003
A2	Inmalog Elementary School	Sept 21,2016	46.4	ND	ND	ND	0.00004
A3	Sitio Saguitlang Elementary School	Sept 20, 2016	56.0	ND	ND	ND	0.00003
NAAQS (µg/Ncm)			300	0.02	0.01	-	-

	Location	Date of Sampling	PM_{10}	NO_2	SO_2	Pb
A1	Labayug National Highschool	July 25, 2019	7.2	ND	ND	ND
A2	Inmalog Elementary School	July 25, 2019	10.1	ND	25.5	ND
A3	Sitio Saguitlang Elementary School	July 25, 2019	15.0	ND	ND	ND
NAAQS (µg/Ncm)			200	260	340	20

221 The proposed project is expected to emit CO, NO_2, SO_2, TSP and PM_{10} due to its nature of operation. Air pollution control facilities such as bag filters shall be installed to ensure compliance of the air emissions with the DENR standards.

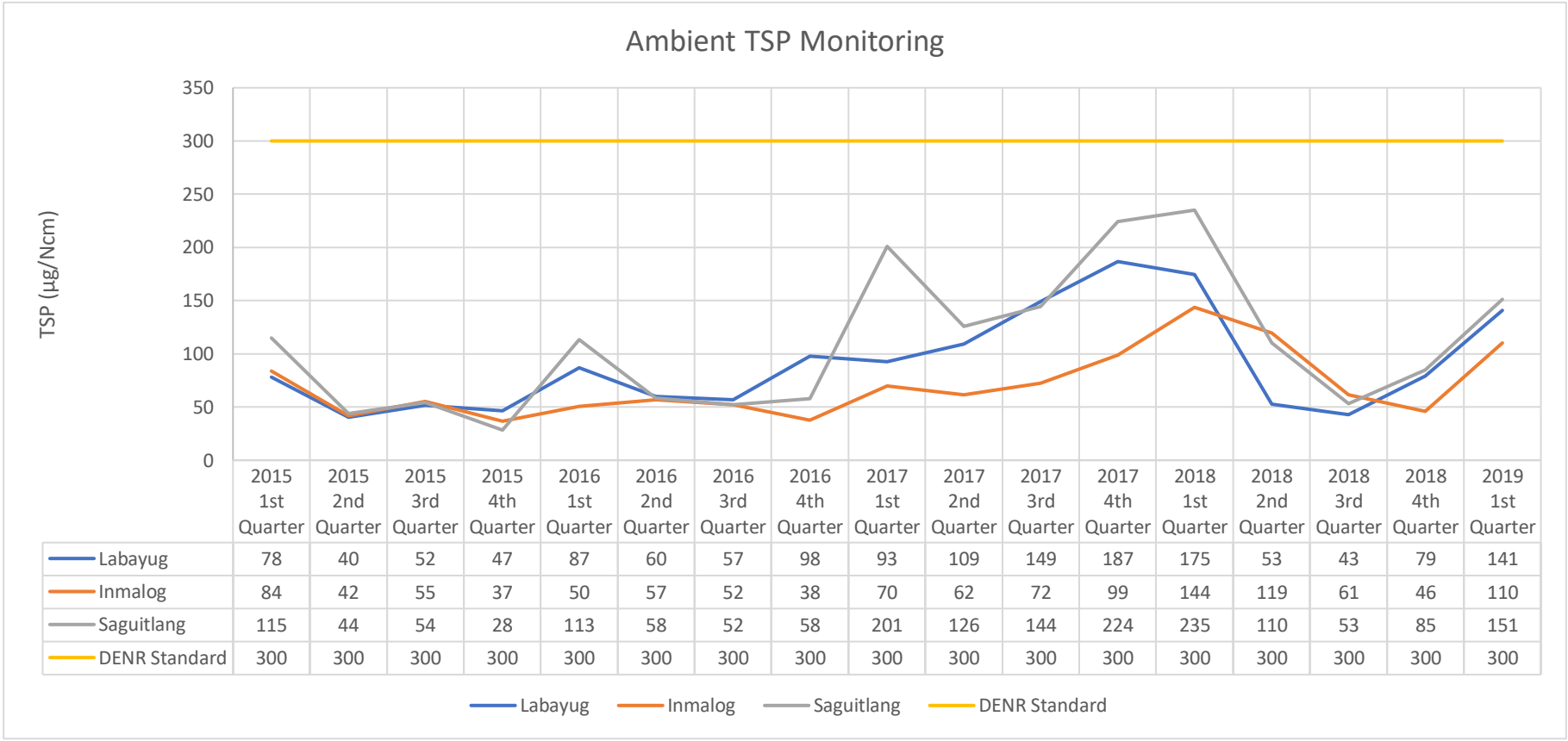
Figure 2-26: Ambient Air Quality Monitoring Stations



LOCATION		COORDINATES	
		NORTH	EAST
A1	Labayug National Highschool	16° 9'9.82"N	120°33'59.90"E
A2	Inmalog Elementary School	16° 9'49.45"N	120°33'18.73"E
A3	Sitio Saguitlang Elementary School	16°10'32.84"N	120°34'14.35"E

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **AMBIENT AIR QUALITY MONITORING STATIONS**	FIGURE NO.: 2-26
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: NCC

Figure 2-27: Ambient TSP Monitoring Results



2015 1st Quarter	2015 2nd Quarter	2015 3rd Quarter	2015 4th Quarter	2016 1st Quarter	2016 2nd Quarter	2016 3rd Quarter	2016 4th Quarter	2017 1st Quarter	2017 2nd Quarter	2017 3rd Quarter	2017 4th Quarter	2018 1st Quarter	2018 2nd Quarter	2018 3rd Quarter	2018 4th Quarter	2019 1st Quarter
Labayug	78	40	52	47	87	60	57	98	93	109	149	187	175	53	43	79	141
Inmalog	84	42	55	37	50	57	52	38	70	62	72	99	144	119	61	46	110
Saguitlang	115	44	54	28	113	58	52	58	201	126	144	224	235	110	53	85	151
DENR Standard	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **AMBIENT TSP MONITORING RESULTS**	FIGURE NO.: 2-27
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: NCC SMR

Air Dispersion Model

222 A steady state Gaussian plume dispersion model was applied to evaluate the air pollution impact on the local air quality from the quarry and cement plant operations of Northern Cement Corporation and San Miguel Northern Cement, Inc. The modeling domain that contains the study area is 10 km by 10 km grid centered on the stack locations (Lat 16.165000°, Lon 120.568319°) as shown in **Figure 2-28**.

223 The primary air pollutants in the study area will be particulates emitted from the cement line production and the quarrying sites. Gaseous air pollutants will also include Carbon Monoxide (CO), Nitrogen Dioxide (NO_2) and Sulfur Dioxide (SO_2) primarily from cement line production. Heavy metals, such as arsenic, cadmium, cobalt, copper, mercury, nickel, antimony, and zinc are also expected to be emitted by the cement plant due to the use of alternative fuels.

224 AERMOD, the US EPA's recommended model for most small scale regulatory applications, was then used for predicting the ground-level concentrations (GLC) of the said air pollutants. AERMOD, also known as the AERMIC (American Meteorological Society/EPA Regulatory Improvement Committee) Regulatory Model, is an advanced next-generation air dispersion model that incorporates concepts such as planetary boundary layer (PBL) theory and advanced methods for handling complex terrain. Such model has undergone thorough model evaluation procedures yielding reasonably accurate modeling results provided that the appropriate input data are used.

225 In this first level of analysis, it is assumed that the pollutants do not undergo any physico-chemical transformations and that there is no pollutant removal by dry deposition. The emission rate of the pollutants from a stack (point source) in a reasonable worst-case scenario was estimated based from the following equation:

$$\textit{Emission rate (g/s)} = \textit{Concentration (mg/Nm}^3\textit{)} \times \textit{Stack volumetric flowrate (Nm}^3\textit{/s)} \times 10^{-3}$$

226 The maximum concentrations of heavy metals (As, Cd, Co, Cu, Hg, Ni, Sb, and Zn) from the stack in the cement line production are listed on **Table 2-30**. The point sources of these pollutants will be primarily from the kiln. Note that these maximum concentrations are based on the limits indicated in the National Emissions Standards for Source Specific Air Pollutants (NESSAP) (Table 2, Sect.1, Rule XXV of DAO 2000-81). Concentrations from the source monitoring data of NCC as well as typical concentrations from the prospective equipment of SMNCI were also considered.

227 As for particulates, the typical concentrations from equipment of NCC and prospective equipment of SMNCI were used (**Table 2-30**). It is also assumed that sixty five percent of the Total Suspended Particulates (TSP) will be PM_{10} for the worst-case scenario. Another potential source of particulates as fugitive dust is from the crushing plant, finish mill, and roads. The quarry is another major source of TSP. As in most model runs, the emission rate of area source used in the report was taken from EPA AP-42. The value was calculated based on emission factor from quarries and massive drilling and construction sites, which is 1×10^{-4} g/s-m^2.

Table 2-30: Concentrations of Pollutants

Pollutant	Max Concentrations (mg/Ncm)	Concentrations specifications of SMNCI equipment (mg/Ncm)	Concentration (mg/Ncm) of NCC equipment From SMR – 1Q2019	
			ESP 1	ESP 2
TSP		8.2	106	120
PM_{10}		5.3	70	103
CO		40.6	184	220
NO_2		302.1	139	73
SO_2		7.9	15	4
As	10			
Cd	10			
Sb	10			
Pb	10			

228 As suggested by Emission Inventory Improvement Program (EIIP) of the US EPA, there are several activities that have impacts on the emission rates in quarry. Some activities that were considered during quarrying are blasting, truck loading, transport through haul roads, and truck unloading. The fugitive dust emissions from crushing plant and quarry site are modeled as a 30m-length volume source and a 10m-radius circular area source, respectively.

229 The proposed facility is in an area where regional meteorological condition and terrain would have a significant effect on the predicted ground-level concentration (GLC) of its air emissions. The meteorological data used for the model was derived from a 3-year mesoscale regional meteorological model (MM5) for the said area. The summarized wind frequency data for the three-year MM5 data as shown in the wind rose diagram (Figure 2-29) indicates that the prevailing wind direction in the area is in northeasterly, southwesterly, and southeasterly sectors with a wind speed range between two to eleven meters per second. The MM5 data was processed by AERMET, the meteorology data processor for AERMOD. The terrain elevation data was obtained from high resolution database of Earth's topography collected during the Shuttle Radar Topography Mission (SRTM). The elevation data was then processed (Figure 2-30) by AERMAP, the terrain preprocessor for AERMOD air dispersion study, to calculate the hill height scale and elevations for receptors within the model domain of 10 km x 10 km grid with a 500 m resolution of the uniform Cartesian grid receptor.

230 On the other hand, physical stack parameters of the identified point sources used in the model including the stack volumetric flowrate are summarized in **Table 2-31**. The volumetric flow rate is based on typical values of the plant equipment.

Table 2-31: Description of the stacks from the proposed project (from SMR 1Q2019)

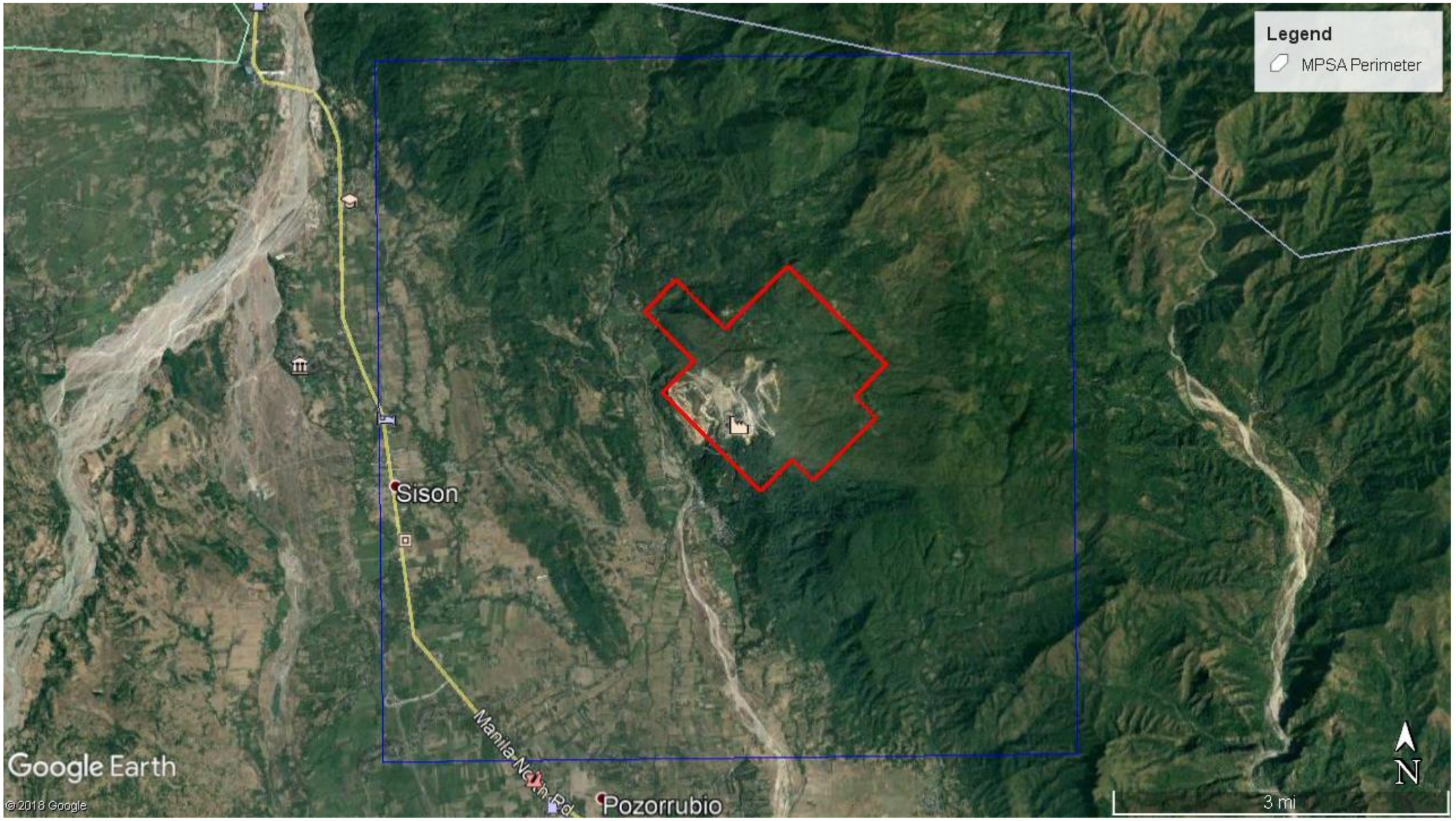
Point source	Stack height (m)	Stack Diameter (m)	Exit Stack Gas Temp (K)	Actual volumetric flow rate (m^3/min)	Corrected volumetric flow rate (Nm^3/s)	Number of Stacks	Mitigating Measures
Kiln	46	4.5	393.15	4,236.19	52.2	NCC – 2	ESP
Kiln	60	3.5	423		195.7	SMNCI – 2	Bag Filters

231 The estimated emission rates in g/s are shown in **Table 2-32**.

Table 2-32: Emission rates (g/s) from the Cement Plant and Quarry Operations

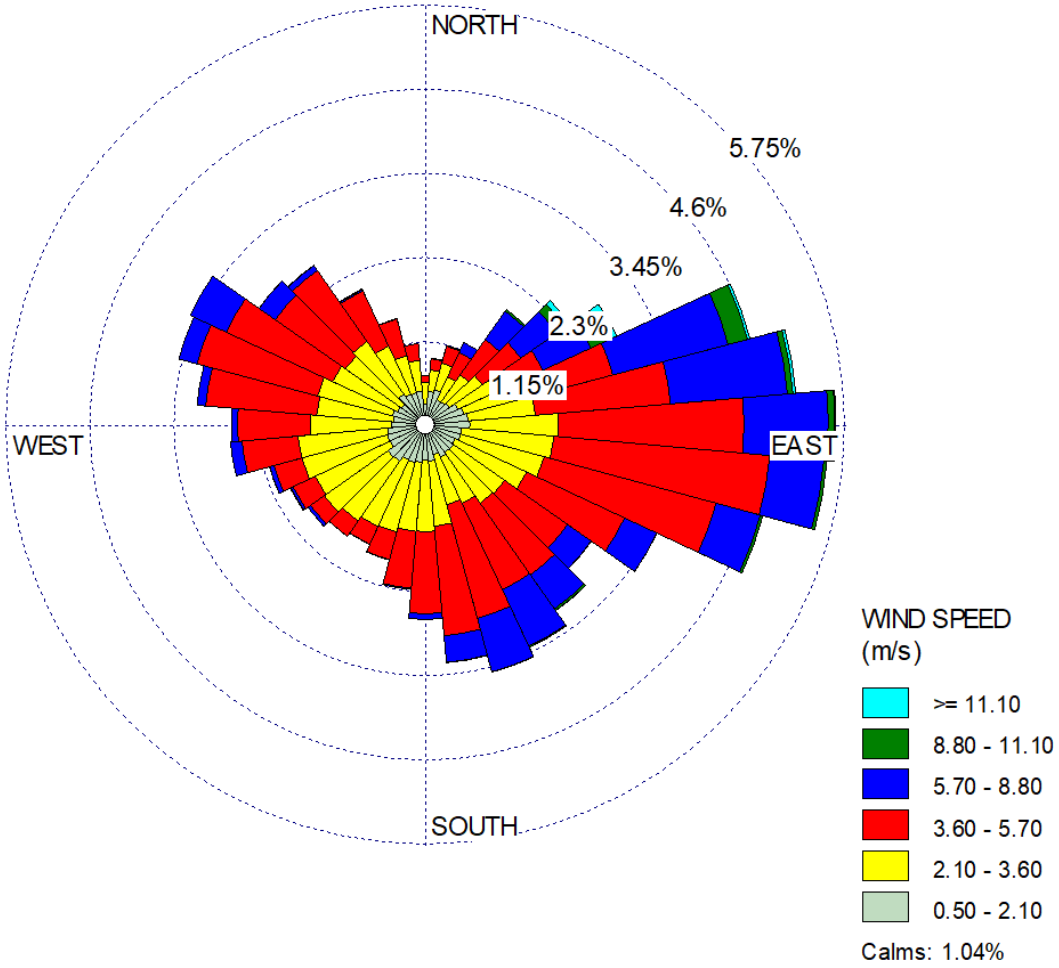
Parameters	Kiln (NCC Line 1)	Kiln (NCC Line 2)	Kiln (SMNCI Line A)	Kiln (SMNCI Line B)	Limestone Crushing 1 (Shared)	Limestone Crushing 2 (Shared)	Finish Mill 1 (NCC Line 1)	Finish Mill 2 (NCC Line 2)	Finish Mill 3 (SMNCI Line A)	Finish Mill 4 (SMNCI Line B)	Quarry Areas (g/s-m^2)	Quarry Roads
TSP	7.9	7.9	11.1	11.1	0.05	0.05	1.3	0.9	1.8	1.8	$1x10^{-4}$	2.7
NO_2	10.3	5.4	37.3	37.3								
SO_2	1.1	0.3	52.2	52.2								
CO	13.7	16.4	37.3	37.3								
PM_{10}	5.2	7.6	7.3	7.3							$6.5x10^{-6}$	0.7
As	0.7	0.7	0.7	0.7								
Cd	0.7	0.7	0.7	0.7								
Sb	0.7	0.7	0.7	0.7								
Pb	0.7	0.7	0.7	0.7								

Figure 2-28: Model Domain of the Study Area



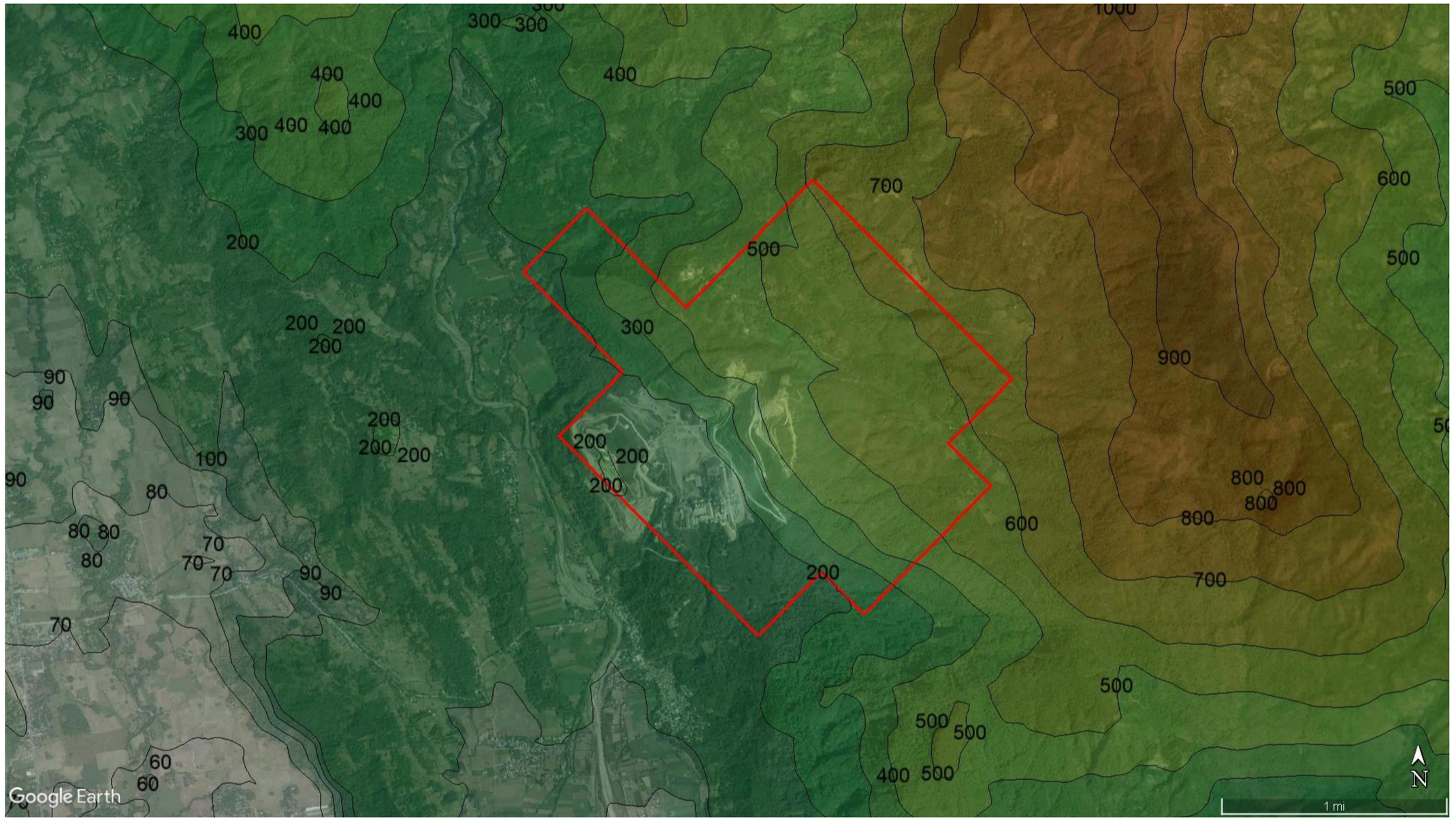
PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **MODEL DOMAIN OF THE STUDY AREA**	FIGURE NO.: 2-28
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Figure 2-29: Wind Rose Diagram in Project Area



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **WIND ROSE DIAGRAM OF THE STUDY AREA**	FIGURE NO.: 2-29
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Figure 2-30: Digitized Terrain Map of the Study Area



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **DIGITIZED TERRAIN MAP OF THE STUDY AREA**	FIGURE NO.: 2-30
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Air Dispersion Modeling of Suspended Particulates

232 The following sources were considered for the air dispersion modeling of particulates:

Table 2-33: Suspended Particulates Sources

Sources	Type	Capacity	Company
Cement Line 1	Point Source	0.88 MMTPY Clinker	NCC
Cement Line 2	Point Source	0.88 MMTPY Clinker	NCC
Cement Line A	Point Source	1.84 MMTPY Clinker	SMNCI
Cement Line B	Point Source	1.84 MMTPY Clinker	SMNCI
Limestone Crushing	Volume Source	1,400 TPH	NCC/SMNCI
Finish Mill Line 1	Volume Source	190 TPH	NCC
Finish Mill Line 2	Volume Source	130 TPH	NCC
Finish Mill Line A	Volume Source	270 TPH	SMNCI
Finish Mill Line B	Volume Source	270 TPH	SMNCI
Limestone/Shale Quarry	Area Source	8.27 MMPTY Limestone 1.83 MMPTYH Shale	NCC
Quarry Roads	Line Volume Source	4 km	NCC

233 **Figure 2-31** shows the estimated location of the point, volume, line, or area source of particulates from the stacks, crushing operation, and quarrying area.

234 **Table 2-35** summarizes the modeling results for each scenario describing the predicted incremental maximum ground level concentration (GLC) of particulates at different averaging times. Moreover, the isopleths for the long-term annual incremental GLC of the said criteria pollutant are also shown in **Figure 2-31** to **Figure 2-33**. It should be noted that these concentrations are the predicted maximum increase in the existing ambient air levels.

235 The predicted concentrations of emissions from the sources exceeded the National Ambient Air Quality Guideline Values (NAAQGV) stipulated in DAO 2000-81, the Implementing Rules and Regulation (IRR) of RA 8749, the Philippine Clean Air Act (CAA) of 1999. Assuming the worst-case scenario, indications suggest the uncontrolled fugitive dust emissions from the quarry site have significant impact on the air quality of the study area in particular to suspended particulates. **Figure 2-31** to **Figure 2-33** suggest the major impact of the plume is in northeasterly direction as influenced by the predominant wind condition and terrain in the area.

236 The proponent must install and operate “Best and Available Control Technology” (BACT) including the continuous opacity monitoring system (COMS) to reduce the emission rate of particulates and ensure that the impact of the operation will not be detrimental to air quality of the area. Table 2-34 also presents the predicted scenarios if the emissions are controlled using different air pollution control devices such as bag filters. Assuming that the equipment used are at 90% efficiency, all parameters in all scenarios will be well below the standards stipulated in DAO 2000-81.

Figure 2-31: Sources of Particulate Matter in the Study Area

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **SOURCES OF PARTICULATE MATTER IN THE STUDY AREA**	FIGURE NO.: 2-31
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

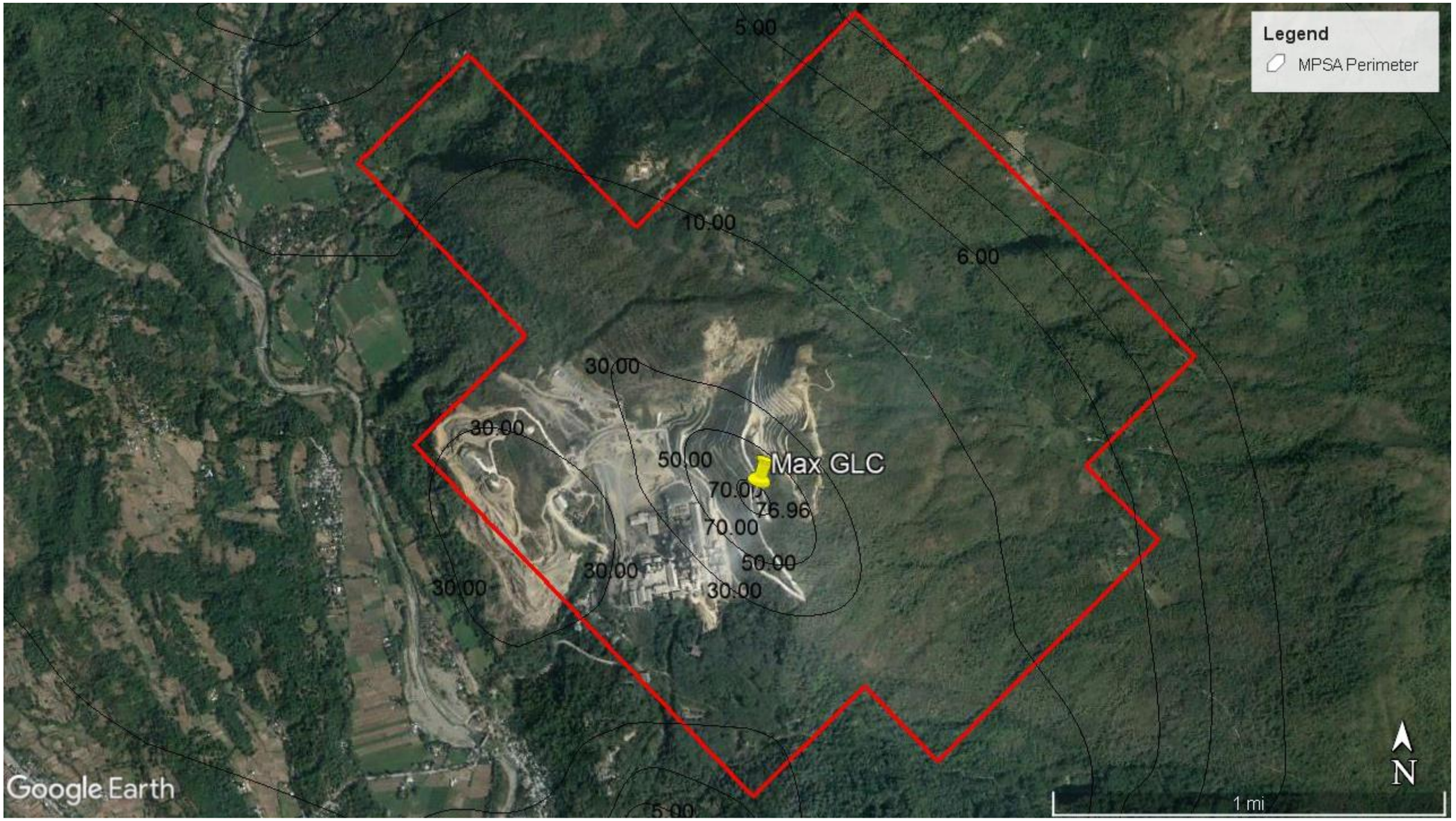
Table 2-34: Predicted incremental maximum GLC of particulates in the study area

Averaging time	Uncontrolled Scenario (cement plant and quarry)		Uncontrolled Scenario (road)		Controlled Scenario (90% efficiency) + Road (Uncontrolled)		NAAQSGV		UTM East	UTM North
	TSP Max GLC[a] ($\mu g/m^3$)	PM_{10} Max GLC[a] ($\mu g/m^3$)	TSP Max GLC[a] ($\mu g/m^3$)	PM_{10} Max GLC[a] ($\mu g/m^3$)	TSP Max GLC[a] ($\mu g/m^3$)	PM_{10} Max GLC[a] ($\mu g/m^3$)	TSP ($\mu g/m^3$)	PM_{10} ($\mu g/m^3$)		
1-hr	**779**	76.96	47.43	30.8	55.1	38.4	300	200	239801.15	1788965.14
24-hr	226	51.7	20.6	13.39	43.2	18.59	230	150	239801.15	1788965.14
Annual	88.9	11.2	13.8	8.97	22.7	10.1	90	60	239801.15	1788965.14

Figure 2-32: Isopleth of the incremental 98th percentile annual average TSP concentration (µg/m³)

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ISOPLETH OF THE INCREMENTAL 98TH PERCENTILE ANNUAL AVERAGE TSP CONCENTRATION (µg/m³)**	FIGURE NO.: 2-32
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Figure 2-33: Isopleth of the incremental 98th percentile annual average PM10 concentration (µg/m³)



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ISOPLETH OF THE INCREMENTAL 98TH PERCENTILE ANNUAL AVERAGE PM10 CONCENTRATION (µg/m³)**	FIGURE NO.: 2-33
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Air Dispersion Modeling of Gaseous Emissions

237 Operation of gaseous emissions sources, which are the kiln and the coal mill, was considered for the air dispersion modeling of CO, NO_2, and SO_2.

238 **Table 2-35** summarizes the modeling results for each scenario describing the predicted incremental maximum ground level concentration (GLC) of these criteria air pollutants at different averaging time. The isopleths for the 24-hr average GLC of CO and annual average GLC of SO_2, and NO_2 are also shown in **Figure 2-34, Figure 2-35,** and **Figure 2-36**. It should be noted that these concentrations are the predicted maximum increase in the existing ambient air levels.

Table 2-35: Predicted incremental maximum GLC of gaseous emissions in the study area

Pollutant	Averaging time	Maximum GLC[d] ($\mu g/m^3$)	UTM East (m)	UTM North (m)	CAA Standards ($\mu g/m^3$)
CO	1-hr	101	240300.07	1788965.74	35,000[a]
	8-hr	187	240300.07	1788965.74	10,000[b]
NO_2	1-hr	64.8	240300.07	1788965.74	260[a]
	24-hr	32.0	240300.07	1788965.74	150[b]
	Annual	7.9	240300.07	1788965.74	40[c]
SO_2	1-hr	4.8	240300.07	1788965.74	340[a]
	24-hr	4.8	240300.07	1788965.74	180[b]
	Annual	0.8	240300.07	1788965.74	80[b]

[a] Section 1, Rule XXVI Source Specific Ambient Air Quality Standards (DAO 2000-81)
[b] Section 1, Rule VII National Air Quality (DAO 2000-81)
[c] WHO guidelines
[d] 98th percentile value

239 Results from both scenarios indicate that these predicted incremental GLC of CO, NO_2, and SO_2 are well below the prescribed limit stipulated in DAO 2000-81, the Implementing Rules and Regulation (IRR) of RA 8749, the Philippine Clean Air Act (CAA) of 1999.

240 The pattern of 98th percentile isopleth shown in Figure 2-34 to Figure 2-36 also suggests the impact of the plume is in northeasterly direction as influenced by the predominant wind condition in the area. The predicted maximum GLCs of pollutants were also observed to be within the MPSA.

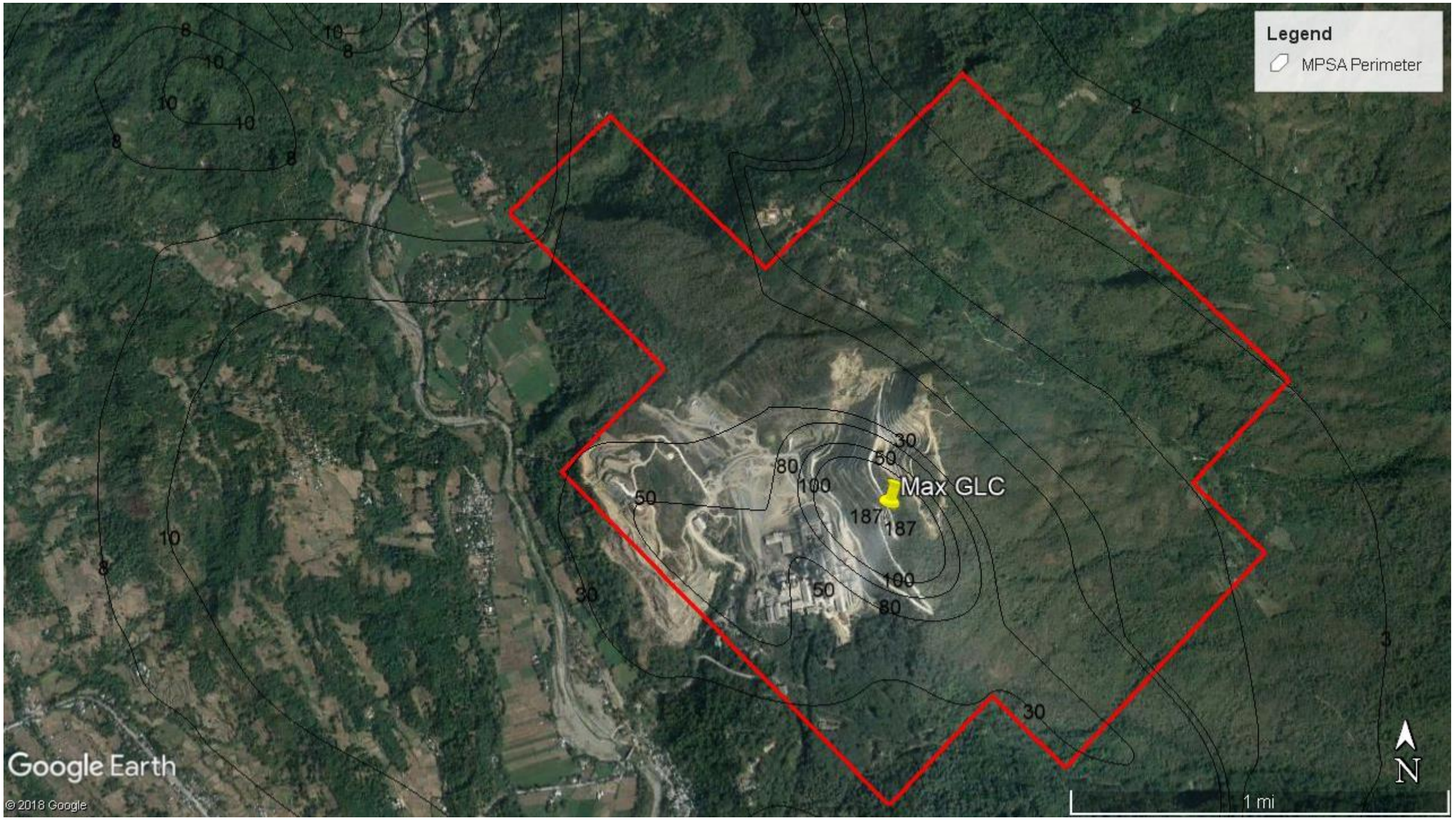
241 The existing operation of the cement plant does not warrant control devices for CO, NO_2, and SO_2. It was anticipated that the environmental limits of these gaseous pollutants will not be exceeded as the sources are minimal. As predicted by the model GLCs are within CAA Standards.

242 To ensure that pollutant concentrations in the area are kept below standards, **Table 2-36** lists the best available control technology (BACT) that should be applied by NCC and SMNCI.

Table 2-36: Best Available Control Technology (BACT) for each pollutant

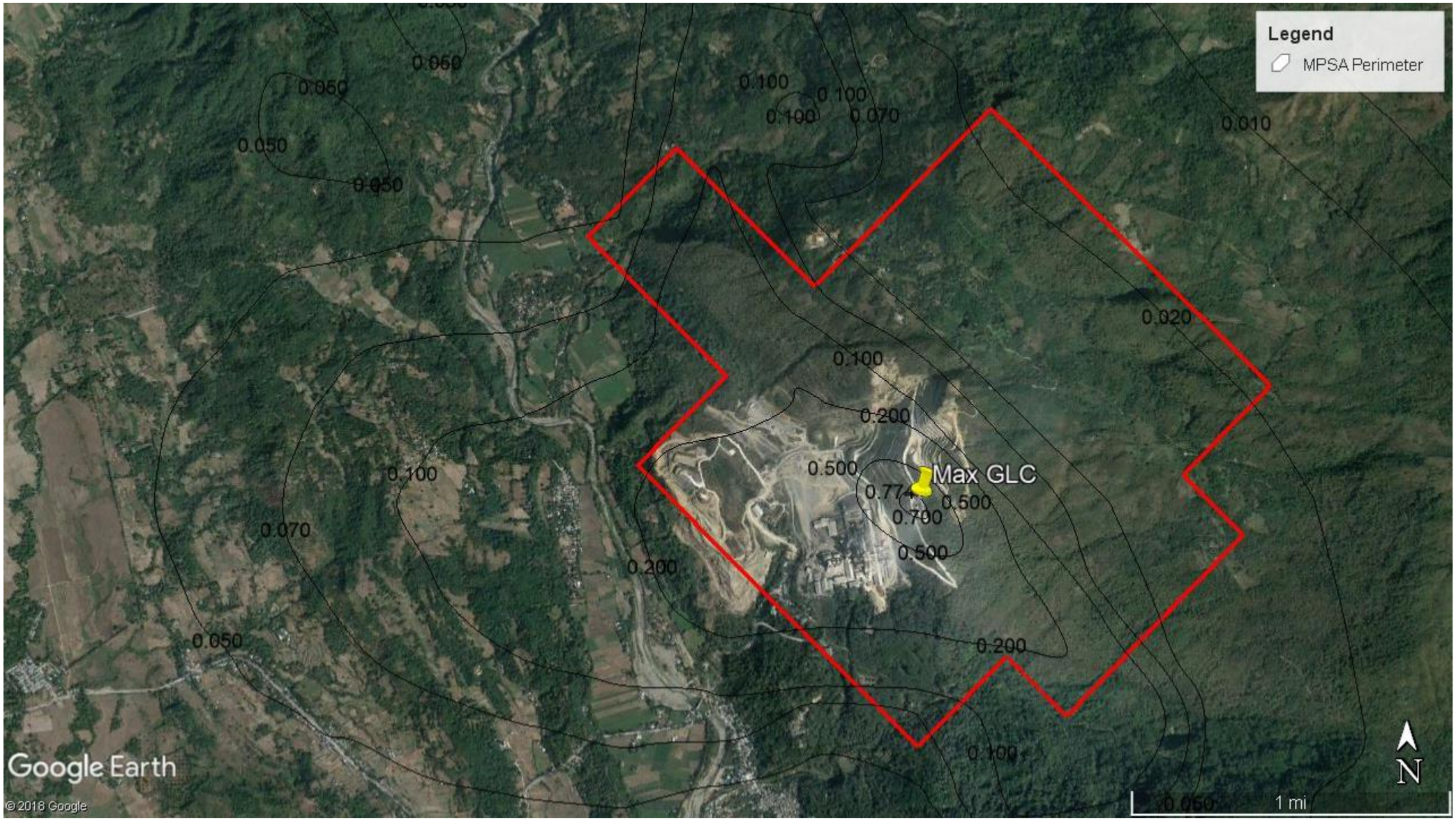
Pollutant	BACT
SO_2	Highly alkaline conditions in cement kiln is maintained to enable it to capture up to 95% of the possible SO_2 emissions
CO	Ensures complete combustion to reduce CO emissions by regular monitoring and continuous auto regulation of fuel and air by automatic combustion control system
NO_2	Reduced through stable kiln operation, as this reduces long term NO_2 emissions.

Figure 2-34: Isopleth of the incremental 98th percentile 8-hour average CO concentration (µg/m³)



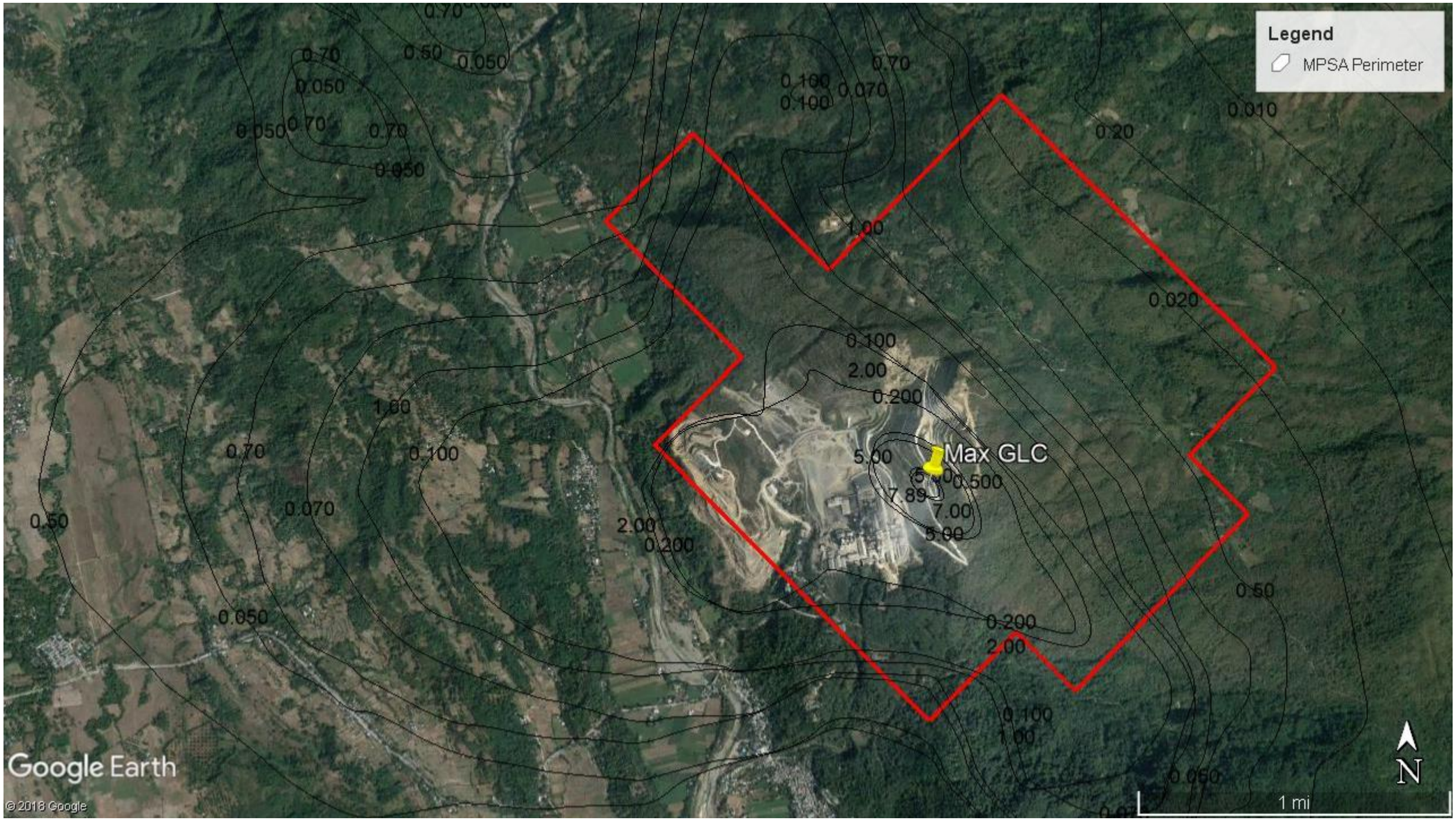
PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ISOPLETH OF THE INCREMENTAL 98TH PERCENTILE 8-HOUR AVERAGE CO CONCENTRATION (µg/m³)**	FIGURE NO.: 2-34
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Figure 2-35: Isopleth of the incremental 98th percentile annual average SO_2 concentration (µg/m³)



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ISOPLETH OF THE INCREMENTAL 98TH PERCENTILE ANNUAL AVERAGE SO_2 CONCENTRATION (µg/m³)**	FIGURE NO.: 2-35
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Figure 2-36: Isopleth of the incremental 98th percentile annual average NO_2 concentration (µg/m³)



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ISOPLETH OF THE INCREMENTAL 98TH PERCENTILE ANNUAL AVERAGE NO_2 CONCENTRATION (µg/m³)**	FIGURE NO.: 2-36
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Air Dispersion Modeling of Heavy Metals

243 The cement plant is expected to emit heavy metals since it will use alternative fuels such as used oil, petroleum coke, shredded tires, refuse-derived fuel from municipal solid waste, and rice husk. The main sources of heavy metals are the kilns of NCC and SMNCI during start-up and calcination.

244 **Table 2-35** summarizes the modeling results describing the predicted incremental maximum ground level concentration (GLC) of the heavy metals at different averaging time. The isopleths for the annual average GLC of Pb and 30-minute averaging time GLC of As, Cd, Sb, and Pb are also shown in **Figure 2-37** and **Figure 2-38**.

Table 2-37: Predicted incremental maximum GLC of gaseous emissions in the study area

Pollutant	Averaging time	Maximum Uncontrolled GLC[b] ($\mu g/m^3$)	Maximum Controlled GLC[b] 90% Efficiency ($\mu g/m^3$)	UTM East	UTM North	CAA Standards[a] ($\mu g/m^3$)
As	30 mins	8.67	0.09	240300.07	1788965.74	20
Cd	30 mins	8.67	0.09	240300.07	1788965.74	10
Sb	30 mins	8.67	0.09	240300.07	1788965.74	20
Pb	30 mins	8.67	0.09	240300.07	1788965.74	20
	Annual	0.98	0.0098	240300.07	1788965.74	1.0

[a] **Section 1, Rule XXVI Source Specific Ambient Air Quality Standards (DAO 2000-81)**

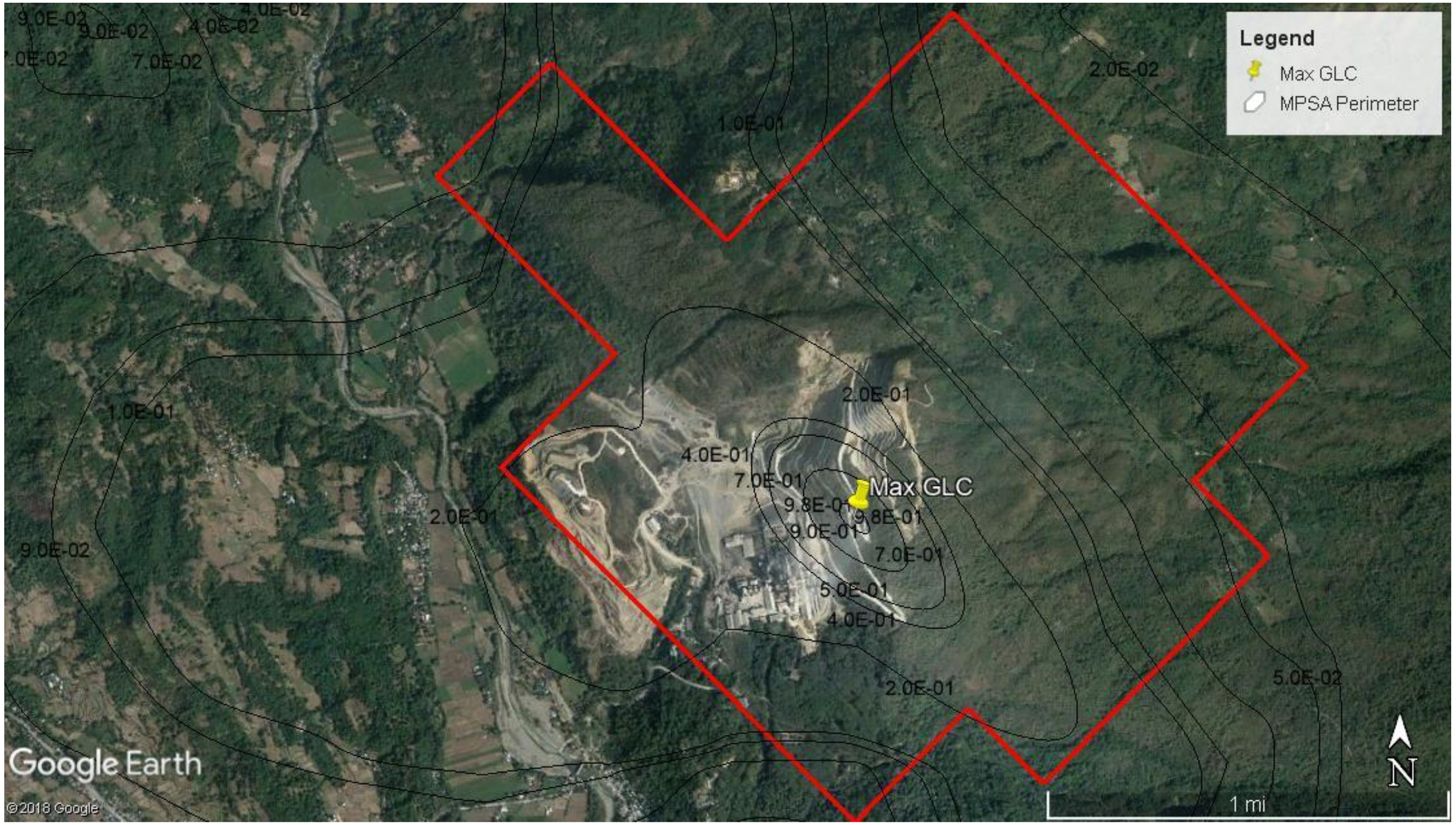
[b] **98th percentile value**

245 Results indicate that these predicted incremental GLCs of As, Cd, Sb, and Pb are below the prescribed limit stipulated in DAO 2000-81, the Implementing Rules and Regulation (IRR) of RA 8749, the Philippine Clean Air Act (CAA) of 1999. Emissions can be reduced further given that the bag filters will capture 90% of the heavy metal emissions.

246 The pattern of 98th percentile isopleth shown in Figure 2-37 and Figure 2-38 also suggests the impact of the plume is in northeasterly direction as influenced by the predominant wind condition in the area. The predicted maximum GLCs of pollutants were also observed to be within the MPSA.

247 To ensure that pollutant concentrations in the area are kept below standards, bag filters will be installed by both companies to mitigate the heavy metal emissions. According to the specifications of the bag filters, it can control heavy metal emissions by up to 92%.

Figure 2-37: Isopleth of the incremental 98th percentile annual average lead concentration (µg/m³)



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ISOPLETH OF THE INCREMENTAL 98TH PERCENTILE ANNUAL AVERAGE LEAD CONCENTRATION (µg/m³)**	FIGURE NO.: 2-37
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Figure 2-38: Isopleth of the incremental 98th percentile 30-minute average arsenic, cadmium, antimony, and lead concentration (µg/m³)

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ISOPLETH OF THE INCREMENTAL 98TH PERCENTILE ANNUAL AVERAGE ARSENIC, CADMIUM, ANTIMONY, AND LEAD CONCENTRATION (µg/m³)**	FIGURE NO.: 2-38
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

2.3.2.2 Increase in ambient noise level

248 Ambient noise level was based on Northern Cement Corporation's Self-Monitoring Reports from 2016 to 2019. NCC is monitoring noise level during morning, daytime, evening and nighttime in the two sampling stations (see **Figure 2-39**). Based from the results, noise levels at both sampling stations are complying with the correspond standard limits of the NPCC. The average of the results of the noise level monitoring of NCC is shown in **Figure 2-40**.

249 Noise is expected to be generated by heavy equipment during construction. **Table 2-38** presents the expected noise levels of construction equipment, which is expected to attenuate with distance. The loudest construction equipment to be used are pile drivers, which emits about 77 dB of noise at 240m away from the source.

250 The proponent must implement mitigating measures to control noise. Some measures that the proponent will apply are proper maintenance of engines and other mechanical parts of the heavy equipment, installation of exhaust mufflers, and installing enclosures surrounding the project site. The proponent will maintain and enhance the existing vegetation surrounding the quarry site which will act as natural noise barriers. The proponent will also limit activities during normal working hours.

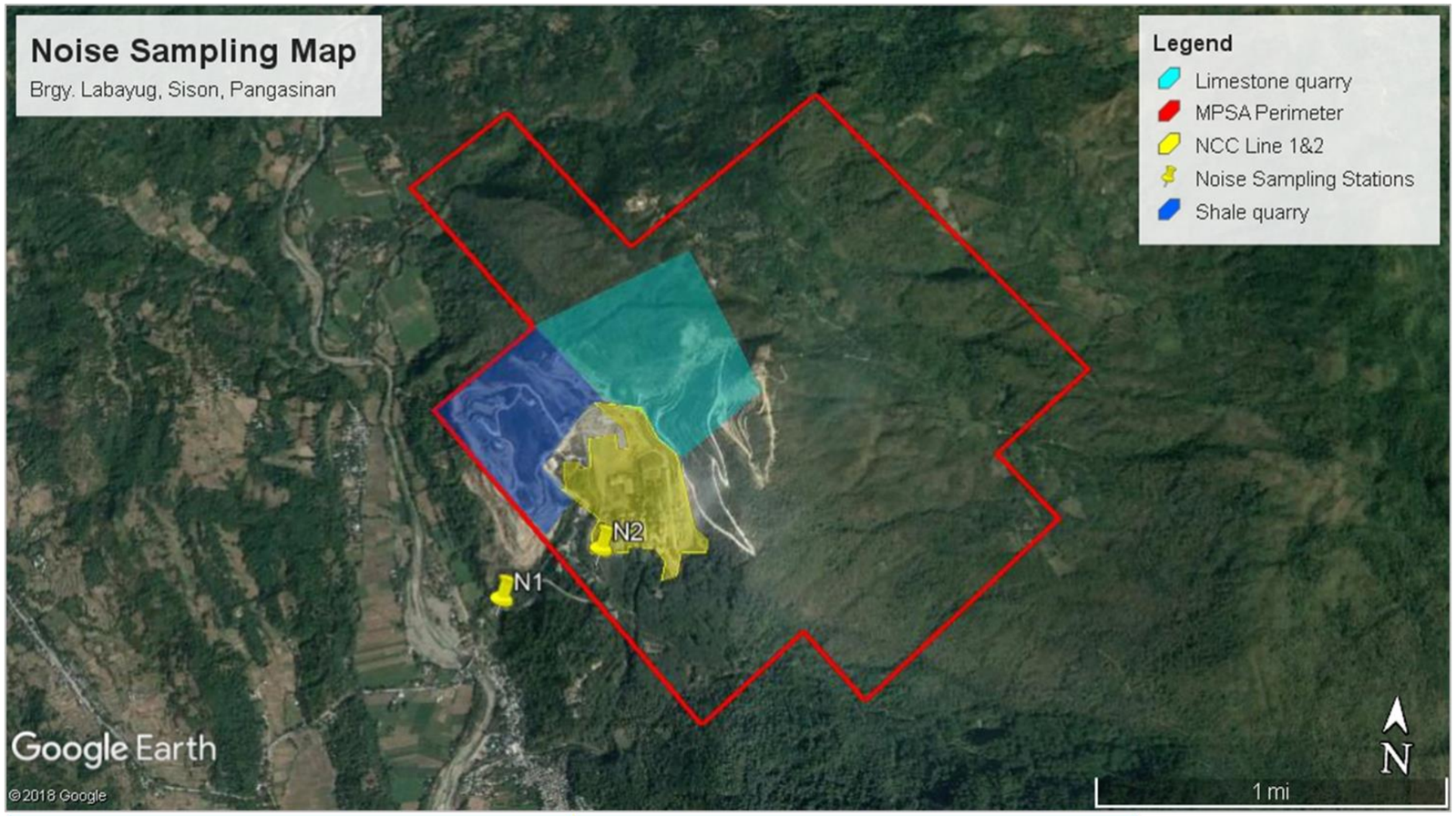
251 Noise will be generated by the cement plant once it is operational. The equipment will be housed to control the noise. Vegetation, which will serve as natural noise barriers, will be maintained around the perimeter of the quarry site.

Table 2-38: Expected Noise Levels from Heavy Equipment, db(A)

EQUIPMENT	DISTANCE (M)				
	15	**30**	**60**	**120**	**240**
Front Loader	75	69	63	57	51
Backhoes	85	79	73	67	61
Graders	88	82	76	70	64
Trucks	91	85	79	73	67
Concrete Mixers	82	79	73	67	61
Cranes	83	77	71	65	59
Generators	78	72	66	60	54
Compressors	81	75	69	63	57
Pumps	76	70	64	58	52
Pile Drivers	101	95	89	83	77
Jackhammers	88	82	76	70	64

Source: Larry W. Canter, Environmental Impact Assessment, New York, 1977

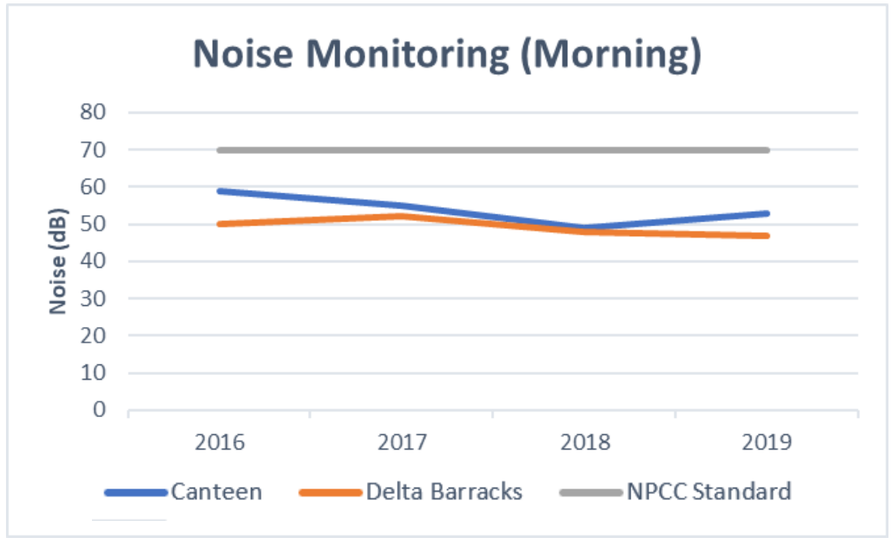
Figure 2-39: Ambient Noise Level Sampling Map

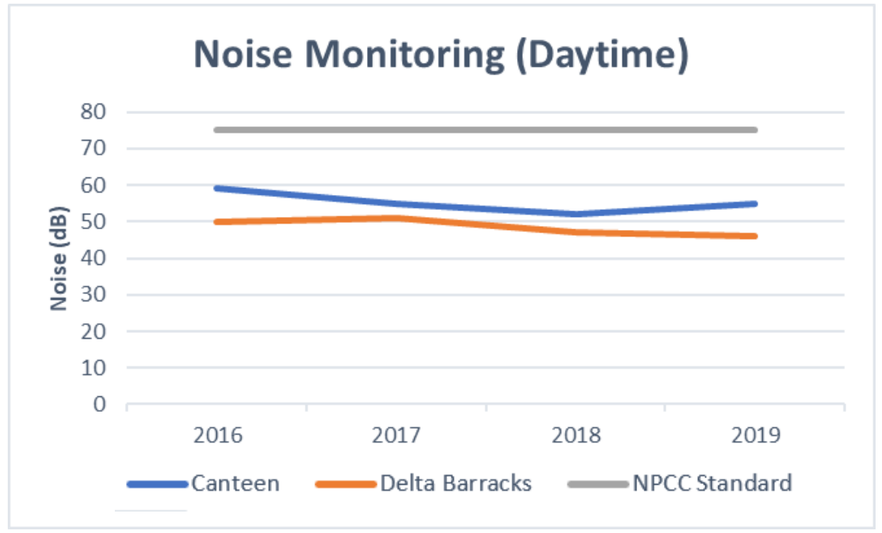


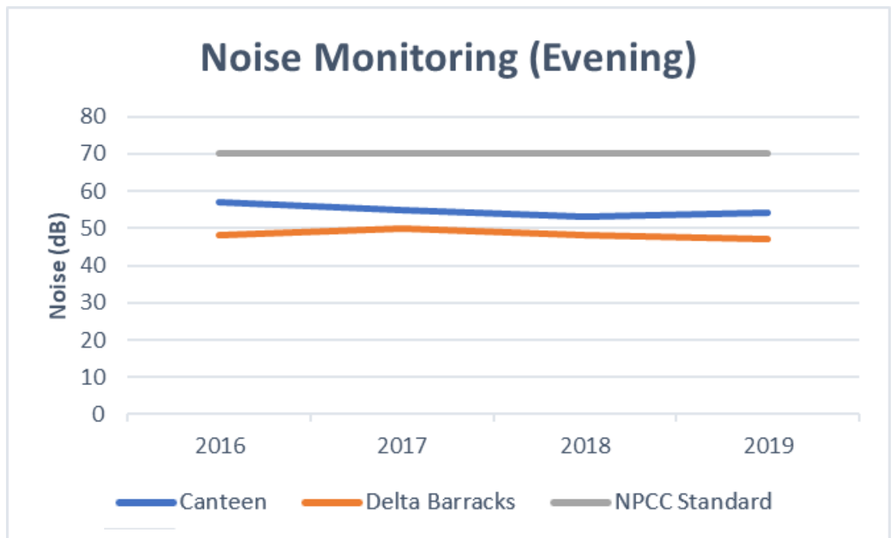
LOCATION		COORDINATES	
		NORTH	EAST
N1	Delta Barracks	16° 9'36.50"N	120°33'43.10"E
N2	NCC Canteen	16° 9'45.10"N	120°33'58.20"E

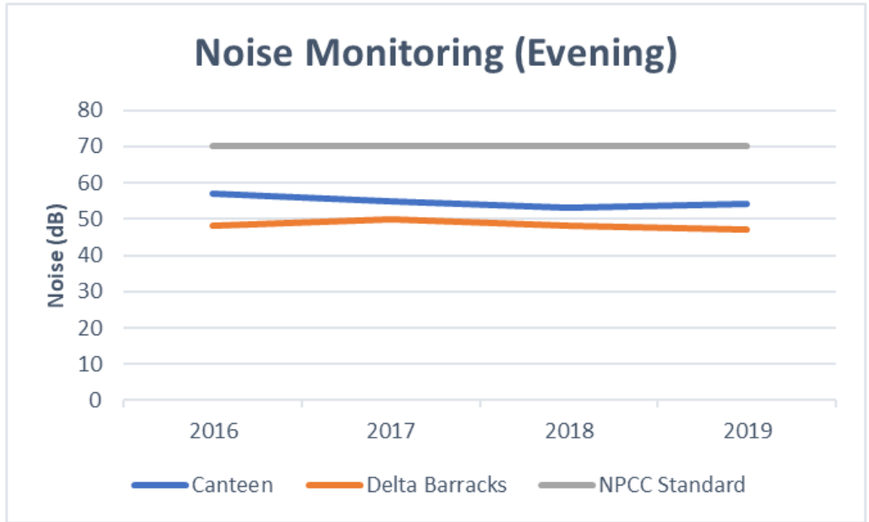
PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **AMBIENT NOISE LEVEL SAMPLING MAP**	FIGURE NO.: 2-39
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: NCC

Figure 2-40: Ambient Noise Level Monitoring Results









PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **AMBIENT NOISE LEVEL MONITORING RESULTS**	FIGURE NO.: 2-40
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: NCC

2.3.3 Summary of Baseline Findings. Impacts and Mitigation on Air and Noise

252 The following table lists the impacts and mitigation on Air and Noise.

Table 2-39: Summary of Significant Baseline Findings and Potential Impacts and Mitigation on Air and Noise

Summary of Baseline Findings on Air:

- **Meteorology**
  - The project area mainly belongs to Type I climate under the modified Coronas classification (two pronounced seasons, dry from December to May and wet from June to November).
  - Temperature is highest in April and lowest in January.
  - The rainiest month is August with mean monthly rainfall values of 581.3mm. The driest month in the area is January with only 6.7 mm of rainfall.
  - An average of 5 cyclones pass through the area every three years.
- **Ambient Air Quality and Noise**
  - All sampling stations showed acceptable ambient air and noise conditions, with the values below the specified NAAQS and NPCC limits, respectively.

POTENTIAL IMPACTS	PROJECT PHASES	DESCRIPTION	MITIGATING MEASURES
AMBIENT AIR QUALITY AND NOISE			
Impact on Air Quality	Construction	NO_x, SO_2, and CO emissions from heavy equipment that will be used during construction	Proper maintenance on heavy equipment.
	Operation	TSP and PM_{10} emissions from the cement manufacturing facility and quarry sites is of primary concern	Installation of bag filters that will control at least 99% of the emissions from the cement manufacturing plant of NCC and SMNCI Road watering within the plant site to control dust
		Gaseous emissions are expected from the kiln.	Proper maintenance of equipment to ensure efficiency
		Heavy metal emissions are expected from the kiln due to use of alternative fuels	Bag filters can also control up to 92% of heavy metal emissions
Increase in Ambient Noise Level	Construction/ Operation	Noise will be generated by heavy equipment during construction The cement plant will generate noise	Maintenance of engines and other mechanical parts of the equipment Installation of exhaust mufflers Constructing enclosures surrounding the project site Maintenance of vegetation surrounding the area to serve as natural noise barriers Quarry operations limited during daytime

2.4 The People

Land Area

253 Sison is a 3rd Class Municipality in the Philippines and has a land area of 13,788 Has., which is 1.5% of the total land area of the Province of Pangasinan. The municipality is bounded by Rosario, La Union on the north, Pozzorubio, Pangasinan on the south, San Manuel and Binalonan, Pangasinan on the southeast, Tuba, Benguet on the northeast and San Fabian, Pangasinan on the west.

254 Pozorrubio is a 1st Class Municipality in the Philippines and has a land area of 8,965 Has., which is 1.64% of the total land area of the Province of Pangasinan. The municipality is bounded San Jacinto, Pangasinan on the west, southwest by the Municipality of Manaoag, southeast by the Municipalities of Laoac and Binalonan, northwest by the Bued River and the Municipality of San Fabian, and on the east by the Aloragat River and a portion of the Municipality of Sison.

Demography

255 The Municipality of Sison has a total population of 47,518 people with an estimated number of households of 10,659 at an average household size of 4-5 as of the 2015 census by the Philippine Statistics Authority (PSA).

256 As summarized in **Table 2-40**, the municipality is comprised of 28 (5 urban and 23 rural) barangays. The data presented shows that rural population greatly outnumbers the population of urban barangays. Barangay Labayug has the highest number of population in the municipality with 4,078 people.

257 Majority of the population (75.47%) and households (74.52%) are living in the rural areas in Sison.

Table 2-40: Population of Sison per Barangay, 2015

NO.	BARANGAY	POPULATION	HOUSEHOLDS
A.	**URBAN BARANGAY**		
1	Poblacion Central	1,596	352
2	Poblacion Norte	1,984	421
3	Poblacion Sur	1,137	255
4	Labayug	2,859	702
5	Paldit	4,078	986
	Sub-Total	**11,654**	**2,716**
B.	**RURAL BARANGAY**		
1	Agat	1,310	315
2	Alibeng	1,422	325
3	Amagbagan	751	148
4	Artacho	1,305	279
5	Asan Norte	2,425	530
6	Asan Sur	2,826	639
7	Bantay Insik	1,416	333
8	Bila	1,686	418
9	Binmeckeg	1,734	394

NO.	BARANGAY	POPULATION	HOUSEHOLDS
10	Bulaoen East	1,031	234
11	Bulaoen West	1,046	215
12	Cabaritan	1,619	356
13	Calunetan	817	189
14	Camangaan	1,185	234
15	Cauringan	1,649	329
16	Dungon	1,588	346
17	Esperanza	1,891	452
18	Inmalog	1,673	391
19	Killo	1,764	395
20	Pindangan	1,562	300
21	Pinmilapil	1,867	391
22	Sagunto	2,064	436
23	Tara-tara	1,233	294
	Sub-Total	**35,864**	**7,943**
	TOTAL	**47,518**	**10,659**

Source: 2015 Philippine Statistics Authority Census
2018 Philippine Standard Geographic Code

258 The Municipality of Pozorrubio has total population of 69,555 people with an estimated number of households of 16,856 at an average household size of 4-5 as of the 2015 census by the PSA.

259 As summarized in **Table 2-41**, the municipality is comprised of 34 (1 urban and 33 rural) barangays. Similarly, the data presented shows that rural population greatly outnumbers the population of urban barangays. Barangay Alipangpang has the highest number of population in the municipality with 5,634 people.

260 Majority of the population (92.90%) and households (91.38%) are living in the rural areas in Pozorrubio.

Table 2-41: Population of Pozorrubio per Barangay, 2015

NO.	BARANGAY	POPULATION	HOUSEHOLDS
A.	**URBAN BARANGAY**		
1	Alipangpang	5,634	1,453
	Sub-Total	**5,634**	**1,453**
B.	**RURAL BARANGAY**		
1	Amagbagan	2,480	594
2	Balacag	806	196
3	Banding	996	260
4	Bantugan	1,046	290
5	Batakil	2,770	629
6	Bobonan	2,645	608
7	Buneg	1,914	520
8	Cablong	1,791	411
9	Casanfemandoan	1,137	261
10	Castano	1,010	256
11	Dilan	3,714	911
12	Don Benito	1,397	144

NO.	BARANGAY	POPULATION	HOUSEHOLDS
13	Haway	628	344
14	Imbalbalatong	2,200	536
15	Inoman	2,372	578
16	Laoac	1,207	311
17	Maambal	1,315	336
18	Malasin	2,021	496
19	Malokiat	1,136	271
20	Manaol	1,435	309
21	Nama	3,095	709
22	Nantangalan	1,742	459
23	Palacpalac	2,871	695
24	Palguyod	3,043	679
25	Poblacion I	2,578	520
26	Poblacion II	1,299	349
27	Poblacion III	1,510	331
28	Poblacion IV	1,621	359
29	Rosario	5,187	1,381
30	Sugcong	1,906	449
31	Talogtog	2,303	615
32	Tulnac	885	191
33	Villegas	1,861	405
	Sub-Total	**63,921**	**15,403**
	TOTAL	**69,555**	**16,856**

Source: 2015 Philippine Statistics Authority Census
2018 Philippine Standard Geographic Code

Population Density

261 Given the total land area and 2015 population of Sison, every square kilometer is inhabited by more or less 580 people. Based from this density, it can be said that the municipality is not crowded. In addition, the population density of Sison is higher than the population density of Pangasinan which is pegged at 542 people per square kilometer.

262 For Pozorrubio, every square kilometer is inhabited by more or less 517 people. Based from this density, it can be said that the municipality is not crowded. In addition, the population density of Pozorrubio is lower than the population density of Pangasinan which is pegged at 542 people per square kilometer.

Population Growth Rate

263 Based from the 2010 census, the population of Sison was only 43,979. Over the span of 5 years, the population increased by 3,539 (est. annual increase: 708) with +1.48% annual growth rate.

264 Based from the 2010 census, the population of Pozorrubio was only 66,111. Over the span of 5 years, the population increased by 3,444 (est. annual increase: 689) with +0.97% annual growth rate.

Population by Sex

265 Based on the CLUP of Sison, in terms of population by sex ratio in Sison, there are more males than females with a total population of 21,679 (50.88%) to 20,929 (49.12%) with ratio of 104 males to 100 females.

Housing

266 Based from the 2015 PSA Housing Characteristics in the Philippines, there are 10,532 occupied housing units in the municipality compared to 10,659 households. Majority of the housing units in the municipality are single houses (91.27%).

267 For the municipality of Pozorrubio, there are 15,789 occupied housing units in the municipality against 16,856 households. Majority of the housing units in the municipality are single houses (92%).

268 The details of the housing characteristics for both the Municipalities of Sison and Pozorrubio are found in **Table 2-42.**

Table 2-42: Housing Characteristics for Sison and Pozorrubio, 2015

MUNICIPALITY	OCCUPIED HOUSING UNIT	NO. OF HOUSEHOLDS	HOUSEHOLD POPULATION	AVE. HOUSEHOLD SIZE
MUNICIPALITY OF SISON				
Single house	9,613	9,736	43,490	4.47
Duplex	639	642	2,827	4.40
Multi-unit residential	270	271	938	3.46
Commercial/industrial/agricultural	8	8	16	2.00
Institutional living quarter	2	2	9	4.50
Others	-	-	-	-
Not Reported	-	-	-	-
TOTAL	**10,532**	**10,659**	**47,280**	**4.44**
MUNICIPALITY OF POZORRUBIO				
Single house	14,527	15,556	64,434	4.14
Duplex	908	933	3,714	3.98
Multi-unit residential	314	320	1,219	3.81
Commercial/industrial/agricultural	22	28	111	3.96
Institutional living quarter	-	-	-	-
Others	-	-	-	-
Not Reported	18	19	63	3.32
TOTAL	**15,789**	**16,856**	**69,541**	**4.13**

Source: 2015 Philippine Statistics Authority Census

2.4.1 Displacement of settler/s

269 Displacement of settlers is not expected to result from the project, since the proposed project site was located within the existing **San Miguel Northern Cement, Inc.** cement plant complex of **Northern Cement Corporation**. Further, there are no formal and informal settlers that are inhabiting near proposed project area.

Land Tenure Profile

270 In terms of the land tenure of the household respondents (**Table 2-43**), in all 5 impact barangays, majority of the respondents mentioned that they own the land that they were currently occupying. Further, a good percentage of the respondents mentioned that the land that they were occupying were rented and/or free occupancy with permission from the owner. However, there were a few respondents who mentioned that they occupy the land without permission from the owner.

Table 2-43: Land Tenure in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Own land	**33**	**72%**	**14**	**74%**	**35**	**58%**	**39**	**65%**	**25**	**50%**	**47**	**78%**
Rented land	3	7%	0	0%	2	3%	7	12%	0	0%	0	0%
Free occupancy with permission from owner	6	13%	2	11%	13	22%	5	8%	7	14%	8	13%
Free occupancy without permission from owner	2	4%	0	0%	1	2%	4	7%	0	0%	0	0%
Others	2	4%	2	11%	3	5%	2	3%	15	30%	5	8%
No Answer	0	0%	1	5%	6	10%	3	5%	3	6%	0	0%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

271 In terms of the house tenure of the household respondents (**Table 2-44**), in all 5 impact barangays, majority of the respondents mentioned that they own the house that they were currently occupying. Further, a small percentage of the respondents mentioned that the house that they were occupying were rented and/or free occupancy with permission from the owner.

Table 2-44: Housing Tenure in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Own house	**41**	**89%**	**17**	**89%**	**40**	**67%**	**46**	**77%**	**39**	**78%**	**52**	**87%**
Rented house	2	4%	1	5%	4	7%	3	5%	0	0%	0	0%
Free occupancy with permission from owner	1	2%	1	5%	11	18%	6	10%	4	8%	6	10%
Free occupancy without permission from owner	0	0%	0	0%	2	3%	2	3%	0	0%	0	0%
Others	2	4%	0	0%	2	3%	1	2%	1	2%	2	3%
No Answer	0	0%	0	0%	1	2%	2	3%	6	12%	0	0%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

272 In terms of the house structure or make, the household respondents (**Table 2-45**), in all 5 impact barangays, majority of the respondents mentioned that they have a fully-concrete house. Followed by those with semi-concrete houses. It can be noted that a small percentage of the houses in the impact barangays were still using nipa, cogon, bamboo or wood and even recycled materials.

Table 2-45: Type of Housing Structure/Make in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Full concrete	**30**	**65%**	**6**	**32%**	**36**	**60%**	**38**	**63%**	**26**	**52%**	**44**	**73%**
Semi-concrete	10	22%	5	26%	5	8%	16	27%	7	14%	8	13%
Nipa, cogon, bamboo, wood	5	11%	4	21%	10	17%	6	10%	11	22%	8	13%
Recycled materials	1	2%	0	0%	1	2%	0	0%	5	10%	0	0%
Others	0	0%	4	21%	1	2%	0	0%	0	0%	0	0%
No Answer	0	0%	0	0%	7	12%	0	0%	1	2%	0	0%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

2.4.1.1 Displacement/disturbance of properties

273 The project will not displace nor cause disturbance to nearby properties, as the project area is located in acquired private and titled lands by **Northern Cement Corporation**. Regulations on buffer zones/areas will be maintained and adhered to by the project. Further, the project is also located in an industrial zone designated by the Municipality of Sison.

2.4.1.2 Change/conflict in land ownership

274 **Northern Cement Corporation** owns the 18.3 Has., were the proposed project will be constructed. Hence, the project will not result to any change or conflict in land ownership.

2.4.1.3 Change/conflict on Right-of-Way

275 A private road network, owned by **Northern Cement Corporation**, was already constructed and currently being utilized, leading to and from the National Highway, by **Northern Cement Corporation**. The same access road will be used by **San Miguel Northern Cement, Inc.**. Hence, the project will not cause any change or conflict on right-of-way (ROW).

2.4.1.4 Impact to Public Access

276 In terms of impact to public access and as mentioned in **Section 2.4.1.3 Change/conflict on Right-of-Way**, the project will not utilize the existing barangay road networks near the project area and cement plant complex nor will it avoid or prevent the community from accessing and using public roads and facilities.

2.4.2 In-migration

277 A total of 1,800 manpower will be required during the project construction of Line A and Line B, respectively and 200 during operation. **San Miguel Northern Cement, Inc.** commits to prioritize employment of qualified workers from the host communities in the Municipalities of Sison and Pozorrubio in the Province of Pangasinan to mitigate the negative effects of in-migration.

278 If migrant workers are hired, **San Miguel Northern Cement, Inc.** will coordinate with the host LGU for the issuance of certificates containing pertinent information about the new employees. Furthermore, employees who are not from the host barangay or municipality will be housed within the cement plant complex to ensure their safety.

Place of Origin

279 In terms of place of origin of the respondents, in all 5 impact barangays, majority were originally from Sison. It can be noted that in Barangay Sugcong, Pozorrubio, (67%) of the respondents mentioned that they were originally from Sison.

Table 2-46: Place of Origin of Household Heads in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Sison, Pangasinan	**24**	**52%**	**11**	**58%**	**30**	**50%**	**41**	**68%**	**30**	**60%**	**40**	**67%**
Pozorrubio, Pangasinan	5	11%	1	5%	6	10%	1	2%	1	2%	0	0%
Other towns in Pangasinan	2	4%	1	5%	3	5%	2	3%	1	2%	0	0%
Metro Manila	1	2%	0	0%	5	8%	1	2%	0	0%	0	0%
Others	14	30%	6	32%	16	27%	15	25%	18	36%	20	33%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

Religious Affiliation

In terms of religious affiliation, all 5 impact barangays were pre-dominantly Roman Catholic. While there was a high percentage of respondents that were affiliated with Born Again Christians.

Table 2-47: Religious Affiliations of the Household Heads in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Roman Catholic	**18**	**39%**	**8**	**42%**	**50**	**83%**	**30**	**50%**	**34**	**68%**	**49**	**82%**
Iglesia ni Cristo	0	0%	1	5%	1	2%	6	10%	5	10%	4	7%
Born Again Christian	**19**	**41%**	2	11%	4	7%	3	5%	3	6%	4	7%
Islam	0	0%	1	5%	1	2%	0	0%	0	0%	0	0%
Others	9	20%	3	16%	1	2%	21	35%	8	16%	3	5%
No Answer	0	0%	4	21%	3	5%	0	0%	0	0%	0	0%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

2.4.2.1 Proliferation of informal settlers

280 Proliferation of informal settlers is not expected to result from the project as **San Miguel Northern Cement, Inc.** prioritizes employment of qualified workers living within the host communities in the Municipalities of Sison and Pozorrubio in the Province of Pangasinan.

281 To date, there were no known instances of informal settlers proliferating near the cement plant complex.

2.4.3 Cultural/Lifestyle Change (especially on Indigenous People, if any)

282 There are no known indigenous peoples residing near or within the project area. Hence, cultural and lifestyle changes that may affect the indigenous peoples are not expected to result from the proposed project.

283 In terms of lifestyle change, increased local income from the project may introduce and expose workers and the community to vices that tend to undermine the morality of the people. Hostelry areas, such as videoke bars, nightclubs, gambling places, and prostitution, among others may proliferate with demand. If not properly handled, addiction to such vices may contribute in social problems, such as destruction of family and values and increase in crime rate.

284 **San Miguel Northern Cement, Inc.** commits to work closely with the both the municipal and barangay LGUs and PNP to regulate and enforce law to avoid vice-related problems in the community. In addition, **San Miguel Northern Cement, Inc.** shall strictly implement a drug- and alcohol-free work environment. Commitment to install closed circuit televisions (CCTVs) in strategic places in the plant and the community will be prioritized.

2.4.4 Impacts on Physical Cultural Resources

285 There are no literature or national/international publications found in the project area that have archaeological, paleontological, historical, aesthetical, or cultural, both tangible and intangible, significance, or immovable objects, below ground or underwater, sites, structures, groups of structures, and natural features.

2.4.5 Threat to Delivery of Basic Services/Resource Competition

286 If skills are not available in the locality, **San Miguel Northern Cement, Inc.** or its contractors, may bring in skilled personnel from outside of the host municipality. Although their residency is temporary, transient workers will have needs that are similar to the permanent residents in the area. Hence, competition for food, shelter, power, water, and other local resources may be expected.

287 To mitigate this, **San Miguel Northern Cement, Inc.** will continue to provide priority employment/hiring to deserving and qualified residents living in the host and nearby communities. Various livelihood and skills training seminars and workshops were being conducted to capacitate and increase the number of skilled persons within the community where the cement plant complex is currently operating.

Power Supply

288 Based from the 2007 CLUP of the municipality, Sison is served by 2 power supply service providers namely: Benguet Electric Cooperative (BENECO) and La Union Electric Cooperative (LUELCO).

289 The municipality of Pozorrubio is served by a power supply service provider namely: Pangasinan III Electric Cooperative, Inc. (PANELCO III).

290 Based from the Province of Pangasinan official website, as of 2009, all of the municipalities and barangays are electrified, however, only (82%) of the households have service connections with the respective power supply providers. In the CLUP of Sison, it was mentioned that more than (90%) of the households have access to electricity.

Water Supply

291 In terms of access to drinking water supply sources (**Table 2-48**), almost all of the respondents in all 5 barangays answered that they source their drinking water from water refilling stations. Further, there are still households who were using hand/pumps and jetmatic wells for their

drinking water supply. A small percentage of the respondents answered that they source their drinking water supply from metered connections (Level III).

Table 2-48: Drinking Water Supply Sources of Surveyed Households in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Metered connection	2	4%	0	0%	8	13%	9	15%	0	0%	13	22%
Handpump/well	5	11%	0	0%	15	25%	16	27%	0	0%	16	27%
Surface water (river, lake, rain-water)	1	2%	7	37%	1	2%	12	20%	6	12%	0	0%
Water refilling station	**36**	**78%**	**9**	**47%**	**33**	**55%**	**19**	**32%**	**43**	**86%**	**37**	**62%**
Others	2	4%	2	11%	2	3%	3	5%	1	2%	0	0%
No Answer	0	0%	1	5%	1	2%	1	2%	0	0%	0	0%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

Sanitation

292 With regards to access to sanitary toilet facilities (**Table 2-49**), almost all the households in the 5 barangays have access to water-sealed and pour-flush toilet. It can be noted that in Sitio Saguitlang in Barangay Labayug, none of the households surveyed have access to sanitary toilet facilities are using communal toilets for their sanitary needs.

Table 2-49: Sanitary Toilet Facility of Households in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
None	3	7%	**19**	**100%**	20	33%	21	35%	1	2%	3	5%
Private Toilet	**43**	**93%**	0	0%	**37**	**62%**	**36**	**60%**	**41**	**82%**	**54**	**90%**
Communal	0	0%	0	0%	3	5%	3	5%	8	16%	3	5%
Type of toilet												
Water-sealed	**41**	**95%**	0	0%	**32**	**80%**	5	13%	**38**	**78%**	3	5%
Pour-flush	2	5%	0	0%	8	20%	**34**	**87%**	11	22%	**54**	**95%**

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

Existing Roads Networks

293 According to the CLUP of Sison and as presented in **Table 2-50**, the municipality is traversed by 118.76 kilometers of overall road network. In which, 5.0 kilometers are national road; 11.20 kilometers are provincial roads, 8.44 kilometers are municipal roads, and 94.11 kilometers are barangay roads.

Table 2-50: Existing Road Network in Sison

TYPE	CONCRETE	ASPHALT	GRAVEL	EARTH	TOTAL (KM.)
National	5.00	-	-	-	**5.00**
Provincial	4.50	6.700	-	-	**11.20**
Municipal	8.44	-	-	-	**8.44**
Barangay	39.80	3.062	51.26	-	**94.11**
TOTAL	**59.07**	**7.062**	**52.63**	**-**	**118.75**

Source: Comprehensive Land Use Plan of Sison

Literacy Rate and Educational Facilities

294 The literacy rate, based on the CLUP, in the municipality of Sison was estimated at (95.62%) in 2015.

295 The number of both private and public academic institutions spread throughout Sison are: 30 pre-school centers, 28 day-care centers, 29 primary/elementary schools, 11 secondary/high school and 1 tertiary institution. The detailed breakdown of the academic institutions is presented in **Table 2-51**.

Table 2-51: Academic Institutions in Sison

ACADEMIC INSTITUTIONS	PRIVATE	PUBLIC	TOTAL
Pre-School	2	28	**30**
Day Care Center	0	28	**28**
Elementary	2	27	**29**
Secondary	2	9	**11**
Tertiary	1	0	**1**
TOTAL	**7**	**92**	**99**

Source: Comprehensive Land Use Plan of Sison

296 In Pozorrubio, the literacy rate in 2015 was at (95.66%). The proportion of household population who were able to read and write a simple message was registered at (95.45%). It can be noted that the female literacy rate of (95. 67%) was slightly higher that among male of (95.65%).

297 In terms of educational attainment (**Table 2-52**), in 4 out of 5 impact barangays, most of the respondents were able to reach or finish high school education. It can be noted that in Barangay Labayug, majority of the respondents were able to reach or graduate college.

Table 2-52: Educational Profile of the Household Heads in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Elementary	5	11%	4	21%	5	8%	11	18%	13	26%	19	32%
High School	14	30%	4	21%	**31**	**52%**	**32**	**53%**	**33**	**66%**	**30**	**50%**
College	**15**	**33%**	2	11%	17	28%	8	13%	3	6%	5	8%
Vocational	11	24%	2	11%	5	8%	8	13%	0	0%	5	8%
Others	0	0%	**6**	**32%**	0	0%	1	2%	1	2%	1	2%
No Answer	1	2%	1	5%	2	3%	0	0%	0	0%	0	0%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

2.4.6 Threat to Public Health and Safety

298 Given the nature of the project, dust may cause negative health effects, especially in the respiratory system, to the community members and workers if not properly mitigated. **San Miguel Northern Cement, Inc.** will conduct medical missions and provide regular check-ups to its workers and the host communities. In addition, there will be constant coordination with the Municipal Health Officers (MHOs) and barangay health units (BHUs) to address health-related needs of the community.

299 Crime incidence may also increase in the local community. With available money at hand, proliferation of vices that tends to undermine the morality of the people in the barangay is

potentially expected. Videoke bars, clubs, gambling places, prostitution, and others can rise in due time when workers in the project site could be attracted to such offering and indulge in activities that may destroy family values.

300 Furthermore, drinking may result to the commission of crimes if not properly handled. It is anticipated therefore that social problems may arise as an aftermath of a fluid local economy. **San Miguel Northern Cement, Inc.** will coordinate with the barangay officials to ensure peace and order among the workers and the community members. In addition to this, there will be minimal interaction among the workers and the community members, as most of the times, the workers are in the plant premises.

Health Facilities

301 The Municipality of Sison currently has 1 Rural Health Unit (RHI) located near the Municipal Hall and 28 Barangay Health Stations to cater to the health needs of the people. In terms of the number of medical professionals complimenting the available health facilities in the area, the municipality has a Municipal Health Officer (MHO), dentist, nurses, population officer, sanitary inspector, medical technologist and 10 midwives.

Morbidity

302 **Table 2-53** presents the leading causes of morbidity in the Municipality of Sison from 2014 to 2018. In 2014 to 2017, hypertension leads the cause of morbidity in the municipality. Further, in 2018, it was second only to urinary tract infection (URTI) by 241 cases. Majority of the morbidity cases are related to respiratory diseases, with some lifestyle diseases. Based from the CLUP, it was noted that the respiratory diseases experienced in Sison was attributed to the changing weather condition and poor health status of the people.

Table 2-53: Leading Causes of Morbidity in Sison (2014-2018)

2014			2015			2016			2017			2018		
CAUSE	**NO.**	**RATE**	**CAUSE**	**NO.**	**RATE**	**CAUSE**	**NO.**	**RATE**	**CAUSE**	**NO.**	**RATE**	**CAUSE**	**NO.**	**RATE**
Hypertension	542	11.98	**Hypertension**	720	15.81	**Hypertension**	825	17.99	**Hypertension**	1,343	26.49	**Upper Respiratory Tract Infection**	778	15.12
Pneumonia	521	11.51	**Pneumonia**	635	13.94	**Pneumonia**	807	17.6	**Pneumonia**	699	13.79	**Hypertension**	537	10.43
Acute Respiratory Infection	226	4.99	**Acute Respiratory Infection**	337	7.4	**Acute Respiratory Infection**	755	16.47	**Acute Respiratory Infection**	311	6.13	**Pneumonia**	296	5.75
Influenza	213	4.7	**Influenza**	287	6.3	**Influenza**	366	7.98	**Influenza**	306	6.03	**Bronchitis**	183	3.55
Iron Deficiency Anemia	127	2.8	**Diarrhea**	140	3.07	**Diabetes Mellitus**	234	5.1	**Bronchitis**	196	3.86	**Influenza**	96	1.86
Acute Gastroenteritis	117	2.58	**Tuberculosis**	107	2.34	**Bronchitis**	196	4.27	**Iron Deficiency Anemia**	139	2.74	**Acute Gastro Enteritis**	89	1.73
Tuberculosis	91	2.14	**Iron Deficiency Anemia**	104	2.28	**Tuberculosis**	149	3.18	**Tuberculosis**	102	2.01	**Urinary Tract Infection**	66	1.28
Bronchitis	55	1.21	**Animal Bite**	34	0.74	**Iron Deficiency Anemia**	144	3.14	**Diarrhea**	95	1.08	**Rhinitis**	49	0.95
Animal Bite	41	0.9	**Diabetes Mellitus**	17	0.37	**Diarrhea**	73	1.59	**Diabetes Mellitus**	40	0.78	**ATP**	45	0.87
Chicken Pox	31	0.68	**Asthma**	9	0.15	**Animal Bite**	32	0.69	**Animal Bite**	19	0.37	**Bronchial Asthma**	34	0.66

Source: Comprehensive Land Use Plan of Sison
Municipal Health Office of Sison

303 In line with the municipal health data of Sison, the health reports (**SEE: Table 2-54**), from period 2014 to 2018, from the Barangay Local Government Units (BLGUs) of Labayug reported similar causes of morbidities reflected on the municipal health data. Common illnesses such as fever, cough, colds, diarrhea and influenza are observed in the barangay. Further, there were also reported cases of pulmonary tuberculosis, hypertension, animal bites and chickenpox in the barangay.

Table 2-54: Leading Causes of Morbidity in NCC Impact Barangays (2014-2018)

2014		2015		2016		2017		2018	
BRGY. LABAYUG									
CAUSE	**NO.**	**CAUSE**	**NO.**	**CAUSE**	**NO.**	**CAUSE**	**NO.**	**CAUSE**	**NO.**
Fever	**490**	**Fever**	**505**	**Cough**	**579**	**Cough**	**416**	**Cough**	**576**
Cough	**315**	**Cough**	**487**	**Fever**	**311**	**Fever**	**398**	**Fever**	**439**
Colds	**35**	**Colds**	**23**	**Colds**	**105**	**Colds**	**92**	**Colds**	**85**
				Diarrhea	**42**	**Diarrhea**	**83**	**Diarrhea**	**41**
				Pulmonary Tuberculosis	**8**			**Pulmonary Tuberculosis**	**4**

Source: Barangay Local Government Unit of Labayug,

Mortality

304 **Table 2-55** presents the leading causes of mortality in the Municipality of Sison from 2014 to 2018. In 2014 to 2017, senility or old age was the leading cause of mortality in the municipality. However, in 2018, It was taken over by Cerebrovascular Accident with 11 cases. As with the morbidity cases, most of the deaths were related to respiratory and lifestyle diseases.

Table 2-55: Leading Causes of Mortality in Sison (2014-2018)

2014					2015					2016				
CAUSES	**MALE**	**FEMALE**	**TOTAL**	**RATE (%)**	**CAUSES**	**MALE**	**FEMALE**	**TOTAL**	**RATE (%)**	**CAUSES**	**MALE**	**FEMALE**	**TOTAL**	**RATE (%)**
Senility	26	41	**67**	1.48	**Senility**	20	38	**58**	1.27	**Senility**	14	25	**39**	0.85
Cerebrovascular Accident	22	15	**37**	0.81	**Cancer**	18	11	**29**	0.63	**Cancer**	10	19	**29**	0.63
Cancer	17	13	**30**	0.66	**Cerebrovascular Accident**	13	13	**26**	0.57	**Pneumonia**	13	10	**23**	0.5
Pneumonia	13	3	**16**	0.35	**Pneumonia**	9	13	**22**	0.59	**Accident**	5	8	**13**	0.28
Myocardial Infraction	8	4	**12**	0.26	**Myocardial Infraction**	8	8	**16**	0.35	**Cerebrovascular Accident**	8	4	**12**	0.26
Hypertension	5	7	**12**	0.26	**Cardiovascular Accident**	11	3	**14**	0.3	**Hypertension**	3	6	**9**	0.19
Pulmonary Tuberculosis	4	5	**9**	0.19	**Pulmonary Tuberculosis**	6	4	**10**	0.21	**Myocardial Infraction**	3	5	**8**	0.17
Asthma	4	4	**8**	0.17	**Asthma**	5	4	**9**	0.19	**Diabetes Mellitus**	3	5	**8**	0.17
Chronic Obstructive Pulmonary Disease	7	0	**7**	0.15	**Diabetes Mellitus**	2	5	**7**	0.15	**Pulmonary Tuberculosis**	4	2	**6**	0.13
Renal Disease	4	5	**9**	0.13	**Septicemia**	3	3	**6**	0.13	**Anemia**	2	2	**4**	0.08

2017					2018				
CAUSES	**MALE**	**FEMALE**	**TOTAL**	**RATE (%)**	**CAUSES**	**MALE**	**FEMALE**	**TOTAL**	**RATE (%)**
Senility	29	37	**66**	1.3	**Cerebrovascular Accident**	5	6	**11**	0.21
Pneumonia	17	12	**29**	0.57	**Cancer**	6	0	**6**	0.11
Cerebrovascular Accident	18	10	**28**	0.55	**Acute Debilitating Disease**	3	2	**5**	0.09
Myocardial Infraction	19	5	**24**	0.47	**Accident**	4	0	**4**	0.7
Cancer	12	10	**22**	0.43	**Pneumonia**	1	2	**3**	0.5

2017					2018				
CAUSES	MALE	FEMALE	TOTAL	RATE (%)	CAUSES	MALE	FEMALE	TOTAL	RATE (%)
Cardiovascular Disease	9	5	**14**	0.27	**Bronchial Asthma**	1	2	**3**	0.5
Chronic Obstructive Pulmonary Disease	7	1	**8**	0.15	**Myocardial Infraction**	2	0	**2**	0.03
Accident	6	1	**7**	0.13	**Diabetes Mellitus**	0	2	**2**	0.03
Severe Malnutrition	2	4	**6**	0.11	**Pulmonary Tuberculosis**	1	1	**2**	0.03
Pulmonary Tuberculosis	4	1	**5**	0.09	**Severe Malnutrition**	0	1	**1**	0.02

Source: Comprehensive Land Use Plan of Sison
Municipal Health Office of Sison

305

306

307 **Table** 2-56 presents the common diseases that affect the households in the project impacts area. Based on the respondents, almost all of the respondents from the 5 impact barangays were able to experience having cough or flu, and in Brgy. Labayug, 45 or (98%) have experienced it. This was followed by fever or headache, with all 5 impact barangays having experienced it.

308 Further, a good percentage of the respondents mentioned that they or their family members had diarrhea.

309 It can be noted that respiratory illnesses or diseases were relatively low in all 5 impact barangays.

Table 2-56: Common Diseases that Affect the Households in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	**No.**	**% total**	**No.**	**% total**	**No.**	**% total**	**No.**	**% total**	**No.**	**% total**	**No.**	**% total**
Fever, headache	31	67%	10	53%	32	53%	39	65%	27	54%	28	47%
Cough, flu	**45**	**98%**	**15**	**79%**	**37**	**62%**	**46**	**77%**	**44**	**88%**	**38**	**63%**
Diarrhea	20	43%	2	11%	5	8%	21	35%	21	42%	11	18%
Dengue, malaria	1	2%	1	5%	1	2%	3	5%	2	4%	1	2%
Respiratory diseases	1	2%	1	5%	0	0%	0	0%	4	8%	3	5%
Heart diseases	1	2%	0	0%	1	2%	4	7%	2	4%	4	7%
Others	1	2%	1	5%	0	0%	5	8%	1	2%	11	18%
No Answer	0	0%	1	5%	3	5%	4	7%	1	2%	5	8%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

2.4.7 Generation of Local Benefits from the Project

310 In terms of generation of local benefits, the proposed project will generate positive impacts. The project will not adversely affect the employment, livelihood, and income of the residents; on the contrary, it may even provide income opportunities.

311 The positive impacts of the project are the following:

- generation of additional source of income and livelihood;
- additional revenue for the local government;
- increased basic social services; and
- addition and improvement of local residential dwellings.

312 These benefits were further enhanced through the implementation of various social development programs responsive to local needs in the impact area.

Livelihood

313 Based on the Comprehensive Land Use Plan of Sison, the primary drivers of the economy in the municipality are agriculture and quarrying/mining.

314 For the Municipality of Pozorrubio, the municipality is primarily engaged in agricultural activities.

Income Sources

315 In terms of income sources of the households (**Table 2-57),** in 3 out of 5 impact barangays, majority are from farming. In Barangay Paldit, most of the respondents were earning their living by being a private employee (30%). A good percentage of the respondents were engaged in the transportation and labor services.

Table 2-57: Income Sources of Households in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
Barangay Official	2	4%	0	0%	4	7%	7	12%	3	6%	4	7%
Government Employee	2	4%	1	5%	2	3%	1	2%	1	2%	1	2%
Private Employee	7	15%	0	0%	**18**	**30%**	2	3%	0	0%	4	7%
Laborer/Contractor	2	4%	0	0%	15	25%	8	13%	13	26%	6	10%
Tricycle/Jeepney Driver	5	11%	2	11%	6	10%	10	17%	3	6%	3	5%
Farmer	10	22%	**14**	**74%**	4	7%	**20**	**33%**	**22**	**44%**	15	25%
Fisherfolk	0	0%	0	0%	0	0%	1	2%	0	0%	0	0%
Own Business	2	4%	0	0%	0	0%	5	8%	0	0%	2	3%
None	1	2%	0	0%	3	5%	1	2%	3	6%	1	2%
Others	**11**	**24%**	1	5%	5	8%	5	8%	4	8%	**23**	**38%**
No Answer	4	9%	1	5%	3	5%	0	0%	1	2%	1	2%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

Average Monthly Income

316 In terms of income profile of the households (**Table 2-58**), in all impact barangays, majority of the respondents mentioned that they were just earning, on the average, between Php 0.00 to 5,000.00 a month. There were below (20%) of the respondents in all impact barangays who mentioned that they were earning between Php 5,001.00 to 15,000.00 a month.

317 Based on the PSA average family income in 2015, the estimated average family income for the Filipino families is Php 22,000.00 or Php 267,000.00 per year. Given the responses, most of the families in the impact barangays were earning way below the national average family income. It can be noted that in the average family expenditure was pegged at Php 215,000.00 pesos per year.

Table 2-58: Income Profile of Households in the Project Impact Area

Municipality	Sison		Sison		Sison		Sison		Sison		Pozorrubio	
Barangay	Labayug		Labayug S. Saguitlang		Paldit		Inmalog		Calunetan		Sugcong	
Respondents	46		19		60		60		50		60	
Category	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total	No.	% total
0-5,000 PHP	**23**	**50%**	**13**	**68%**	**26**	**43%**	**35**	**58%**	**44**	**88%**	**39**	**65%**
5,001-10,000 PHP	6	13%	1	5%	10	17%	12	20%	3	6%	10	17%
10,001-15,000 PHP	8	17%	2	11%	7	12%	7	12%	0	0%	2	3%
15,001-20,000 PHP	0	0%	1	5%	5	8%	0	0%	1	2%	0	0%
More than 20,000 PHP	3	7%	1	5%	5	8%	0	0%	0	0%	1	2%
No Answer	6	13%	1	5%	7	12%	6	10%	2	4%	8	13%

Note: Based on the Socio-Economic and Perception Survey conducted on July 2019

2.4.8 Traffic Congestion

318 Public transportation options in the area include buses, jeepneys and tricycles that travel to neighboring barangays and neighboring cities/municipalities. Residents also have private vehicles ranging from cars, vans, tricycles and motorcycles.

319 An estimated additional 200 to 300% trucks per day will come in and out of the plant site, on top of the existing plant operations. However, traffic congestion will not be a concern given that the access road to and from the plant site is private. Furthermore, **San Miguel Northern Cement, Inc.** will allocate additional parking area to complement the existing truck marshalling area within existing cement plant complex.

320 Traffic may also increase in the National Road (Maharlika Highway) due to delivery trucks coming in and out of the cement complex. Traffic congestion shall be mitigated with the support of the surrounding Local Government Units (LGUs) in terms of scheduling and handling the flow of traffic near the project area.

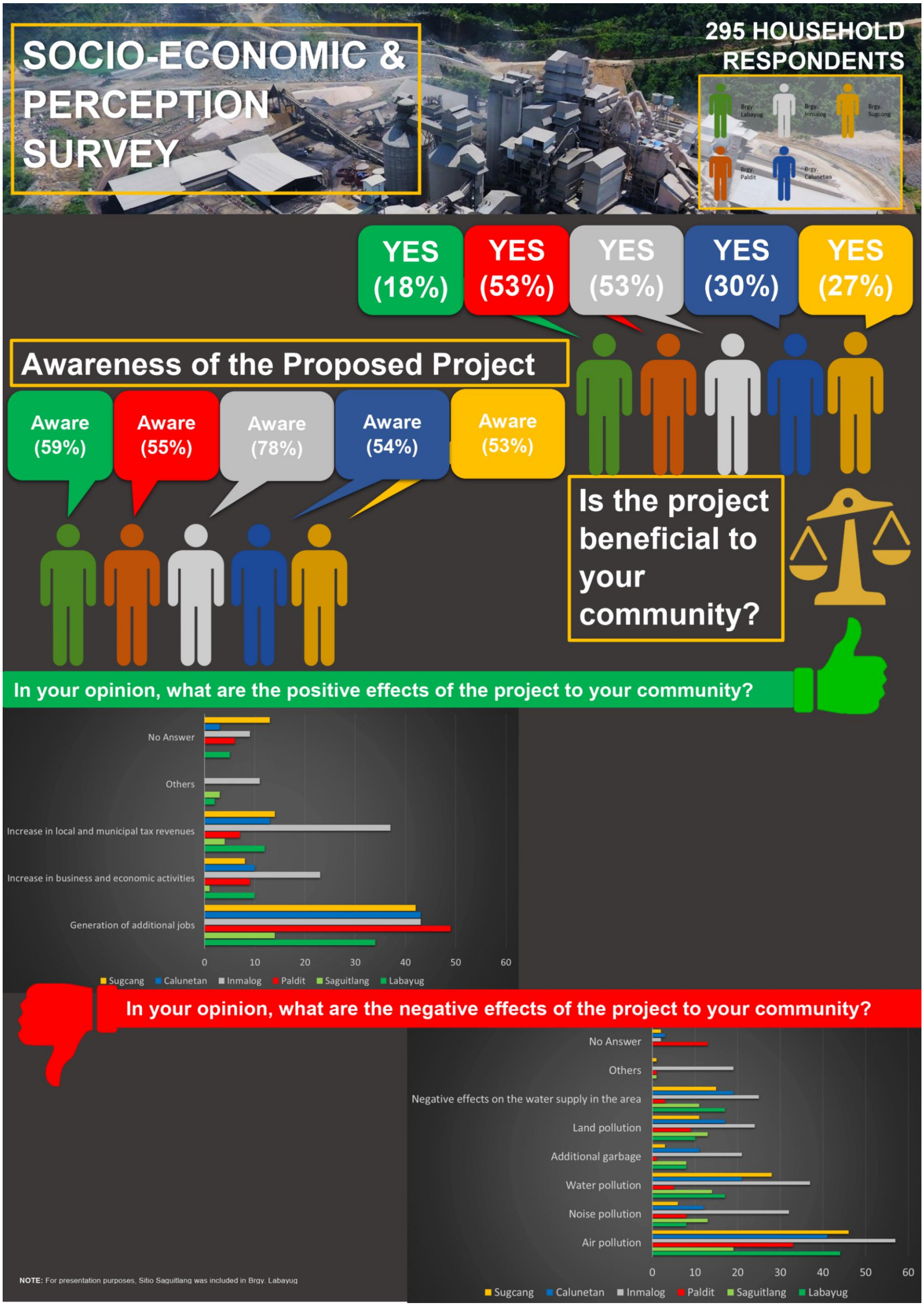
321 To mitigate the said impact, **San Miguel Northern Cement, Inc.** shall develop a traffic management plan with the LGU of Sison. The following measures were included in the plan:

- Coordination with LGU of Sison and surrounding LGUs;
- Lane designation and speed limit;
- Regulation of truck deployment;
- Provision of safety barriers, warning signs and lights, traffic marshals within the vicinity of project sites, and adequate parking spaces;
- All deliveries of construction materials and heavy equipment, either inbound or outbound of the facility may be done during off-peak hours and at designated delivery hubs located near the Project area to prevent blockage of traffic flow along public roads; and
- Assistance of security personnel in directing traffic of vehicles coming in and out of the facility.

2.4.9 Social Acceptability and Perception

322 **Figure 2-41** summarizes the social acceptability and perception of the 295 respondents from Barangays Labayug, Paldit, inmalog, Calunetan and Sugcong regarding the proposed cement plant project.

Figure 2-41: Summary of the Respondents' Perception



PROJECT PROPONENT:	FIGURE TITLE: **SUMMARY OF THE RESPONDENT'S PERCEPTION**	FIGURE NO.: **2-41**
EPRMP REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI Envi Corporation Perception Survey

2.4.10 Summary of Baseline Findings, Impacts and Mitigation on People

323 The following table lists the impacts and mitigation on People.

Table 2-59: Summary of Significant Baseline Findings and Potential Impacts and Mitigation on People

Summary of Baseline Findings on People:

- Water supply sources in Sison and Pozorrubio include piped connection, deep wells, shallow wells and spring sources.
- Sison is served by 2 power supply service providers namely: Benguet Electric Cooperative (BENECO) and La Union Electric Cooperative (LUELCO).
- The municipality of Pozorrubio is served by a power supply service provider namely: Pangasinan III Electric Cooperative, Inc. (PANELCO III).
- The consistent leading cause of morbidity in Sison (2014-2018) was Hypertension and Upper Respiratory Tract Infection.
- Based on the perception survey, (~60%) of all the respondents have prior knowledge about the proposed project. (36.2%) of the respondents believed that the proposed project would be beneficial for their respective communities.
- The most cited potential positive impact of the project for the impact Barangays is employment generation (76%), followed by increased local tax revenue collection (28%).
- Conversely, the most cited potential negative impact of the project is air pollution (84%), followed by water (45%) and land (33%) pollution.

POTENTIAL IMPACTS	PROJECT PHASES	DESCRIPTION	MITIGATING MEASURE
In-migration	N/A	The project only requires 5,438 manpower for construction and 611 manpower in operation	Prioritization of hiring qualified local workers
Cultural/Lifestyle Change	Operation	No known IPs residing near or within the project area, hence no perceived cultural and lifestyle changes (for IPs) expected to result from the project Increase in income can introduce and expose workers and community to vices that tend to undermine morality	Coordination with barangay LGUs and PNP to enforce law to avoid vice-related problems in the community Strict implementation of a drug and alcohol-free work environment Installation of CCTVs in strategic places
Threat to Delivery of Basic Services/ Resource Competition	Construction Operation	The project will have minimal effect in terms of resource competition with nearby households. Project's water requirement is for maintenance and domestic use. There will be a construction of a new deep well for the project. The project will be served by national grid to power the offices and utilities to be constructed within the project area	N/A
Threat to Public Health and Safety	Construction Operation	Dust may cause negative health effects (i.e., respiratory) to the community and workers if not properly mitigated	Conduct of medical missions and regular check-ups to workers and host barangay

POTENTIAL IMPACTS	PROJECT PHASES	DESCRIPTION	MITIGATING MEASURE
		Crime incidence may also increase in the local community	Coordination with Municipal Health Officer (MHO) and barangay health units to address health-related needs of the community Coordination with barangay officials to ensure peace and order among workers and community members
Generation of Local Benefits from the Project	Operation	Generation of additional source of income and livelihood Additional revenue for the local government Increased basic social services Addition and improvement of local residential dwellings	Implementation of social development programs that are responsive to local needs in the impact area
Traffic Congestion	Construction Operation	Increase in traffic generation in the area due to delivery trucks coming in and out of the cement plant complex	Coordination with LGU on scheduling and handling the flow of traffic near the project area

ENVIRONMENTAL MANAGEMENT PLAN

3.1 Impacts during Construction Phase

3.1.1 Physical Environment

3.1.1.1 Land

324 The major impacts during construction phase are solid waste production and possible soil contamination.

Generation of Solid Wastes

325 Construction wastes such as fill materials, empty cement bags, wood, steel and other construction spoils are expected to be generated during the construction phase of the expansion project. Aside from this, the construction workers will be generating domestic solid wastes. A solid waste management plan will be developed and implemented by the contractors with the supervision of SMNCI.

326 A temporary storage area for the solid wastes will be provided on site. All the solid wastes prior to hauling out will be segregated properly. Hauling-out of the solid wastes for disposal will be done by accredited service providers. Details that shall be considered in the development of the waste management plan are discussed in Section 3.5.

Generation of Hazardous Wastes

327 Hazardous wastes such as used oil, grease, aerosols, paint containers and used bulbs will also be potentially generated during the construction. Hazardous wastes must be managed and disposed in accordance to RA 6969. A temporary hazardous waste storage area will also be provided in the site. All hazardous wastes will be properly sealed to ensure that there will be no leakage in the environment. Only DENR-accredited waste service providers must collect the hazardous wastes in the project site.

Soil Contamination

328 Since heavy equipment will be used during construction, there is a risk of soil contamination due to possible oil spills during maintenance activities of the heavy equipment. It is advisable to use sawdust, rice hulls, or coir dusts to absorb accidental oil spills.

3.1.1.2 Water

Groundwater and Surface Water Contamination

329 Domestic wastewater will be generated by the construction workers. Wastewater, if untreated prior to disposal, can cause water pollution and may pose health hazards to the nearby communities. Temporary sanitation facilities (e.g., toilet, bathing facilities) to be provided by the Contractor at the construction site shall be regularly maintained by assigned construction workers or hired service crew.

3.1.1.3 Air and Noise

Gaseous Emissions

330 Gaseous emissions from heavy equipment and generators used in the construction site will produce short-term impacts on the ambient air quality. An increased concentration of carbon

monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2) may be realized in the ambient air. This impact may not be a primary concern, since the construction phase will only take several months until project completion. Nevertheless, heavy equipment must be kept in prime condition at standard air and fuel ratio in order to limit gaseous emissions, particularly total suspended particulates (TSP). Diesel fuel products emit TSP, SO_2 and nitrogen oxides (NO_x) due to the hydrocarbon and sulfur content. If possible, all heavy equipment shall be fitted with exhaust mufflers.

Noise Generation

331 Noise may also be generated by construction operations and equipment. Although construction works are expected to occur regularly, the impacts may be considered temporary.

Table 3-1: Expected Noise Levels from Heavy Equipment, db(A)

EQUIPMENT	DISTANCE (M)				
	15	**30**	**60**	**120**	**240**
Front Loader	75	69	63	57	51
Backhoes	85	79	73	67	61
Graders	88	82	76	70	64
Trucks	91	85	79	73	67
Concrete Mixers	82	79	73	67	61
Cranes	83	77	71	65	59
Generators	78	72	66	60	54
Compressors	81	75	69	63	57
Pumps	76	70	64	58	52
Pile Drivers	101	95	89	83	77
Jackhammers	88	82	76	70	64

Source: Larry W. Canter, Environmental Impact Assessment, New York, 1977

Table 3-2: DENR Standards for Noise Levels in General Areas, db(A)

TIME	CATEGORY AREA				
	AA	A	B	C	D
Day Time (9am-6pm)	50	55	65	70	75
Morning/Evening (5am-9am) & (6pm-10pm)	45	50	60	65	70
Night Time (10pm-5am)	40	45	55	60	65
Note: Area AA:	Section or contiguous area which requires quietness, such as an area within 100 meters from school sites, nursery school, hospitals, and special homes for the aged.				
Area A:	Section or contiguous area which is primarily used for residential purposes.				
Area B:	Section or contiguous area which is primarily a commercial area.				
Area C:	Section primarily reserved as a light industrial area.				
Area D:	Section which is primarily reserved as a heavy industrial area.				
Source: UP NCTS Environmental Text Series					

3.1.2 Biological Environment

332 The construction of the SMNCI Line A and Line B cement plant will not involve removal of vegetation since the expansion will be situated in a developed area already. However, anthropogenic movements, noise, and vibrations may drive wildlife away from the ecosystem, may cause temporary or permanent migration of the faunal species in other or nearby areas/habitat where disturbance is less.

3.1.3 Socio-Economy

Accessibility and Circulation Concerns

333 Traffic is not an issue in the project area at present. However, heavy equipment mobilization may affect travel time and road condition. Early notice to the public of upcoming activities is an obligation of the Contractor. Installation of early warning device installations is a part of this mitigating measure. In the instance where roads are starting to deteriorate, the Contractor should immediately provide fillings to the potholes created by hauling trucks and other heavy equipment. Excavated materials shall be placed in a suitable location that will not cause severe disruption to road traffic.

Local Economy

334 The project is expected to have a positive impact on the local economy of the host community with an increase in business opportunities, such as food retail, housing rental, and other services to the construction workers. This is in addition to the employment opportunities that will be available to the local workforce.

Population

335 A temporary increase in population may occur during the construction phase as workers are brought into the area. Local labor will be sourced to meet the work force required by the construction. However, there may be cases where transient settlers may opt to stay in Barangay Labayug permanently (e.g. marriage, work opportunities, and etc.), thus increase in population may be realized. Consequently, there may be need for improved basic social services in the area.

Peace and Order

336 Presence of outsiders (i.e., migrant workers) can bring about difference in views and perspectives and new influence changing attitudes and bias. Peace and order may be upheld through strict law enforcement, regular patrolling, and apprehension of erring individuals.

3.1.4 Health and Safety

337 Construction may pose danger to vehicles, equipment, and even people. Accidents can be prevented through the installation of enclosures, early warning devices, and other protective means within and around the working area. The Contractor will be required to submit an Occupational Safety and Health Plan (OSHP), based on the Department of Labor and Employment (DOLE) DO No. 13 Series of 1998, that covers the safety of the workers and the community.

338 Potential health and safety risks may also arise from dust, pollutants, noise and vibration to be generated from construction activities. Workers, particularly those operating heavy equipment, must be provided with personal protective equipment (PPE), such as earmuffs.

3.2 Impacts during Operational Phase

3.2.1 Physical Environment

3.2.1.1 Land

Generation of Solid Wastes

339 The operation of the cement plant will be generating domestic solid wastes from the workers. All solid wastes must be properly segregated and disposed to minimize its impact to the environment.

Generation of Hazardous Wastes

340 Possible hazardous wastes that may be generated by the project are used bulbs, oil and grease, empty chemical containers and others. These wastes should be disposed in accordance to RA 6969. The Proponent will also secure a Hazardous Waste Generator ID to DENR to facilitate the transfer and disposal of hazardous wastes generated. Water

3.2.1.2 Water

Oil Spill

341 Oil spills from vehicle and equipment repair and maintenance may impact the ambient quality of the nearby surface water and groundwater during the operational phase. As a preventive measure, repair and maintenance will be done in a designated area with concrete flooring and canals constructed to channel any oil spills. Oil and water separator tanks will also be installed in these areas.

Domestic Wastewater Generation

342 Workers of the cement plant are also generating domestic wastewater. Untreated domestic wastewater when discharged may cause water pollution affecting the ecosystem of the nearby river. On-site sanitation facilities with septic tanks will be provided in the project site. The effluent of the septic tanks will be discharged to the siltation ponds.

Ground subsidence

343 The quantity of water supply may also be affected with the proposed project. Deep wells will be constructed to supply the water requirements of the project. Since the water supply will include deep wells, ground subsidence may occur from excessive pumping, especially during dry seasons where lowering of groundwater table is normally experienced.

3.2.1.3 Air and Noise

Dust Generation

344 Dusts may be generated during the operation of the cement plant especially in the bagging section and the transport of raw materials to the cement plant by the trucks. Too much exposure to dusts presents serious risks to human health. Dusts may cause irritation of the eyes, coughing and sneezing. Particulate matters when inhaled can also cause respiratory and cardiovascular diseases.

345 To minimize the dust emissions, covers are provided to the delivery trucks and regular sprinkling of the dirt roads is being done. SMNCI will utilize high-efficient equipment with baghouse filters and to minimize and contain the fugitive dusts that will be generated in its operation.

Gaseous emissions

346 Combustion of diesel fuel from the operation of the cement plant equipment may emit pollutants such as CO, SO_2 and NO_x. All heavy equipment must be properly and regularly maintained to minimize their potential pollution emissions.

Noise and vibration

347 The operation of the heavy equipment and the machines may generate noise and vibration. Continuous exposure to high noise intensity can cause hearing impairment which is irreversible. To reduce the occurrence and intensity of the noise and vibration, suppressers or mufflers will be installed.

3.2.2 Socio-Economy

Local Economy

348 The proposed project may provide employment opportunities to qualified local residents which may become their source of income. The proposed project may also create various opportunities for retailing, services, buy and sell, and others. The basic needs of the community continue to grow, and these needs must be met. This is where the law of supply and demand comes in. Enterprising residents of the surrounding barangays can therefore look at the needs of the new occupants of the project and their dependents so that they can prepare what appropriate investment response will they adopt to earn some income.

349 The proposed project will also provide additional revenues for the local government in terms of taxes and dues. Laws and ordinances on tax collection and land registration must be properly implemented.

Population

350 Transient settlers may opt to stay permanently thus increase in population may be realized. Continuous improvement of infrastructures and support services for local constituents and in coming visitors is advised.

Peace and Order

351 Partiality between local residents and newcomers or migrant workers may occur. Peace and order may be upheld through strict law enforcement, regular patrolling, and apprehension of erring individuals

3.3 Unavoidable and Residual Impacts

352 Implementation of the proposed mitigating measures discussed in previous sections is expected to leave residuals, which should not adversely affect the people and the vicinity. Noise and vibration generated by the machines and equipment are attendant consequences. However, these can be reduced to tolerable levels by the use of suppressers or mufflers and other measures identified in the preceding pages. Noise and vibration residuals should be as low as possible so as not to cause nuisance to workers and the public.

353 Stacks of the cement plant also emit air pollutants. However, with proper design of the stack and the installation of air emission control devices, the impacts will be reduced.

3.4 Summary Matrix of Environmental Impact and Level of Significance

354 The summary of identified environmental impacts and its corresponding mitigating measures is presented in **Table 3-3.** This matrix summary also includes the responsible parties, estimated costs, and guarantees involved.

Table 3-3: Summary Matrix of Environmental Impacts and Mitigating Measures

ENVT'L ASPECT	ENVT'L COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	SCHEDULE OF IMPLEMENTATION	ESTIMATED COST	RESPONSIBLE ENTITY	GUARANTEES
CONSTRUCTION PHASE							
Construction and installation, including site facilities	The Land	Accumulation of construction debris and other solid waste	• Implementation of the solid waste management program by the contractor • Regular transport of construction debris and other solid waste in the approved designated area by the DENR.	During construction	Covered by contract amount of Contractor PHP 40,000	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The Land	Generation of hazardous wastes	• Collect, store and dispose hazardous wastes in accordance to RA 6969 • Treatment and dispose of hazardous wastes through DENR-accredited waste treaters	During construction	Covered by contract amount of Contractor PHP 40,000	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The Water	Possible siltation and surface runoff Possible clogging of drainage due to siltation	• Establishment of sediment traps, erosion barriers, and silt curtains • Regular removal of silt and sediments	During construction	PHP 50,000	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The Air	Generation of dust	• Regular watering of construction site • Apply canvas cover on construction materials to avoid long exposure to strong winds	During construction	PHP 30,000	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The People	Health hazards from dust emissions	• Implement dust control management • Proper PPEs to workers	During construction	Covered by contract amount of Contractor	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report

ENVT'L ASPECT	ENVT'L COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	SCHEDULE OF IMPLEMENTATION	ESTIMATED COST	RESPONSIBLE ENTITY	GUARANTEES
Use of heavy equipment, during construction works	The Land	Ground vibration	• Apply non-vibration techniques during construction, if possible • Notify nearby residents about use of heavy equipment • For hauling trucks, comply with road weight limit standards to avoid ground vibration	During construction	Minimal	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The Land/The Water	Surface and groundwater contamination due to accidental oil spills/leaks	• Use sawdust, rice hulls, or coir dusts to absorb the oil spills • Maintain canal in the maintenance and repair area of vehicles and equipment	During construction	Minimal	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The Air	Generation of Air Emissions and Noise	• Regular maintenance of heavy equipment • Perform noisy activities during daytime • Establish and maintain green zone to serve as natural noise barrier.	During construction	Covered by contract amount of Contractor	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The People	Traffic congestion	• Provide early warning devices/road signs • Provide parking spaces within project site	During construction	Covered by contract amount of Contractor	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
Influx of workers	The Land	Generation of solid waste	• Implement solid waste management plan • Hauling of discarded items by accredited haulers	During construction	Minimal	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report

ENVT'L ASPECT	ENVT'L COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	SCHEDULE OF IMPLEMENTATION	ESTIMATED COST	RESPONSIBLE ENTITY	GUARANTEES
	The Water	Ground and surface water contamination from improper disposal of wastes, percolated wastewater, sludge and fecal matter.	• Provision of sanitation facilities for workers (e.g. toilets, showers, etc.)	During construction	PHP 30,000	San Miguel Northern Cement Inc.	Contractor's EMP, Site Inspection Report
	The People	Occupational Health and Safety	• Proper training on construction safety • Provision of PPE • Proper supervision by trained professionals during construction activities	During construction	PHP 100,000	San Miguel Northern Cement Inc.	Contractor's EMP
	The People	Employment opportunities	• Priority in hiring should be given to residents of host communities	Construction stage		San Miguel Northern Cement Inc.	SDP
OPERATION PHASE							
Operation of cement plant facility	The Air	Increased levels of TSP Increased noise levels	• Regular ambient air monitoring • Operate and maintain bag filters • Daily road watering to avoid fugitive emissions from area sources • Assign sweepers to regularly remove dust in areas such as roads, parking areas, and other paved areas. • Implement speed limit in the vicinity of the plant site to avoid re-suspension of dust.	Operational stage	Php50,000	San Miguel Northern Cement Inc.	Environmental Monitoring Report

ENVT'L ASPECT	ENVT'L COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	SCHEDULE OF IMPLEMENTATION	ESTIMATED COST	RESPONSIBLE ENTITY	GUARANTEES
			• Raw material and product storage areas are enclosed • Trucks shall be required to have covers • Enhance and maintain green zones to serve as natural wind and noise barrier.				
	The Water	Runoff from plant operation	• Installation and maintenance of drainage system within the plant • Construction of siltation ponds	Operational stage	Php3 Million	San Miguel Northern Cement Inc.	Environmental Monitoring Report
	The Land	Accumulation of hazardous waste	• Develop and implement a hazardous waste management plan that complies with RA 6969.	Operational stage	-----	San Miguel Northern Cement Inc.	Environmental Monitoring Report
	The Land	Accidental oil spill from delivery trucks	• Use sawdust, rice hulls, or coir dusts to absorb the oil spills • Maintain canal in the maintenance and repair area of vehicles and equipment • Installation of oil and water tank separator	Operational stage	-----	San Miguel Northern Cement Inc.	Environmental Monitoring Report
	The Water	Ground and surface water contamination from improper disposal of wastes, percolated wastewater, sludge and fecal matter.	• Provision of sanitation facilities for workers (e.g. toilets, showers, etc.)	Operational stage	PHP 30,000	San Miguel Northern Cement Inc.	Environmental Monitoring Report

ENVT'L ASPECT	ENVT'L COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	SCHEDULE OF IMPLEMENTATION	ESTIMATED COST	RESPONSIBLE ENTITY	GUARANTEES
	The People	Occupational Health and Safety	• Proper training on safety • Provision of PPE	Operational stage	PHP 100,000	San Miguel Northern Cement Inc.	Environmental Monitoring Report
Effect of operations on local economy	The People	Increased tax revenue	• Proper registration, tax contribution, land registration and other laws/ordinances shall be followed	Operational stage	------	San Miguel Northern Cement Inc.	Tax collection certificate
		Increased employment opportunities	• Priority in hiring of personnel shall be given to residents in the impact areas (host LGUs)	Operational stage	------	San Miguel Northern Cement Inc.	Municipal / Brgy. Development Plan / MOA
Influx of delivery trucks in the area	The Air	GHG emissions from delivery trucks	• Implement carbon sink programs such as tree planting to mitigate GHG emissions	Operational stage		San Miguel Northern Cement Inc.	Environmental Monitoring Report
	The People	Traffic congestion	• Develop a traffic management plan together with the Municipality of Sison • Provide truck marshalling area within plant site • Provide early warning devices/road signs	Operational stage	------	San Miguel Northern Cement Inc.	Environmental Monitoring Report
DECOMMISSIONING/ABANDONMENT PHASE							
Pull-out of equipment	The Air	Generation of air emissions and nose	• Regular maintenance of heavy equipment • Perform decommissioning during daytime	Decommissioning/ Abandonment	Covered by contract amount of Contractor	San Miguel Northern Cement Inc.	EMP
Abandonment of offices and other facilities	The People	Abandonment of facilities	• Possible donation to LGU	Decommissioning/ Abandonment	Minimal	San Miguel Northern Cement Inc.	EMP

ENVT'L ASPECT	ENVT'L COMPONENT LIKELY TO BE AFFECTED	POTENTIAL IMPACT	OPTIONS FOR PREVENTION OR MITIGATION OR ENHANCEMENT	SCHEDULE OF IMPLEMENTATION	ESTIMATED COST	RESPONSIBLE ENTITY	GUARANTEES
Termination of employment	The People	Loss of employment	• Provide 6 months' notice of impending termination of employment • Provide compensation to affected personnel • Provide training of personnel in preparation for other jobs	Prior to decommissioning/ abandonment	To be determined	San Miguel Northern Cement Inc.	EMP

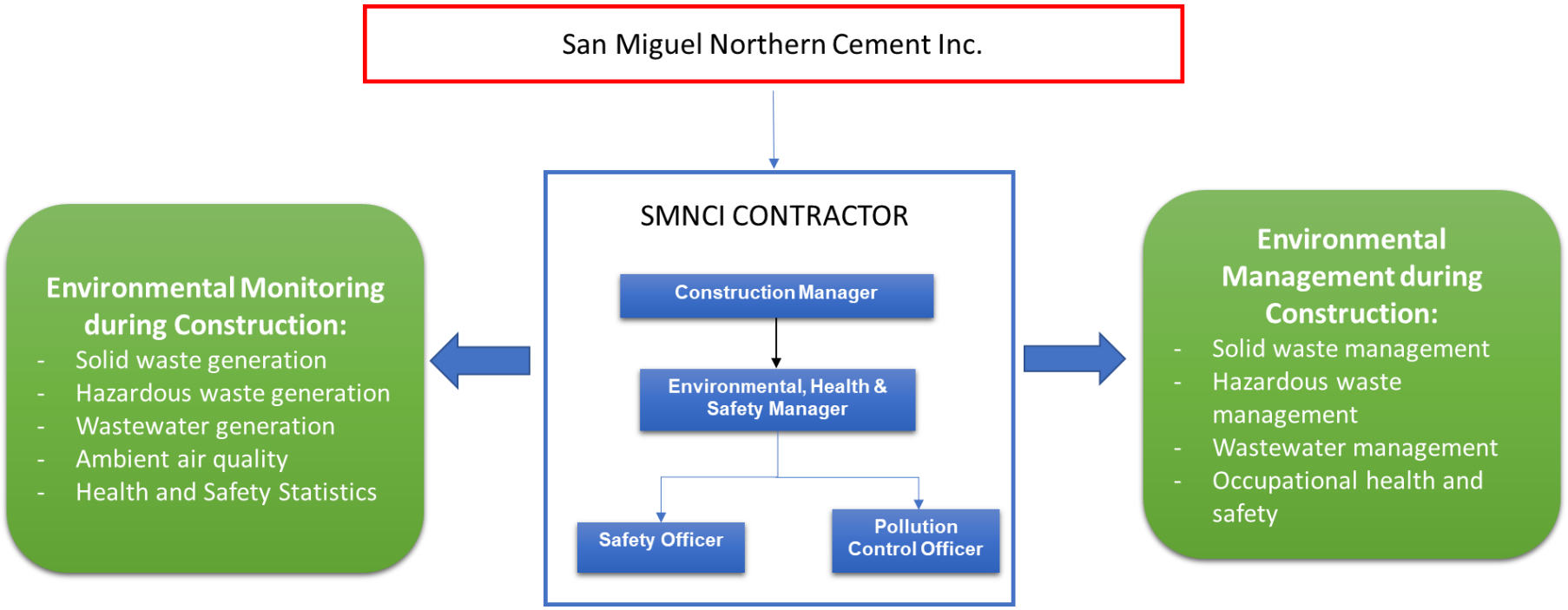
3.5 Construction Environmental Program

355 During the construction phase of the Project, the designated contractor for the Project shall implement and be responsible for its environmental program, under the supervision of San Miguel Northern Cement Inc. The designated contractor will be required to implement the EMP, in accordance to the ECC conditions.

356 The implementation of the Construction Environmental Program will be part for the scope of work of contractor of San Miguel Northern Cement Inc. in accordance with the conditions stipulated in the ECC. It shall include specific actions and measures such as:

- Provision of temporary lodging and sanitation amenities for workers, and liquid and solid waste handling/disposal facilities;
- Avoidance of unnecessary earth-movement;
- Worker and project site safety programs, including emergency response plans;
- Proper storage and disposal of hazardous wastes (i.e., used oils, oil-contaminated material, BFL etc.);
- Establishment of silt traps and erosion barriers around the project site;
- Regular removal of silts and sediments or as necessary;
- Worker and project site safety programs and emergency response plans;
- Provision of portable sanitation facilities to the workers and ensure safe disposal of wastewater generated;
- Proper segregation, storage, disposal of solid and hazardous wastes (i.e., used oils, etc.);
- Reduction or elimination of pollution sources by using pollution control measures (i.e., watering of project site, installation of noise reduction equipment such as mufflers, scheduling of work during daytime, installation of septic tanks)
- Elimination/Reduction of occupational safety and risks through strict implementation of safety plans and procedures (i.e., use of PPEs, provide health stations and first aid kits, regular monitoring of workstations if still meet work standards).
- Proper demobilization procedures (i.e. clean-up of construction sites, replacement/re-planting of removed trees).

Figure 3-1: Construction Management Framework



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **CONSTRUCTION MANAGEMENT FRAMEWORK**	FIGURE NO.: 3-1
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: PROJECT PROPONENT

3.6 Solid Waste Management

357 Solid wastes will inevitably be generated during the Construction and Operations phases of the project. To address this concern, **San Miguel Northern Cement Inc.** will adopt a solid waste management program (SWMP), which will target to reduce the solid waste generation during the different phases of its development. This program shall aim to decrease the amount of operational costs as a result of handling, storage, and disposal of solid wastes. To realize these targets, the proposed project will incorporate the following details to enhance its SWMP:

- Implementation of waste segregation (biodegradable and non-biodegradable) policy for all construction and operations personnel;
- Provision of solid waste handling and storage facilities, such as dumpsters, trash cans in common areas and strategic locations in the facility;
- The biodegradable wastes, such as discarded kitchen wastes and yard trimmings shall be composted;
- Implement a paper usage reduction program in the administration office by re-using paper for other similar purposes;
- The recyclable wastes, such as paper, plastics, and metals, shall be sorted accordingly and sold to waste service providers; and
- The residual and other general solid wastes shall be disposed in their appropriate bins and in accordance with the local solid waste collection schedule.

358 Monitoring activities regarding waste management should include the monitoring of the weight of the generated solid waste and keeping an inventory for each kind of waste, regular audits of waste segregation and collection practices, tracking of waste generation trends by type and amount of waste generated by section, characterizing waste at the beginning of generation of a new waste stream and periodically documenting the characteristics and proper management of waste, and all related retained information regarding solid waste shall be kept by the PCO.

3.7 Hazardous Waste Management

359 Although cement plant will not use any hazardous materials as part of the process, hazardous waste such as used oils, oil-contaminated materials, and BFLs will be produced. Proper storage and disposal of these hazardous materials shall be ensured by the proponent. Also, under RA 6969, the proponent will apply for a Hazardous Waste Generator ID to DENR prior to its construction. A hazardous waste management plan will also be developed by SMNCI.

360 The PCO should ensure appropriateness of the labelling and segregation of hazardous waste at the Hazardous Waste Storage Area and accumulated hazardous waste shall be stored for not more than a year. Only DENR-registered hazardous waste transporter and TSD facility will be allowed to collect and treat the hazardous wastes. The transport, treatment, and final disposal will be arranged by the PCO through the online hazardous waste manifest system.

361 All personnel directly handling hazardous waste shall be trained/oriented on this procedure. Topics shall include: waste identification (types and characteristics), hazards and risks in handling hazardous wastes, labelling and placarding, proper storage, waste minimization, types of potential emergencies arising from wastes handling, storage and treatment disposal, Spill Management Plan, Personal Protective Equipment (PPE), laws and regulations concerning hazardous waste management, and monitoring requirements.

3.8 Occupational Health and Safety

362 **San Miguel Northern Cement Inc.** shall have an occupational health and safety policy that will be implemented in all the project phases. This policy will undergo continuous improvement to adapt to the existing conditions. Occupational health and safety policy is necessary since it will not just reduce the likelihood of injuries/fatalities that may affect its personnel, but also protect valuable equipment and properties against damages.

363 The following details are basic guidelines that **San Miguel Northern Cement Inc.** will be applying for the Project:

- All management, technical, and non-technical personnel shall undergo specialized training courses to familiarize themselves to the operations and maintenance of the Project's various facilities;
- Emergency response plan shall be updated regularly, and emergency drills shall be performed regularly to improve personnel's response technique and time;
- Audits shall be conducted by the management and personnel, with possible assistance from various safety consultants;
- Personnel shall undergo scheduled annual health check-ups;
- Safety signage, adequate illumination, anti-skid steps and guard rails, fire extinguishers, first-aid kits, and other safety features shall be established throughout the Project's facilities; and
- Personal protective equipment (PPE), which includes safety boots, hard hats, gloves, safety goggles (in some instances) shall be mandatory for construction workers (during Constructions phase) and personnel (during Operations phase) working on the Project.

3.9 Air Emission Management

364 Air emissions come from the operation activities such as processing operations, and repair and maintenance of vehicles and equipment. In order to reduce the air emissions associated with the Project, **San Miguel Northern Cement Inc.** employs the following measures:

- Installation of bag filters to prevent introduction of suspended particles in the air;
- Regular maintenance of standby generators to ensure efficient combustion of diesel fuel (includes emissions sampling);
- Equipping the generator set with mufflers to lessen noise levels during operation;
- Reminding of delivery trucks/visitors not to leave parked vehicles on long periods of idling; and
- Regular maintenance of equipment and vehicles.

365 Air emissions are expected during the construction phase as well. **SMNCI** will also employ air emissions management program to mitigate concerns on air emissions during construction of the expansion project.

3.10 Vehicular Traffic Management

366 Traffic impact along the road is expected due to the increase of vehicles coming from in and out of the proposed Project. To mitigate the said traffic, **San Miguel Northern Cement Inc.** will implement the following measures:

- Coordination with the Sison LGU;
- Provision of safety barriers, warning signs and lights, traffic marshals within the vicinity of project sites, and adequate parking spaces;

- All deliveries of construction materials and heavy equipment, either inbound or outbound of the facility may be done during off-peak hours and at designated delivery hubs located near the Project area to prevent blockage of traffic flow along public roads; and
- Assistance of security personnel in directing traffic of vehicles coming in and out of the facility.

3.11 Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA)

367 Climate change can affect the frequency of geohazards in the country. Higher temperatures will result in water shortages and droughts while increased rainfall may induce flooding and landslide. Considering these figures, appropriate precautionary climate change measures and adaptation strategies must be employed during the construction and operation phases of the project to avoid any complications in the long-run.

368 The main objective of the DRR and CCA activities is to minimize or reduce the risk and impact of the hazards to the project and to the community. The project included climate change mitigating measures in the design and construction and during its operation. The project was designed to be resistant to natural disasters such as earthquake, typhoons and flooding. The following are the DRR and CCA mitigating measures that will be implemented by the project.

- Green and open areas is part of the features of the project;
- A stormwater drainage is constructed in the project site to avoid flooding during heavy rainfall;
- Waste reduction and recycling will also be observed during the construction and operation of the project. All the wastes will be properly handled and disposed;
- The proponent will also be implementing water and energy saving practices during its operation;
- Rainwater harvesting will be observed;
- The proponent will also ensure that there will always be enough safe water supply and basic sanitation facilities provided even during the event of a disaster;
- A medical clinic is provided in the project site to respond to emergency situations;
- Conduct IEC activities to the community regarding disaster response preparedness and mitigating measures.

369 DRR and CCA activities will also be included in the SDP and IEC plan to highlight that the success of the programs will be dependent on the community support and participation.

SECTION 4

ENVIRONMENTAL RISK ASSESSMENT & EMERGENCY RESPONSE POLICY AND GUIDELINES

4.1 Methodology

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

4.2 Risk Screening Level

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

Table 4-1: Risk Screening Matrix

ACTIVITIES REQUIRING RISK SCREENING EXERCISE*	ERA APPLICABILITY TO THE PROJECT
1) Facilities for the production or processing of organic/inorganic chemicals using: Alkylation, Amination, Carbonylation, Condenstation, Dehydrogenation, Esterification, Halogenation, Hydrogenation, Hydrolysis, Oxidation, Polymerization, Sulphonation, Desulphurization, Nitration, Phosphorus prod., Distillation, Extraction, Solvation, Pesticides & pharmaceutical prod.	Not Applicable
2) Installations for distillation, refining, and other processing of petroleum products	Not Applicable
3) Installations for total or partial disposal of solid or liquid substances by incineration or chemical decomposition	Not Applicable
4) Installations for the production or processing of energy gases (e.g., LPG, LNG, SNG.)	Not Applicable
5) Installations for the dry distillation of coal or lignite	Not Applicable
6) Installations for the production of metals and non-metals by wet process or electrical energy	Not Applicable
7) Installations for the loading and unloading of hazardous materials as defined by RA 6969 (or DAO 1992-29)	Applicable
CONCLUSION	**Risk screening level exercise is applicable.**
NOTE: *- Based on Annex 2-7e of DAO 2003-30 Revised Procedural Manual	

4.3 Risk Identification and Analysis

372 The proposed Project entails risks that are natural, man-made, or a combination of both. Natural risks are hazards caused by phenomena such as earthquakes, geological instability (e.g., sink holes, landslides), and typhoons. Meanwhile, man-made risks are caused by accidents such as fires,

structural/equipment failure, spillages, and human error. Man-made risks could also be aggravated as a direct consequence of natural risks.

4.3.1 Natural Hazards

4.3.1.1 Seismicity

373 Intense or strong seismic activities may cause damage to the cement plant infrastructures. The construction and operational phase of the proposed project should then factor the potential for earthquake induced risks.

4.3.1.2 Typhoons

374 The mean annual number of typhoons that pass through the Philippine Area of Responsibility (PAR) is about 20, of which around 9.2 cross the country. If a typhoon directly hits the plant facilities, it could possibly bring extensive wind and rain hazards (i.e. strong wave currents and flooding). Regular weather monitoring should be done so that cement plant safety protocols can be done.

4.3.1.3 Flooding

375 The proposed project area is not prone to flooding. However, heavy rains may occur in times of extreme precipitation volume and intensity. During heavy rains, flooding may occur which may affect the cement plant operations. Emergency responses must be considered for possible occurrences.

4.3.2 Man-Made Hazards

4.3.2.1 Occupational Accidents

376 The project involves a variety of equipment and facilities which may possibly injure personnel and/or damage property if handled/operated improperly. These risks can be greatly reduced with scheduled maintenance checks. Also, personnel handling such equipment and operating the facilities will be properly trained and supervised and re-trained periodically.

4.3.2.2 Accidental Spills (e.g. fuel, engine lubrication oil, coolant)

377 Oil spillage that may come from engine maintenance or storage failure may be caused by several reasons such as faulty operational procedures, pipe deterioration, sabotage, and force majeure. It may result to anaerobic conditions since large spills may form a film on water surfaces impairing oxygen transfer. This scenario may be harmful to aquatic organisms. The fuel may be decomposed by micro-organisms, but degradation is selective and can result in sediment becoming enriched with aromatic hydrocarbons. Proper oil spill protocols should then be observed should this happen.

4.3.3 Air Pollutants Hazards

378 Considering the nature of the project, exposure to pollutants associated with cement plant may lead to potential health effects and other hazards. Regular maintenance of equipment and other air mitigating measures should be strictly done to avoid these risks. Potential air pollutants associated with cement plant are particulate (TSP and PM_{10}) and gaseous (CO, NO_x, SO_x) emissions.

4.3.3.1 Particulate Matter

379 Particle matter (PM) is the term for a mixture of solid particles and liquid droplets found in the air. Airborne particulate matter varies in size and may be in different chemical constituents. Airborne particles can range in size from a few nanometers (nm) to around 100 micrometers (µm) in diameter. PM_{10} is the concentration of particles that are less than or equal to 10 µm in diameter;

similarly, $PM_{2.5}$ describes the concentration of particles that are less than or equal to 2.5 µm in diameter.

380 Particulate matter comes from a variety of sources and contains primary components, which are emitted directly into the atmosphere, and secondary components, which are formed within the atmosphere because of chemical reactions. Primary sources include combustion sources (road vehicles and power stations), mechanical processes (e.g. quarrying and agricultural harvesting), and natural processes (e.g. entrainment of soil by the wind and generation of marine aerosol particles). Secondary particles form in the atmosphere because of chemical reactions that lead to the formation of substances of low volatility, which consequently condense into the solid or liquid phase, thereby becoming particles. The formation of secondary particulate matter takes hours or days and the air containing the pollution can travel long distances.

381 The "coarse particles" (such as those found near roadways and dusty industries) with diameters between 2.5 and 10 micrometers and "fine particles" (such as those found in smoke and haze) that are 2.5 micrometers in diameter or less are of concern due to their effect on human health. Both short and long-term exposure to these can cause increased respiratory symptoms (e.g., irritation of the airways, coughing, or difficulty breathing); decreased lung function; aggravated asthma; development of chronic bronchitis; irregular heartbeat; nonfatal heart attacks; and premature death in people with heart or lung disease.

382 The most serious health problems occur among susceptible groups with pre-existing lung or heart disease and the elderly and children. However, even healthy individuals may experience temporary symptoms from exposure to elevated levels of particle pollution.

4.4 Identification of Potential Emergencies

383 Emergencies are unforeseen events or episodes that are caused by natural forces and circumstances that may result to negative effects to people, property, and the surrounding environment. As a preliminary step in developing an effective emergency response policy, it is important to identify the potential emergency scenarios that would most likely occur. **Table** 4-2 lists the most probable emergencies that could happen in future operation of the Project.

384 Emergency situations may also require different levels of classification and response procedures, depending on the degree of situations. These levels will be referred to as: 1) Incident; 2) Emergency; and 3) Crisis.

385 Incident situations present minor events that may require partial or total mobilization of the proposed Project's resources to effectively deal with an accident. An episode may present very minimal injuries and/or partial damages to property.

386 Emergency situations require the utilization of all resources, with the assistance of local emergency responders, and additional resources from Northern Cement Corporation's main office. This episode may present serious injuries and some fatalities and could result to severe or total damage to the property.

387 Crisis situations are the worst conditions, which require the utilization of full resources, and possibly, assistance from the national government to address the event. An episode may present multiple fatalities, destruction of facilities, and severe/total damage to the surrounding community.

Table 4-2: Emergency Scenarios for the Project

TYPE OF EMERGENCY SITUATION	POSSIBLE CAUSES	POTENTIAL EFFECTS
Construction Phase		
Fire	• Electrical short-circuits, overloading of equipment • Accidental ignition of combustible materials	• Partial or total loss of equipment and property • Injuries and fatalities to personnel
Earthquakes	• Movement/rupture of nearby fault lines • Volcanic eruption	• Failure of concrete structures (i.e. collapse, dam breach, etc.) • Injuries and fatalities to personnel and downstream communities
Release of toxic substances	• Equipment malfunction • Accidental spillage • Man-made errors	• Health hazards to the employees, workers and nearby communities • Degradation of affected parameter (i.e. contamination of soil and water)
Occupational safety accidents	• Improper training and supervision of personnel • Equipment and facility failure • Lack of full understanding regarding the surrounding environment	• Injuries and fatalities to personnel • Partial and total loss of equipment
Flooding	• Heavy rainfall • Clogged drainage	• Damage to property • Stop operation
Operation Phase		
Fire	• Electrical short-circuits, overloading of equipment • Accidental ignition of combustible materials	• Partial or total loss of equipment and property • Injuries and fatalities to personnel
Explosion	• Blasting procedure malpractice • Power outrage • Equipment malfunction	• Partial or total loss of equipment and property • Injuries and fatalities to personnel
Earthquakes	• Movement/rupture of nearby fault lines • Volcanic eruption	• Failure of concrete structures (i.e. collapse, dam breach, etc.) • Injuries and fatalities to personnel and downstream communities
Release of toxic substances	• Equipment malfunction • Accidental spillage • Man-made errors	• Health hazards to the employees, workers and nearby communities • Degradation of affected parameter (i.e. contamination of soil and water)
Occupational safety accidents	• Improper training and supervision of personnel • Equipment and facility failure • Lack of full understanding regarding the surrounding environment	• Injuries and fatalities to personnel • Partial and total loss of equipment
Flooding	• Heavy rainfall • Clogged drainage	• Damage to property • Stop operation
Landslide	• Heavy rainfall • Man-made errors	• Damage to property • Injuries and fatalities to personnel and downstream communities • Stop operation

4.5 Emergency Plan

388 The Emergency Plan is a management structure that is intended as a guide for the personnel during emergency situations. This structure may or may not be similar to the existing organizational/management hierarchy of the Project, although comparison on roles and responsibilities can be used as reference.

389 The implementation of the Emergency Plan is a standard practice that is currently being integrated as part of company policies. Its objective is to establish an orderly and systematic approach in addressing an emergency, and in turn, decrease further injuries/fatalities and loss of property.

390 Forming the Emergency Plan requires the Proponent to select among the different skills and knowledge of its personnel at the Project. The selection process will involve background checks, training and skills learning, and voluntary application of selected personnel. The proposed project will follow the schematic diagram and procedures presented in **Figure 4-1** and **Table 4-3**. The roles and responsibilities of each personnel involved in the Emergency Plan are listed in **Table 4-4.**

391 The designation of the personnel and their corresponding responsibilities may be changed during different types of emergency scenarios that were previously identified in this section. Therefore, if such case will exist, SMNCI will train and designate personnel appropriately to deal with each type of emergency.

Figure 4-1: Emergency Response Plan

PREPARATION - development of actual plans should an emergency happen and elimination or avoidance of hazards from happening or occurring.

RESPONSE - execution of the plans and procedures during an actual emergency plan.

RECOVERY - retrieval of important assets and restoration of the site prior to the emergency.

PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **EMERGENCY RESPONSE PLAN**	FIGURE NO.: 4-1
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: LCI ENVI CORPORATION

Table 4-3: Emergency Response Procedures for Different Scenarios

PREPARATION	RESPONSE	RECOVERY
A. Fire		
• Orientation and training of personnel on fire safety • Conduct of regular fire drills • Installation and regular testing of firefighting devices (i.e. fire hoses, fire extinguishers, smoke detectors, sprinkler system) • Regular inspection of electrical equipment and lines for any defect or malfunction, and replacement, as necessary • Securing of all flammable items in proper containers and storage facilities • Strict implementation of "No Smoking" policy in plant facilities • Placement of emergency numbers and communication equipment in conspicuous areas for easier notification • Designation of emergency exits (free from obstruction) and evacuation procedures • Regular maintenance of plant equipment	• Notice for personnel to keep calm and alert to prevent further injuries; to follow emergency evacuation procedures; and to report immediately any presence of smoke, spark, or open flame to authorized personnel • Immediate use of fire extinguishers, only if the fire can still be contained • Disconnection of electrical or fuel connections and shutdown of all affected equipment • Removal of all flammable materials from the fire scene to avoid further contact, if possible • Wearing of proper fire protection attire (i.e. fire suit, boots, breathing apparatus) by responders • Prohibition of using or pouring of water over fuel or alcohol fires, and electrical fires	• Prohibition of returning to the fire scene, as long as necessary, unless declared for safe entry • Checking for personnel that may be trapped, injured, or needs further assistance • Reporting of any important incident that require immediate attention • Securing of important items and equipment from unauthorized access from outsiders, after the building is declared safe for re-entry • If fire damage is minimal, or if facility is recoverable, implementation of necessary corrective measures to prevent the accident from re-occurring
B. Earthquakes		
• Conduct of necessary preparations, including equipment and facility checks, to prevent injuries in an event of an earthquake • Securing of all loose items to prevent falling • Placement of heavy materials near the ground • Storage of flammable items in designated safe areas • Orientation of personnel on safe locations, emergency response equipment, and evacuation routes	• Notice for personnel to keep calm and alert to prevent further injuries; to protect themselves by getting under sturdy structures and stay away from sharp, flammable, or heavy items; and to prepare for immediate evacuation of the facility, if necessary • Shutdown of all gas and electric equipment	• If there are no threats of aftershocks, checking for personnel that may be trapped, injured, or needs further assistance • Prohibition of returning to the facility if it is deemed structurally unstable, or declared unsafe • Thorough inspection of the facility premises for any unusual crack/gap in the ground or walls • Checking for possible fires and advise authorities for appropriate response • Securing of important items and equipment from unauthorized access from outsiders, after the building is declared safe for re-entry • Inspection of the facility for any major structural defect,

PREPARATION	RESPONSE	RECOVERY
		crack, unstable item, and other potential hazards • If earthquake damage is minimal or facility is recoverable, implementation of corrective measures to prevent the further hazards from affecting personnel and property
C. Release of Toxic Substances (e.g. fuel)		
• Regular visual inspection for potential leaks and corrosion • Inspection of facilities, containers, and equipment for any sign of leaks or spills	• Notice for personnel to report the occurrence immediately to supervisor; to follow strictly instructions of supervisor in charge of cleaning operations • Ceasing of operations in the area affected by spillage and stop appropriate source • Stop vehicles' engines in the affected area • Ceasing of operations or any movement until clearance is given	• Immediate clean-up of all spills using proper conditions, including stoppage and containment of spill or leak • Implementation of measures to prevent re-occurrence of the incident
D. Occupational Hazards		
• Provision of basic PPEs. • Formation of an emergency response team for each department • Provision of first-aid kits and emergency equipment on critical workstations • Training of personnel on proper equipment handling and other safety practices • Posting of safety reminders on workstations • Provision of safety features, such as adequate lighting, guide rails, and safety signage	• Immediate reporting of any accident, especially those considered life-threatening • Immediate application of first-aid • Removal of affected personnel from the accident site • Bringing of affected personnel to the nearest first aid station or hospital if necessary	• Performing of corrective measures on equipment and procedures • Provision of additional safety procedures, equipment, and training
E. Flooding		
• Securing of all loose items (i.e. lamp post, roofs, loose planks, and other light materials) by adding extra guy wires or reinforcing materials • Removal of obstructions to the drainage system • In case of storm warning from PAGASA, monitoring of important weather forecast/ parameters, such as path and intensity of the storm	• Notice for personnel to avoid staying outdoors; to stay away from items that may be blown away by strong winds and from electrical mains • Continuous monitoring of the weather conditions • Shutdown of all gas and electric equipment	• Inspection of facility for any major structural defect, crack, unstable item, and other potential hazards • Repair of broken power lines, fuel lines, and other utilities, if necessary • Securing of important items and equipment from unauthorized access from outsiders, after the building is declared safe for re-entry

PREPARATION	RESPONSE	RECOVERY
F. Landslide		
• Formation of an emergency response team for each department • Training of personnel on proper equipment handling and other safety practices • Orientation of personnel on safe locations, emergency response equipment, and evacuation routes	• Notice for personnel to avoid staying outdoors; to stay away from items that may have been affected by the event • Notice for personnel to keep calm and alert to prevent further injuries; and to prepare for immediate evacuation of the facility, if necessary • Shutdown of all gas and electric equipment • Bringing of affected personnel to the nearest first aid station or hospital if necessary	• Inspection of facility for any major structural defect, crack, unstable item, and other potential hazards • Repair of broken power lines, fuel lines, and other utilities, if necessary • Securing of important items and equipment from unauthorized access from outsiders, after the site is declared safe for re-entry • Assess damage from the incident. Conduct geotechnical investigation if necessary.

Table 4-4: Roles and Responsibilities in the Emergency Plan

EMERGENCY RESPONSE PERSONNEL	ROLES AND RESPONSIBILITIES
Incident Commander	• Overall in-charge of operations during an event of an emergency • Gives direction and orders to the response teams in managing the emergency
Safety Officer	• Supervises the daily safety performance of operations and maintenance procedures, including emergency response procedures
Liaison Officer	• Secures the necessary permits and training certification for the personnel
Public Information Officer	• Performs communication duties in behalf of **San Miguel Northern Cement Inc.** to the media, government officials, and the local population • Issues relevant warnings and advisories to concerned authorities
Operations Team	• Performs the actual response, rescue, and retrieval of personnel and equipment during an event of an emergency
Planning/Intelligence Team	• Devices programs and policies for proper response procedures • Informs the operations team regarding the nature and type of response procedure for the Operations Team • Identifies potential hazards and performs recommendations to authorities
Logistics Team	• Provides the necessary supplies and equipment for the Operations Team • Provides additional support/assistance to the Operations Team
Finance and Administration Team	• Provides the assessment of expenses and allocates the necessary financial resources for the other Teams • Performs the disbursement of claims and compensation for affected personnel, property and the community

4.6 Safety and Health Program

392 **San Miguel Northern Cement Inc.** gives priority on the safety of its employees and their working environment. It developed this program for accident and injury prevention through the

implementation of plant rules and guidelines that shall involve management, supervisors, and employees in identifying and eliminating hazards that may develop during work process.

4.6.1 Leadership and Administration

393 The management will spearhead in the formation of a safety committee, develop a system for identifying/correcting hazards, prepare for foreseeable emergencies, provide appropriate trainings, and establish a disciplinary policy to ensure strict compliance.

4.6.1.1 Company Safety Policy

394 It is basic policy that no task is so important that an employee must take a risk of injury/illness or violate a safety rule. Active involvement in safety practices is then encouraged to make the area a safe place to work.

395 It is the daily duty of every employee to be cautious of unsafe conditions. In addition to this, supervisors or accountable managers are responsible in overseeing the actions of employees and to take prompt action in eliminating unsafe practices and hazards in the workplace.

4.6.2 Accident/Incident Investigation Reporting

396 It is very advantageous for every employee to be prepared for any emergency to prevent further injury, property damage, and loss of limb or even life. An emergency preparedness plan must then be prepared and strictly implemented.

397 Prevention of accidents by eliminating potential threats/hazards and anticipating other probable causes is an effective way of creating a safe and healthy environment.

Emergency Response Program

398 The emergency response program shall be implemented by an emergency response team composed of equipped and trained personnel who will be tasked to handle and manage the program, assist other employees to safety, and to prevent any damage or injury. Proper training and orientation of concerned team members will be accorded to prepare them in responding appropriately in any emergency they may encounter.

Personal Protective Equipment

399 The personal protective equipment (PPE) is a set of safety gear worn by personnel that is designed to provide sufficient safeguard against occupational-related illnesses and to prevent life-threatening injuries.

400 PPE, such as safety hats, safety shoes, gloves, dust mask, and ear plugs, will be provided as necessary. This is to ensure safe and protected personnel working in safe working environment. SMNCI will make the usage of PPE a mandatory policy for personnel working inside the Project premises. Guests and visitors will also be required to wear PPE as necessary.

4.6.2.1 Incident Response Procedure

401 Any accident, injury, or work-related illness should be reported and investigated on immediately so as to determine the appropriate action to be conducted.

Recording and Review

402 It is mandatory that employees are to report any injury or work-related illness to their immediate supervisor regardless of how serious. Minor injuries, such as cuts and scrapes, can be entered on the first-aid only log. More serious injuries are to be reported and recorded properly for future review.

Incident Investigation

403 It is imperative that an incident scene should not be disturbed except to aid in rescue or make the scene from further incidence. In case of an incident resulting in death or serious injuries, a preliminary investigation will be conducted by the immediate supervisor of the injured person(s), a person designated by management, an employee representative of the safety committee, and any other person whose expertise would help the investigation.

404 The investigating team will obtain written statements from witness, photograph the incident scene and machines/equipment involved. The said team will also document, as soon as possible after the incident, the condition of equipment and anything that may be relevant in the work area. A written "Incident Investigation Report" is necessary. The report should include a sequence of events leading up to the incident, conclusions derived from the incident and any recommendation to prevent a similar incident in the future.

Damage Control

405 Damage cost because of accident, in reality, is unquantifiable, especially when damage to life and limb is involved. Cost of properties, structure, and equipment including its effect on existing productivity is quantifiable.

406 Any employee may be subject to on-the-spot termination when a safety violation places the employee or co-workers at risk of permanent disability or death.

SECTION 5

SOCIAL DEVELOPMENT PLAN/FRAMEWORK AND IEC FRAMEWORK

407 The following project stakeholders have been identified based on the stakeholder groups indicated in Section 5 of DENR Administrative Order No. 2017-15:

- **LGUs in areas where all project facilities are proposed to be constructed/situated and where all operations are proposed to be undertaken (a)**
  - Municipal LGU of Sison, Pangasinan (host municipality)
  - Brgy. Labayug, Sison (host barangay)

- **Government agencies with related mandate on the type of project and its impacts (b)**
  - DENR Region I (Ilocos Region)
  - DENR EMB Region I (Ilocos Region)
  - DOH Region I (Ilocos Region)
  - Provincial Environment and Natural Resources Office (PENRO Pangasinan)
  - Community Environment and Natural Resources Office (CENRO Dagupan City)

- **Interest groups, preferably those with mission/s specifically related to the type and impacts of the proposed undertaking (c)**
  - Sison Senior Citizens Association
  - Women Sector
  - Youth Sector

- **Local institutions (f)**
  - Labayug Elementary & High School

408 No "households, business activities, industries that will be displaced" (d) and "people whose socio-economic welfare and cultural heritage are projected to be affected by the project especially vulnerable sectors and indigenous populations" (e) have been identified for the project.

409 Other stakeholders for the proposed project include the local peace-and-order groups (i.e., PNP, Brgy. Police) and concerned non-government organizations (NGOs).

5.1 Social Development Program (SDP)

410 An indicative community-based Social Development Plan (SDP), as presented in **Table 5-1**, will be developed by **San Miguel Northern Cement, Inc.** through a series of consultation with various stakeholder representatives in the project impact area.

411 The objectives of the SDP include the following:

- Identify the basic needs and welfare of the host community as basis for the framework of social development program of the Project;
- Prepare an indicative sustainable plan based on the Barangay Development Plans and the mandated support of **San Miguel Northern Cement, Inc.**; and

- Establish a working relation with **San Miguel Northern Cement, Inc.** and the various community stakeholders with the goal of improving the quality of life of the project-affected communities by instilling self-reliance.

412 The community-based consultation and survey during the development of the SDP also provides an opportunity for identifying the following:

- Addressing key issues and concerns by the various stakeholders;
- Identifying and designing the recommend measures in response to the issues and concerns that were raised;
- Identifying the lead agency or organization responsible in implementing the measures; and
- Setting of timelines in implementing these measures consistent with the plans and programs of the lead agencies.

Table 5-1: Matrix of Social Development Plan

CONCERN	PROGRAM/PROJECT/ACTIVITY	RESPONSIBLE COMMUNITY MEMBER/ BENEFICIARY	GOVERNMENT AGENCY/NON-GOVERNMENT AGENCY AND SERVICES	PROPONENT	INDICATIVE TIMELINE	SOURCE OF FUND
Livelihood and Employment	On-the-Job Training (OJT) Program	Brgy. Kagawad for Education Bonafide students of academic institutions in Labayug and nearby barangays	CHEd Region I Sison LGU Brgy. Labayug LGU Nearby barangay LGUs	San Miguel Northern Cement, Inc.	Pre-Construction Operation	San Miguel Northern Cement, Inc.
	Handicraft skills training (cross-stitch, rug making, beauty care and hair dressing, cooking, etc.) Food processing training Skills training (welding, machinery and auto-mechanics, etc.) Provision of relevant tools and trainings for farmers	Brgy. Kagawad for Education Unemployed members of the host community Women Farmer organization/cooperative Out-of-school youth	TESDA Region I Sison LGU Brgy. Labayug LGU Nearby barangay LGUs MAO	San Miguel Northern Cement, Inc.	Operation	San Miguel Northern Cement, Inc.
Infrastructure	Support in the development of water supply system for Brgy. Labayug	Brgy. Kagawad for Infrastructure Host community	Sison LGU Brgy. Labayug LGU	San Miguel Northern Cement, Inc.	Operation	San Miguel Northern Cement, Inc.
Health and Nutrition	Provision of various medicines/medical and dental services	Brgy. Kagawad for Health and Education Host community	DOH Region I MHO Sison LGU Brgy. Labayug LGU	San Miguel Northern Cement, Inc.	Construction Operation	San Miguel Northern Cement, Inc.
Education	Provision of scholarships and financial assistance to students (both formal and informal education)	Qualified students of the host barangay	CHEd Region I DepEd Region I TESDA Region I Brgy. Labayug LGU	San Miguel Northern Cement, Inc.	Construction Operation	San Miguel Northern Cement, Inc.
Peace and Order	Financial support on closed circuit television (CCTV) installation in strategic areas in Brgy. Labayug	Brgy. Kagawad for Peace and Order	Brgy. Labayug LGU	San Miguel Northern Cement, Inc.	Operation	San Miguel Northern Cement, Inc.

CONCERN	PROGRAM/PROJECT/ACTIVITY	RESPONSIBLE COMMUNITY MEMBER/ BENEFICIARY	GOVERNMENT AGENCY/NON-GOVERNMENT AGENCY AND SERVICES	PROPONENT	INDICATIVE TIMELINE	SOURCE OF FUND
		Host community				
Environment	Climate Change Adaptation and Disaster Risk Reduction Management training	Host community and nearby barangays	MDRRC Sison LGU Brgy. Labayug LGU Nearby barangay LGUs	San Miguel Northern Cement, Inc.	Operation	San Miguel Northern Cement, Inc.
Safety	Provision of traffic signage and early warning device in strategic areas in Brgy. Labayug	Host community and nearby barangays	Sison LGU Brgy. Labayug LGU	San Miguel Northern Cement, Inc.	Construction Operation	San Miguel Northern Cement, Inc.
Cultural Heritage	Financial support to sports, recreation, town fiesta, and cultural activities	Residents of Sison Host community and nearby barangays	Sison LGU Brgy. Labayug LGU Nearby barangay LGUs	San Miguel Northern Cement, Inc.	Operation	San Miguel Northern Cement, Inc.
Spiritual	Financial support to religious institutions maintenance and construction works	Religious sector Ecumenical (pastors, priests, ministers, etc.)	Brgy. Labayug LGU Nearby barangay LGUs	San Miguel Northern Cement, Inc.	Operation	San Miguel Northern Cement, Inc.
Note: Based on the Revised Procedural Manual for DAO 2003-30						

5.2 Information and Education Campaign (IEC)

413 The Information, Education, and Communication (IEC) campaign for the proposed project will be conducted in all phases of its development, which also allows for a regular feedback/grievance mechanism of issues and concerns. The contents of the IEC are based on the action or operation plans of **San Miguel Northern Cement, Inc.** and will be monitored by a multipartite group for evaluation.

414 A feedback/grievance mechanism is a very important tool to educate people regarding the project's development and to check whether the project has negative or positive effects or perception. It will strengthen the knowledge of the people with regards to the positive impacts of the project, as well as the effort of the monitoring team together with the Proponent in resolving unfavorable events, if any.

415 Integral to the IEC is the regular reporting of **San Miguel Northern Cement, Inc.** on the progress of the proposed Project's operations. In general, the Proponent shall update the host LGUs if the agreements are followed or if there are minor or major changes to be made, and if there are problems that might occur and advice the LGU on appropriate preparations that are necessary to avoid or mitigate negative results. The Proponent will conduct IEC activities to establish transparency and to develop a partnership with the host communities.

416 IEC activities envisioned for the Project are numerous interactions between the Proponent, the host communities, and the local government officials. **Table 5-2** presents the indicative IEC plan, which can be further improved after the series of consultations and future developments of the Project. Throughout the different phases of the proposed project, the Proponent will continue to inform the stakeholders about the status of the social development plan (SDP) to prevent any speculations, anxiety, and miscommunication.

Table 5-2: Matrix of the Project's IEC Plan

TARGET SECTOR IDENTIFIED AS NEEDING PROJECT IEC	MAJOR TOPIC/S OF CONCERN IN RELATION TO PROJECT	IEC SCHEME / STRATEGY / METHODS	INFORMATION MEDIUM	INDICATIVE TIMELINES AND FREQUENCY	INDICATIVE COST (PHP)
Residents of Brgy. Labayug **Residents of nearby Barangays**	▪ Personnel requirements and announcement of job opening for potential workers/employees/contractors	▪ Group Consultation ▪ Multi-media	▪ Invitation letter ▪ Multi-sectoral cluster meetings ▪ Newspaper publication ▪ Radio broadcast ▪ Posters	At least, two months prior to start of construction	PHP 50,000.00
Municipality of Sison **Residents of Brgy. Labayug** **Farmer Groups** **NGOs** **Residents of nearby Barangays**	▪ Presentation of construction works/activities ▪ Potential impacts and proposed mitigation measures during construction works	▪ Group Consultation ▪ Multi-media	▪ Invitation letters ▪ Focus Group Discussion ▪ Multi-sectoral cluster meetings ▪ Handouts ▪ Audio-visual presentations on EIA ▪ Posters and flyers	At least 1 month prior to start of construction and quarterly during the entire construction phase	PHP 50,000.00
Municipality of Sison **Brgy. Labayug** **NGOs** **Residents of nearby Barangays**	▪ Report on project's compliance to ECC and EMP during construction period	▪ Group Consultation ▪ Grievance mechanism	▪ Invitation Letters ▪ Handouts ▪ Multi-sector cluster meeting ▪ Grievance box (comments, suggestions) at the municipal and barangay halls	1 month prior to completion of construction works	PHP 25,000.00
Municipality of Sison **Brgy. Labayug**	▪ Presentation of completion of construction works and preparation for operation	▪ Group Consultation	▪ Invitation Letters ▪ Multi-sectoral meeting	1 month prior to completion of construction phase	PHP 25,000.00
Municipality of Sison **Brgy. Labayug** **NGOs** **Residents of nearby Barangays**	▪ Project operation phase ▪ Highlight of the project's environmental control measures ▪ Compliance to ECC conditionality's and the EMP ▪ Actual impacts during construction and control measures implemented	▪ Group Consultation ▪ Grievance mechanism	▪ Invitation letter ▪ Handouts ▪ Posters ▪ Grievance box (comments, suggestions) at the municipal and barangay halls	Priority to operation phase and yearly thereafter	PHP 40,000.00
Schools **NGOs** **LGUs**	▪ Plant tour and highlight of project's environmental control	▪ Group Consultation	▪ Educational tour to project site	Throughout the operation phase	PHP 50,000.00

TARGET SECTOR IDENTIFIED AS NEEDING PROJECT IEC	MAJOR TOPIC/S OF CONCERN IN RELATION TO PROJECT	IEC SCHEME / STRATEGY / METHODS	INFORMATION MEDIUM	INDICATIVE TIMELINES AND FREQUENCY	INDICATIVE COST (PHP)
	measures, SDP, and environmental projects				
San Miguel Northern Cement, Inc. employees	▪ Awareness and Safety ▪ Disaster Risk Reduction and Management ▪ Climate Change awareness and adaptation	▪ Group Consultation ▪ Multi-media	▪ Climate change adaptation and disaster risk reduction and management seminar ▪ Hazard identification and risk assessment training ▪ First aid training	Once a year	PHP 50,000.00
Brgy. Labayug Schools	▪ Climate Change awareness and adaptation ▪ Disaster Risk Reduction and Management	▪ Group Consultation ▪ Multi-media	▪ Climate change adaptation and disaster risk reduction and management seminar	Once a year	PHP 50,000.00

5.3 Grievance Redress Mechanism (GRM)

417 Grievances are any major or complicated issues which require deeper, and sometimes, deeper understanding which can be resolved through complex, time-consuming and may often involve large expenditures solutions. Hence, different levels of responses are required to register, classify and redress these issues.

418 **San Miguel Northern Cement, Inc.**, through the Community Relations Office (COMREL) will establish a grievance recording and redress mechanism to efficiently and effectively record and redress any concern, complaint or grievances arising out during the (a) construction and (b) operations phases of the Project.

419 The redress of the grievances will be coordinated with the COMREL.

420 Once the construction of the project begins, the designated grievance officer of **San Miguel Northern Cement, Inc.** shall coordinate with the responsible units/departments about any possible complaints, issues and concerns lodged on the project.

5.3.1 General Principles of the Grievance Redress Mechanism

421 A credible grievance mechanism is necessary for the community, especially the stakeholders, to have confidence that if they lodge a complaint, it will be treated in a fair and objective manner. The fairness of the process is to be understood in the context of the imbalances of power that may exist. The grievance registration or communication process should present no barriers in terms of access (e.g. geographic location/educational attainment/language/ access to communication/technology) by the stakeholders.

422 Registering a complaint can pose risks for the stakeholders, especially if it concerns issues such as corruption, misconduct, or monetary compensation, or if it interferes with local social and gender norms. Hence, the grievance mechanism should be free of retribution and should proactively consider potential dangers and risks to complainants and incorporate ways to prevent harm. Protection of privacy of the complainant will also be prioritized.

5.3.2 Levels of Grievance Redress Mechanism

423 The stakeholders must be fully informed of the proper venue to lodge their complaints or grievances, and of their rights to use alternative measures if they choose to do so if they are not satisfied with the response of the **San Miguel Northern Cement, Inc.** COMREL to their complaints.

Figure 5-1: Levels of Grievance Redress Mechanism

PROJECT PROPONENT:	FIGURE TITLE:	FIGURE NO.:
SAN MIGUEL NORTHERN CEMENT, INC.	**LEVELS OF GRIEVANCE REDRESS MECHANISM**	**5-1**
EIA REPORT PREPARER:	PROJECT TITLE & LOCATION:	SOURCE:
LCI ENVI CORPORATION	**SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	PROJECT PROPONENT

424 Irrespective of the choice of the complainant on the level of grievance management system, **San Miguel Northern Cement, Inc.** will demonstrate a culture of non-retaliation and respect for a community's choice to seek alternative avenues for raising complaints.

5.3.3 Grievance Redress Mechanism Steps

425 The Grievance Redress Mechanism that will be employed for the project is detailed in 6 steps. The GRM is presented in **Table 5-3**.

Table 5-3: Grievance Redress Mechanism

GRM STEP	DESCRIPTION OF THE PROCEDURE
Step 1	▪ Affected person lodges the complaint.
Step 2	▪ San Miguel Northern Cement, Inc. COMREL will document and register received complaints during construction and operation of the project.
Step 3	▪ Two days upon the receipt of the complaint, a meeting will be called between the affected person and San Miguel Northern Cement, Inc. COMREL. The affected person will be immediately informed if the grievance is within, or outside, the purview of the mechanism. ▪ If the scope is outside, the affected person will be referred to the proper institution and/or proper mechanism for the complaint. If the complaint is within the scope of the project, the resolution of the complaint shall be discussed during the meeting.

GRM STEP	DESCRIPTION OF THE PROCEDURE
	Investigation will be immediately scheduled for proper resolution of the complaint. After the investigation, the San Miguel Northern Cement, Inc. COMREL will immediately decide on the most suitable internal measure to reduce the impact the source of the complaint while working on the final measure not later than 5 days from the day when the meeting for the complaint was held.
Step 4	▪ If the affected person is satisfied with the resolution of the complaint, San Miguel Northern Cement, Inc. COMREL shall obtain a written confirmation of satisfaction from the affected person.
Step 5	▪ For at least a week after closure of grievance, the Grievance Officer, shall monitor the effectiveness of the resolution.
Step 6	▪ If the issue/impact persists, the affected person can lodge an appeal at the barangay level. The Barangay Chairman shall immediately record the appeal, contact the grievance to discuss the immediate resolution of the issue. If the issue persists despite the second action, the affected person can seek assistance from the Municipal Government. A total of two weeks is given to process, address and monitor a grievance that will arise due to the project implementation.

SECTION 6

ENVIRONMENTAL COMPLIANCE MONITORING

6.1 Environmental Performance

426 **Table 6-1** shows the ECC conditions of ECC Reference No. 9910-163-208 and the compliance of **Northern Cement Corporation** (former owner) from these conditions. SMNCI will continually comply with these ECC conditions.

Table 6-1: Compliance of NCC to ECC No. 9910-163-208

ECC Conditions	ECC Compliance
Covers the limestone and shale quarrying operations of maximum production rates of 8,500 MTPD and 2,100 MTPD respectively, and the construction of third production line with a maximum production rate of 5,000 MTPD of clinker.	• Maximum production rates for the limestone and shale quarry are 8,500 and 2,100 MTPD. Operation of the quarry will be transferred to ECC No. 9207-032-301C. ECC amendment is being applied. • Construction and operation of the NCC line 3 cement plant was not pursued. ECC is to be amended for the increase of the clinker production capacity of the cement plant under SNMCI.
Limestone and shale quarrying operations cover 163 hectares of the 630-hectare approved Mineral Production and Sharing Agreement (MPSA) of NCC denominated as MPSA-106-98(I) situated at Brgy. Labayug, Sison, Pangasinan.	• Operation of the quarry will be transferred to ECC No. 9207-032-301C. ECC amendment is being applied.
The cement plant must be limited to a total capacity of 8,000 MTPD of clinker using the dry process operation and shall cover 17 hectares within the MPSA.	• Construction and operation of the NCC line 3 cement plant was not pursued. ECC is to be amended for the increase of the clinker production capacity of the cement plant under SNMCI.
The proponent must undertake an Information, Education and Communication (IEC) Program to explain to local residents and other stakeholders, the mitigating/enhancement measures stated in the EIS, the condition under this Certificate, and the environmental and human safety measures for greater awareness, understanding and acceptance of the project. The IEC program must be specifically implemented in the affected communities.	Part of the SDP.
The proponent, in coordination with the EMB-1 and MGB-1, must identify a site, establish, adopt and/or maintain a mini forest within the project area.	Part of the mining forest program of the NCC is the maintenance of the Sapid Forest.
At least 40 meters wide buffer zones measured landward from each side of the normal high-water line of the Buli Creek, Bettac Creek and Sapid Creek must be established. The same	Width of buffer zone flanking the creeks are erratic, some areas attain 40 meters strip, some only 3 meters.

ECC Conditions	ECC Compliance
must be densely vegetated with appropriate species to enhance their conditions.	
All mitigating/enhancement measures stated in the submitted EIS document. Modification to it and as approved by the EMB must be strictly implemented.	EMP is strictly being implemented by NCC.
The proponent must ensure that all the condition in this Certificate are properly complied with by its commissioned contractors and sub-contractors.	NCC sub-contractors are required to comply with applicable ECC conditions.
Any significant expansion and/or modification of the currently approved operation must be subjected to a new Environmental Impact Assessment (EIA) requirement.	ECC amendment is being applied to EMB to increase the clinker production capacity. An EPRMP will be submitted.
Transfer of ownership of this project carries the same conditions in this ECC for which written notification to the EMB must be made within 15 days from such transfer.	A request letter was submitted by NCC last March 5,2019 to the EMB for the transfer of ownership of this project to San Miguel Northern Cement Inc.
A MOA must be forged among the affected families, the proponent and the LGUs regarding the payment of disturbance compensation/relocation package for the affected families	NCC has acquired the areas it has quarries. Landowners of high mineralized land gave up subject lands due to poor agricultural productivity.

The proponent shall comply with the environmental management and protection requirements of the pertinent provisions of the Philippine Mining Act of 1995 and its Revised Implementing Rules and Regulations (DAO No. 2010-21).	• EPEP Certificate #019-2000-04 approved last May 9, 2000.
	• Funds deposited at Land Bank of the Philippines as of March 2018
	  ○ Mine Rehabilitation Fund: Php 150,000
	  ○ Environmental Trust Fund: Php 50,000
	• Operation of the quarry will be transferred to ECC No. 9207-032-301C. ECC amendment is being applied.

An archaeological survey report endorsed by the National Historical Institute must be submitted to EMB and EMB-1.	Report and certification are available. No archeological assets were found within the MPSA.
Implementation of an Emergency and Safety Preparedness Program.	Complied and approved by MGB.
Implementation of Stormwater/Runoff Management Plan.	Plan is being updated for the new SMNCI cement plant project and is included in this EPRMP.
Implementation of Solid Waste Management Program.	Compliant
Implementation of Watershed Management Plan for Sapid Creek.	Compliant
Implementation of the Environmental Management Plan and Monitoring Program.	Compliant
The proponent must observe good vegetative practices, proper land use and sound soil management.	Compliant

ECC Conditions	ECC Compliance
The proponent must provide adequate and safe storage facilities for stockpiling of crushed limestone, shale, silica, coal, fuel oil, and other raw materials and finished products.	Storage facilities are provided in the project site.
Controlled blasting techniques must be employed in its quarrying operations.	Compliant
Install and properly maintain adequate and effective air, water, and noise pollution control equipment and facilities to ensure maximum efficiencies.	The NCC Line 3 cement plant was not pursued however, this will be applied to the new SMNCI cement plant that will be constructed.
Recycle the water for the cooling system. No overflow must be discharged as effluent to the water ways unless the effluent quality conforms with the DENR standards for receiving waterbodies.	The NCC Line 3 cement plant was not pursued however, this will be applied to the new SMNCI cement plant that will be constructed.
Recycling of the collected dust from the electrostatic precipitators and filter bag dust collectors and proper collection and disposal of sludge from the settling ponds. Mill scales, used oil, used drums, and other related waste generated.	The NCC Line 3 cement plant was not pursued however, this will be applied to the new SMNCI cement plant that will be constructed.

6.2 Self-Monitoring Plan

427 The Environmental Monitoring Plan (EMoP) presents a set of critical environmental parameters that will allow the San Miguel Northern Cement Inc. to ensure environmental compliance and sustainability of its operations. The EMoP allows monitoring, verification, and performance of the necessary corrective measures towards the mitigation of the identified environmental impacts. Information obtained during the EMoP implementation can be used in examining the short and long-term effects of the proposed Project's various environmental aspects, from which future strategies on environmental enhancement measures can be formulated.

428 **Table 6-2** presents the EMoP that will be implemented by SMNCI. Shown in the matrix are the concerns, parameters, monitored, as well as the corresponding sampling and measurement plan (method, frequency, location), lead person, annual estimated cost, and environmental quality performance level (EQPL) range (i.e., Alert, Action, Limit).

429 Air and water quality will be monitored as part of the EMoP. Proper methods for sampling and analysis of each media must be employed.

430 For sampling and analysis of air quality, the proponent must refer to DAO 2000-81: "Implementing Rules and Regulations of the Philippine Clean Air Act". Results of the ambient air quality sampling must be compared with the National Ambient Air Quality Guideline Values (NAAQGV) and National Emission Standards for Source Specific Air Pollutants (NESSAP), respectively. NAAQGV and NESSAP standards are disclosed in DAO 2000-81.

431 There are two references that must be followed regarding the sampling and analysis methods and water quality standards. Proper methods for water sampling and analysis are in EMB MC 2016-012 "EMB Approved Methods of Analysis for Water and Wastewater". Results of the water sampling and analysis must be compared with the standards stated in DAO 2016-08: "Water Quality Guidelines and General Effluent Standards of 2016."

432 The prescribed air and water monitoring stations are on Error! Reference source not found..

433 **San Miguel Northern Cement Inc.** will monitor its compliance through regular submission of Self-Monitoring Report (SMR) and Compliance Monitoring Report (CMR) to the DENR-EMB.

Table 6-2: Matrix of Environmental Monitoring Plan (EMoP)

KEY ENVIRONMENTAL ASPECTS PER PROJECT PHASE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETER TO BE MONITORED	SAMPLING AND MEASUREMENT PLAN			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME					
			Method	*Frequency*	*Location*			*EQPL Range*			*Management Measures*		
								Alert	*Action*	*Limit*	*Alert*	*Action*	*Limit*
PRE-CONSTRUCTION/CONTRUCTION PHASES													
Local Sourcing of Labor	People: Employment Opportunities	No. of employees from host barangays	Record no. of employees from host barangays	During pre-construction	Administration Office of the Project	San Miguel Northern Cement Inc.	Minimal	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Construction and installation of plant and support facilities	Solid Waste Generation	Weight of waste generated	Weighing/ log-book recording	Daily/weekly	Waste storage facility	San Miguel Northern Cement Inc	Part of operation costs	50% of maximum storage capacity	80% of maximum storage capacity	Maximum storage capacity	Prepare waste for disposal by third party	Contact third party for waste for disposal	Disposal of waste by third party.
	People: Occupational health and safety	No. of work-related illnesses/ injuries, No. of safety man-hours	Log-book/ database registration	Daily	Administration office of the project site	San Miguel Northern Cement Inc	Minimal	1 Non-Lost Time Accident	Multiple Non-Lost Time Accident	1 Lost Time Accident	Investigate, Do necessary actions.; Re-training of staff regarding health and safety guidelines	Investigate, Do necessary actions.; Review and reinforce safety guidelines.; Re-training of staff regarding health and safety guidelines.	Investigate, Do necessary actions.; Review and reinforce safety guidelines.; Stricter implementation of health and safety guidelines
	Water Quality: Impact on surface water quality	pH	Refer to EMB MC 2016-12	Quarterly	Aloragat River	San Miguel Northern Cement Inc	PHP 10,000 per parameter	6.5-7.5	8.0-8.5	6.5-9.0	Investigate, identify non-point sources	Investigate, identify non-point sources; Conduct maintenance of septic tanks, drainage and siltation ponds	Investigate, identify non-point sources, repair damages/ defects, repeat analysis
		TSS						60 mg/L	65 mg/L	80 mg/L			
		Fecal Coliform						180 MPN/100mL	190 MPN/100mL	200 MPN/100mL			
		Oil & Grease						1 mg/L	1.5 mg/L	2 mg/L			
	Water Quality: Impact on ground water quality	pH	Refer to EMB MC 2016-12	Quarterly	Groundwater Monitoring Wells	San Miguel Northern Cement Inc	PHP 10,000 per parameter	6.5-8.0	8.0-8.5	6.5-9.0	Investigate, identify non-point sources	Investigate, identify non-point sources; Conduct maintenance of septic tanks and drainage	Investigate, identify non-point sources, repair damages/ defects, repeat analysis
		Fecal Coliform						8.0 MPN/100mL	9.0 MPN/100mL	10.0 MPN/100mL			
		Oil & Grease						0.5 mg/L	0.75 mg/L	1.0 mg/L			

KEY ENVIRONMENTAL ASPECTS PER PROJECT PHASE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETER TO BE MONITORED	SAMPLING AND MEASUREMENT PLAN			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME					
			Method	*Frequency*	*Location*			*EQPL Range*			*Management Measures*		
								Alert	*Action*	*Limit*	*Alert*	*Action*	*Limit*
Use of Heavy Equipment	Air Quality: Impact on Ambient Air Quality and Noise	NO_2	DAO 2000-81 Analysis Methods	Quarterly	Host Municipality	San Miguel Northern Cement Inc	PHP 20,000 per station per event	105 µg/NCM	135 µg/NCM	150 µg/NCM	Continuous maintenance of heavy equipment	Continuous maintenance of heavy equipment; Investigate, identify non-point sources	Investigate condition of equipment; Repair damages/ defects, repeat analysis
		SO_2						125 µg/NCM	160 µg/NCM	180 µg/NCM			
		TSP						180µg/ NCM	200µg/ NCM	230µg/ NCM			
		PM_{10}						500 mg/NCM	550 µg/NCM	600 µg/NCM			
Use of Heavy Equipment	Hazardous Waste Generation (used oil)	Volume of wastes generated	Number of drums/log-book recording; Weighing/ log-book recording	Weekly	Waste storage facility (Refer to DAO 1992-29)	San Miguel Northern Cement Inc	Part of operation costs	50% of maximum storage capacity	80% of maximum storage capacity	Maximum storage capacity	Ensure proper storage of hazardous waste, as stipulated in HW ID. Prepare hazardous waste for treatment/ disposal by third party (Refer to DAO 1992-29)	Ensure proper storage of hazardous waste, as stipulated in HW ID. Contact third party for hazardous waste for treatment/ disposal (Refer to DAO 1992-29)	Treatment/disposal of hazardous waste by third party. (Refer to DAO 1992-29)
OPERATION PHASE													
Operation of cement plant	Air Quality: Impact on Ambient Air Quality	NO_2	DAO 2000-81 Analysis Methods	Quarterly	Host Municipality	San Miguel Northern Cement Inc	PHP 50,000 per station per event	80 µg/NCM	120 µg/NCM	150 µg/NCM	Continuous maintenance of engines	Continuous maintenance of engines; Investigate, identify non-point sources	Investigate condition of engines; Repair damages/ defects, repeat analysis
		CO						25 mg/NCM	30 mg/NCM	35 mg/NCM			
		SO_2,						120 µg/NCM	150 µg/NCM	180 µg/NCM			
		TSP						180µg/ NCM	200µg/ NCM	230µg/ NCM			
		PM_{10}						120 mg/NCM	150 µg/NCM	200 µg/NCM			
		As						0.01 mg/NCM	0.015 mg/NCM	0.02 mg/NCM			
		Cd						0.005 mg/NCM	0.008 mg/NCM	0.01 mg/NCM			
		Sb						0.01 mg/NCM	0.015 mg/NCM	0.02 mg/NCM			
		Pb						10 µg/NCM	15 µg/NCM	20 µg/NCM			
Operation of cement plant	Noise	Noise	Digital sound level meter	Quarterly	Host Municipality	San Miguel Northern Cement Inc		65 dB	70 dB	75 dB	Continuous maintenance of engines	Continuous maintenance of engines; Investigate, identify non-point sources	Investigate condition of engines; Repair damages/ defects, repeat analysis
Operation of cement plant	Stack Monitoring	CO	COMS	Continuous	Coal Mill, Raw Mill and Clinker Cooler	San Miguel Northern Cement Inc		300 mg/NCM	400 mg/NCM	500 mg/NCM	Continuous maintenance of equipment. Continuous monitoring.	Investigate, identify non-point sources	Investigate, identify non-point sources, repair damages/ defects, repeat analysis
		NO						300 mg/NCM	400 mg/NCM	500 mg/NCM			
		SOx						100 mg/NCM	150 mg/NCM	200 mg/NCM			
		PM						80 mg/NCM	100 mg/NCM	150 mg/NCM			
		As						5 mg/Ncm	8 mg/Ncm	10 mg/Ncm			
		Cd						5 mg/Ncm	8 mg/Ncm	10 mg/Ncm			
		Sb						5 mg/Ncm	8 mg/Ncm	10 mg/Ncm			
		Pb						5 mg/Ncm	8 mg/Ncm	10 mg/Ncm			

KEY ENVIRONMENTAL ASPECTS PER PROJECT PHASE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETER TO BE MONITORED	SAMPLING AND MEASUREMENT PLAN			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME					
			Method	*Frequency*	*Location*			*EQPL Range*			*Management Measures*		
								Alert	*Action*	*Limit*	*Alert*	*Action*	*Limit*
Operation of cement plant	Water Quality: Impact on surface water quality	pH TSS Fecal Coliform Oil & Grease	Refer to EMB MC 2016-12	Quarterly	Aloragat River	San Miguel Northern Cement Inc	PHP 10,000 per parameter	6.5-7.5 60 mg/L 180 MPN/100mL 1 mg/L	8.0-8.5 65 mg/L 190 MPN/100mL 1.5 mg/L	6.5-9.0 80 mg/L 200 MPN/100mL 2 mg/L	Continuous maintenance of treatment system. Continuous monitoring.	Investigate, identify non-point sources Conduct maintenance of septic tanks, drainage and siltation ponds	Investigate, identify non-point sources, repair damages/ defects, repeat analysis
Operation of cement plant	Water Quality: Impact on Groundwater quality	pH Fecal Coliform Oil & Grease	Refer to EMB MC 2016-12	Quarterly	Groundwater Monitoring Wells	San Miguel Northern Cement Inc	PHP 10,000 per parameter	6.5-8.0 8.0 MPN/100mL 0.5 mg/L	8.0-8.5 9.0 MPN/100mL 0.75 mg/L	6.5-9.0 10.0 MPN/100mL 1.0 mg/L	Continuous maintenance of treatment system. Continuous monitoring.	Investigate, identify non-point sources	Investigate, identify non-point sources, repair damages/ defects, repeat analysis
Operation of cement plant	People: Occupational health and safety	No. of work-related illnesses/ injuries, No. of safety man-hours	Log-book/ database registration	Daily	Administration office of the project site	San Miguel Northern Cement Inc	Minimal	1 Non-Lost Time Accident	Multiple Non-Lost Time Accident	1 Lost Time Accident	Investigate, Do necessary actions. Re-training of staff regarding health and safety guidelines	Investigate, Do necessary actions. Review and reinforce safety guidelines. Re-training of staff regarding health and safety guidelines. Stricter implementation of health and safety guidelines.;	Investigate, Do necessary actions. Review and reinforce safety guidelines. Re-training of staff regarding health and safety guidelines
Operation of cement plant	People: Potential negative Public Perception	No. of valid complaints	Consultation with local officials and residents	Upon official request /summon of the local barangay office	Host Municipality	San Miguel Northern Cement Inc	Minimal	1 minor complaint, such as nuisance complaints (e.g. noise caused by operation)	Multiple minor complaints such as nuisance complaints (e.g. noise caused by operation)	1 major complaint (incidents causing loss of life, damage to private property, adverse effects to health an economics)	Investigate, address issue accordingly	Investigate, address issue accordingly. Review and reinforce safety guidelines. Re-training of staff regarding health and safety guidelines.	Investigate, address issue accordingly. Review and reinforce safety guidelines. Re-training of staff regarding health and safety guidelines. Increase community IEC regarding measures taken to solve major complaints. Get feedback from community regarding

KEY ENVIRONMENTAL ASPECTS PER PROJECT PHASE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETER TO BE MONITORED	SAMPLING AND MEASUREMENT PLAN			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME					
								EQPL Range			*Management Measures*		
			Method	*Frequency*	*Location*			*Alert*	*Action*	*Limit*	*Alert*	*Action*	*Limit*
													acceptability or adequacy of actions taken to mitigate major concerns.
Operation of cement plant	Solid Waste Generation	Weight of waste generated	Weighing/ log-book recording	Daily/ weekly	Waste storage facility	San Miguel Northern Cement Inc	Part of operation costs	50% of maximum storage capacity	80% of maximum storage capacity	Maximum storage capacity	Prepare waste for disposal by third party	Contact third party for waste for disposal	Disposal of waste by third party.
Operation of cement plant	Hazardous Waste Generation (used oil, oil-contaminated materials, BFLs)	Volume of wastes generated	Number of drums/log-book recording Weighing/ log-book recording	Weekly	Waste storage facility (Refer to DAO 1992-29)	San Miguel Northern Cement Inc	Part of operation costs	50% of maximum storage capacity	80% of maximum storage capacity	Maximum storage capacity	Ensure proper storage of hazardous waste, as stipulated in HW ID. Prepare hazardous waste for treatment/ disposal by third party (Refer to DAO 1992-29)	Ensure proper storage of hazardous waste, as stipulated in HW ID. Contact third party for hazardous waste for treatment/ disposal (Refer to DAO 1992-29)	Treatment/disposal of hazardous waste by third party. (Refer to DAO 1992-29)
Effluent from plant site	Water Quality: Degradation of water quality due to effluent discharge	Oil and Grease pH TSS	Refer to EMB MC 2016-12	Quarterly	Siltation pond effluent, OWS effluent	San Miguel Northern Cement Inc	PHP 10,000 per parameter	3 6.0-9.5 90 mg/L	4 6.0-9.5 95 mg/L	5 6.0-9.5 100 mg/L	Continuous maintenance of treatment system. Continuous monitoring.	Investigate, identify non-point sources	Investigate, identify non-point sources, repair damages/ defects, repeat analysis
ABANDONMENT PHASE													
Pull-out of equipment, decommissioning of fuel storage, abandonment of offices	Generation of Demolition spoils and solid wastes	Weight (kg); no. of items	Weighing/ log-book recording	Daily/ weekly	Project Site	San Miguel Northern Cement Inc	To be deter-mined	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Potential negative public perception	No. of valid complaints	Consultation with local officials and residents	Variable	Host Municipality	San Miguel Northern Cement Inc	PHP 40,000 per consultation	1 minor complaint, such as nuisance complaints (e.g. noise caused by decommissioning, inconvenience and traffic caused by trucks)	Multiple minor complaints such as nuisance complaints (e.g. noise caused by decommissionin g, inconvenience and traffic caused by trucks)	1 major complaint (incidents causing loss of life, damage to private property, adverse effects to health an economics)	Investigate, address issue accordingly	Investigate, address issue accordingly. Review and reinforce safety guidelines. Re-training of staff regarding health and safety guidelines.	Investigate, address issue accordingly. Review and reinforce safety guidelines. Re-training of staff regarding health and safety guidelines. Increase community IEC regarding measures taken to solve major complaints. Get feedback from community regarding

KEY ENVIRONMENTAL ASPECTS PER PROJECT PHASE	POTENTIAL IMPACTS PER ENVIRONMENTAL SECTOR	PARAMETER TO BE MONITORED	SAMPLING AND MEASUREMENT PLAN			LEAD PERSON	ANNUAL ESTIMATED COST	EQPL MANAGEMENT SCHEME					
			Method	*Frequency*	*Location*			*EQPL Range*			*Management Measures*		
								Alert	*Action*	*Limit*	*Alert*	*Action*	*Limit*
													acceptability or adequacy of actions taken to mitigate major concerns.

Notes: EQPL = Environmental Quality Performance Level

- Alert or Red Flag: early warning
- Action Level: point where management measures must be employed so as not to reach the regulated threshold or limit level, or to reduce deterioration of affected environmental component to pre-impact or optimum environmental quality
- Limit Level: regulated threshold of pollutant (standard that must not be exceeded); point where emergency response measures must be employed to reduce pollutants to lower than standard limit.

6.3 Multi-Sectoral Monitoring Framework

434 The Monitoring Framework, as stated in Annexes 3-2 and 3-4 of the RPM for DENR Administrative Order No. 2017-15, presents a proposed program wherein the proposed Project's environmental compliance will be verified and reported to concerned stakeholders.

435 The MMT will be composed of government regulators (LGU representatives) and recognized non-governmental organizations that have valid issues and concerns on the proposed project. The proponent shall provide appropriate funding for the MMT activities based on the Annual Work and Financial Plan approved by EMB. DENR-EMB must provide guidance to the MMT and shall conduct performance audits of the MMT.

436 The MMT's objective is to provide a venue to discuss the important concerns of stakeholders regarding the Project. These concerns may involve the following items:

- Verify the compliance of **San Miguel Northern Cement Inc.** in its ECC and EMP;
- Validate the proposed Project's conformance to government standards, **San Miguel Northern Cement Inc.'s** submission of necessary post-ECC documentation requirements;
- Identify the legitimate concerns of the host community, in relation to the implementation of the Project;
- Determine the extent and scale of the environmental impacts generated by the Project;
- Provide additional information, education, and communication (IEC); and
- Integration/documentation of complaints, suggestions, and compromise agreements.

437 The MMT members and their corresponding roles and responsibilities are presented in **Table 6-3**.

Table 6-3: Proposed Composition of the MMT for the Project

COMPOSITION	MEMBER	ROLE/RESPONSIBILITY
LGU representatives	(1) representative from the Municipal Environment and Natural Resources Office (MENRO) of Sison	▪ Serve as the MMT chair ▪ Oversee Proponent's compliance to environmental regulations ▪ Issue/revoke the ECC of the Project as mandated
	(1) Rural Health Unit (RHU) Chief or Municipal Health Officer (MHO) of Sison	▪ Exercise local authority and knowledge on environmental and social conditions in the project impact area
	Concerned Barangay Captain (Labayug)	
One representative from an LGU-accredited local NGOs with mission/s specifically related to environmental management	(1) To be determined	▪ Represent the mission/s of the NGO
Maximum of 2 representatives from locally recognized community leaders	(1) Farmers (2) Senior Citizens Association	▪ Represent vulnerable sectors in the project impact area
Maximum of 3 representatives from government agencies	(1) Department of Agriculture	▪ Carry out mandate considering the project type and its expected impacts
Reference: DENR Administrative Order No. 2017-15		

438 The DENR heads the MMT and oversees compliance to environmental regulations. Furthermore, it has the power to revoke the ECC if deemed necessary. As the proponent, **San Miguel Northern**

Cement Inc. must comply with environmental regulations by providing mitigation and enhancement measures. Lastly, representatives from the host municipal and barangay LGUs provide the consensus of the local community and has jurisdiction over the project site.

439 **San Miguel Northern Cement Inc.** will continue to regularly conduct consultations/meetings with the MMT members. These meetings shall be conducted quarterly and annually. Special meetings may also be held if necessary, most especially during emergency situations or other important occasions that require immediate resolution.

6.4 Environmental Guarantee and Monitoring Fund Commitments

440 The Environmental Guarantee Fund (EGF) pertains to the fund to be set up by a project proponent which shall be readily accessible and disbursable for the immediate clean-up or rehabilitation of areas affected by damages in the environment and the resulting deterioration of environmental quality as a direct consequence of a project's construction, operation or abandonment. It shall likewise be used to compensate parties and communities affected by the negative impacts of the project, and to fund community-based environment related projects including, but not limited to, information and education and emergency preparedness programs.

441 The indicative allocation for the EGF for the operation of the proposed cement plant complex is PHP 1,000,000.00 (One Million Pesos). The said amount will be subject to review and approval of the MMT. The fund shall be replenished if the amount falls below 50%.

442 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, operation, and abandonment;
- 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, environmental enhancement measures, damage prevention program including the necessary IEC and capability building activities to significantly minimize or buffer environmental risk- related impacts.

443 The EGF can be used for, but not limited to, the following project-specific purposes:

- Environmental enhancement measures such as greening programs in the area,
- Support development and implementation of resource management in area,
- Support development and implementation of water conservation plan, and
- Oil spill clean-up

444 On the other hand, the Environmental Monitoring Fund (EMF) refers to the fund that a proponent shall set up after an ECC is issued for its project or undertaking, to be used to support the activities of the multi-partite monitoring team. It shall be immediately accessible and easily disbursable. The indicative allocation for the EMF of the proposed project is PHP 500,000.00 (Five-Hundred Thousand Pesos), which will also be subject to review and approval of the MMT.

SECTION 7

DECOMMISSIONING/ABANDONMENT/REHABILITATION POLICY

7.1 Post-Construction Decommissioning

445 After the construction, the project site will be thoroughly cleaned as preparation for the operation. All the temporary facilities installed in the project site will be properly dismantled and removed including the equipment brought in the project site. Heavy equipment will be removed at the site during night time so that it will not affect the traffic in the project site. It will be ensured that there will be no oil spills during the decommissioning of the equipment.

446 All the wastes generated will be properly disposed or recycled. Construction debris and domestic wastes will be segregated, and all residual wastes will be hauled out by the Municipal waste collectors. All hazardous wastes will also be collected by DENR-registered haulers. Human wastes from the portable toilets will be properly siphoned by DENR-register desludgers. No wastes will be left in the project site.

7.2 Project Decommissioning/Abandonment

447 **San Miguel Northern Cement Inc.** will allocate sufficient time and available resources if the decommissioning, abandonment, and/or rehabilitation of the Project will be necessary. Depending on the nature and reasons for abandonment, some facilities, such as the containers used as offices, may not be necessarily demolished or removed from the site, since some of these can be useful for other applications. Otherwise, proper dismantling, removal, and transportation of the structures, equipment, and machineries from the existing site will be conducted to minimize possible or further threats to the surrounding environment. Other activities that will be done during this Phase are:

- Proper advice and compensation to all affected personnel;
- Securing of necessary government clearances related to the abandonment of the existing Project (including request for the relief of ECC conditions and commitment);
- Removal of solid, liquid, and hazardous wastes within the site through DENR-certified waste transporter/treater; and
- Clean-up and possible remediation of the site, if future evaluations and testing suggest that such activity is applicable.

448 Some plant facilities, such as office and accommodation buildings, can be repurposed by the community. Cement manufacturing facilities such as crushing plant, kilns, etc.) will be removed while storage facilities can be repurposed. Siltation ponds will be backfilled and re-vegetated.

Table 7-1: Proposed Final Land Use of Project Site After Decommissioning and/or Rehabilitation

Process/Component	Proposed Final Land Use
• **Cement Plant and Facilities**	• Stable and re-vegetated area. • Removal of structures and possibly transferred to other projects or sold. • Retained storages for other useful purpose.
• **Office and accommodation buildings**	• Retained facilities for other useful purpose.

Process/Component	Proposed Final Land Use
	• Laboratory and motor pool equipment and other items will be removed and transferred to another project or sold.
• **Silt traps/ponds and drainage system**	• Silt traps/ponds backfilled and re-vegetated. • Water reservoir retained as recreation/picnic area. • Drainage system retrofitted to conform to proposed final land use.

SECTION 8

INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION

449 The institutional organization of **San Miguel Northern Cement Inc.** for the proposed Line A and Line B cement plant is shown in **Figure 8-1**. The organization is formed to achieve the following:

- Economical and safety operations and maintenance of the proposed cement plant components;
- Implementation of the company policies;
- Environmental compliance and sustainability; and
- Promotion and enhancement of the social acceptability of the proposed project.

450 The institutional organization will involve **San Miguel Northern Cement Inc. 's** top-level management, who is responsible for providing the corporate direction and policies of the company. The policies shall then be disseminated to the department heads and managers for implementation of the company personnel, including those who will be working on the operations of the proposed project.

451 **San Miguel Northern Cement Inc.**will also establish a partnership with relevant government agencies, various stakeholders, and local host communities in relation to the project. This partnership is necessary to maintain a transparent and positive relationship for the proposed project and its stakeholders, as well as to ensure that the environmental protection and enhancement measures are complied with.

452 **San Miguel Northern Cement Inc.** will also continue to establish a partnership with relevant government agencies, various stakeholders and local host communities in relation to the project. This partnership is necessary to maintain a transparent and positive relationship for the proposed project and its stakeholders, as well as to ensure that the environmental protection and enhancement measures are complied with. The following are the identified key stakeholders of the project:

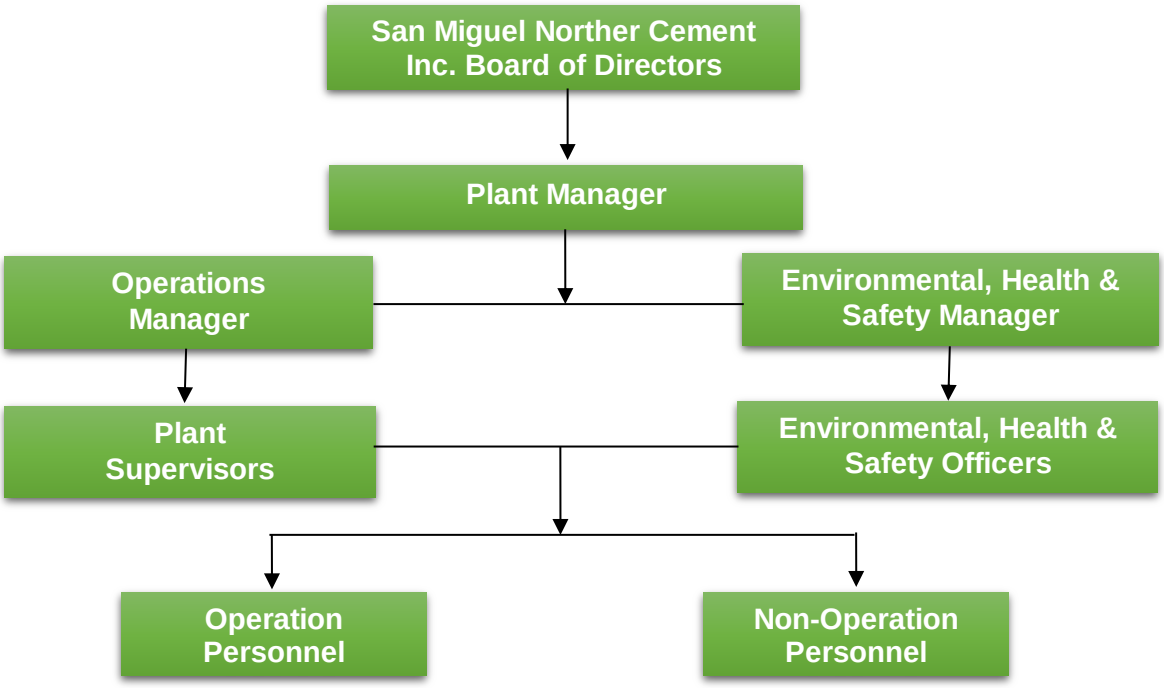
- Municipal LGU of Sison, Pangasinan (host municipality)
- Brgy. Labayug, Sison (host barangay)
- Residents and community organizations that will be affected by the proposed project;
- Farmers' organizations;
- Chamber of Commerce;
- Various industry organizations;
- Local peace-and-order councils (i.e., PNP, Barangay Police); and
- Other concerned non-government organizations.

453 San Miguel Northern Cement Inc. commits to:

- Comply with the conditions that will be stipulated in the ECC and other related environmental laws;
- Foster mutually beneficial partnership and cooperation with the host community;
- Promote sustainable use and responsible development of resources by adopting appropriate technologies;
- Develop livelihood programs and upgrade skills of host community to contribute and enhance the quality of life; and

- Develop training programs for its employees to ensure that they will be continually prepared for the tasks assigned to them.

Figure 8-1: Organizational Chart for the Institutional Plan



PROJECT PROPONENT: SAN MIGUEL NORTHERN CEMENT, INC.	FIGURE TITLE: **ORGANIZATIONAL CHART FOR THE INSTITUTIONAL PLAN**	FIGURE NO.: 8-1
EIA REPORT PREPARER: LCI ENVI CORPORATION	PROJECT TITLE & LOCATION: **SMNCI LINE A & B NEW CEMENT PRODUCTION PROJECT** Brgy. Labayug, Sison, Pangasinan	SOURCE: NCC