

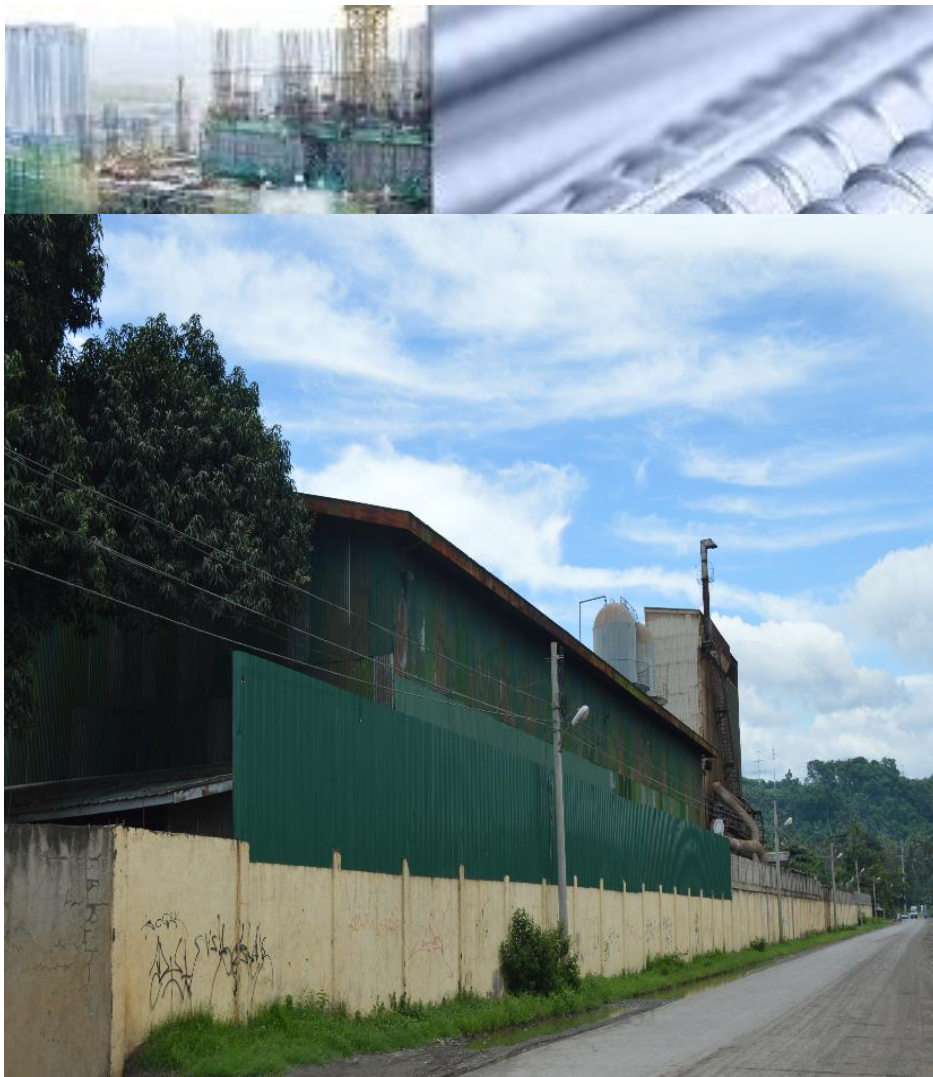


ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Capacity of the Steel Rolling Mill Project



Brgy. San Martin, PHIVIDEC, Villanueva, Misamis Oriental



Prepared by:



Mediatrrix Business Consultancy

Increase in Production Capacity of the Steel Rolling Mill Plant San Martin Steel, Inc.

Table of Contents

Executive Summary	5
Project Fact Sheet / PD Summary	5
Process Documentation in the Conduct of EIA	10
EIA Summary	21
Concise integrated summary of the main impacts and residual effects after applying mitigation	23
Risks and Uncertainties relating to the findings and implications for decision-making	24
CHAPTER I: PROJECT DESCRIPTION	24
1.1 Project Location and Area	24
1.1.1 Project Location	24
1.1.2 Geographic coordinates of the Project Site	30
1.1.3 Discussion on the Accessibility of the Project Site/ Area	34
1.2 Project Rationale	34
1.3 Project Alternatives	36
1.3.1 Criteria Used In Determining Preliminary Options	36
1.3.2 Environmental Impact of Each Alternative	36
1.3.3 No Project Option	36
1.4 Project Components	37
1.4.1 General lay-out of facilities	37
1.4.2 Map showing the location and boundaries of project area, location and footprint of main and support facilities and proposed buffers	37
1.4.3 Major Components:	40
1.4.4 Ancillary/Support Facilities	40
1.4.5 Pollution Control Devices and Corresponding Facilities Being Served or Connected	42
1.5 Process /Technology	45
1.5.1 Processing/Manufacturing Technology	45
1.5.2 Pollution Control Devices and waste management system	59
1.5.3 Operations and Maintenance of Facility	59
1.6 Project Size	59
1.7 Development Plan, Description of Project Phases and Corresponding Timeframes	59
Pre-Construction	59
Construction	59
Operation	60
1.8 Manpower	62
1.9 Indicative Project Investment Cost	65
CHAPTER II: ASSESSMENT OF ENVIRONMENTAL IMPACTS	66

2.1	LAND	66
2.1.1	Land Use and Classification	66
2.1.2	Pedology.....	83
2.1.3	Terrestrial Biology	91
2.1.4.1	Vegetation removal and loss of habitat.....	91
2.1.4.2	Threat to existence and / or loss of important local species	93
2.1.4.3	Threat to abundance, frequency and distribution of important species	93
2.1.4.4	Hindrance to wildlife access	93
2.2	WATER.....	93
2.2.1	Hydrology/Hydrogeology.....	93
2.2.1.2	Hydrogeology.....	94
2.2.2	Oceanography.....	99
2.2.2.1	Change/disruption in water circulation pattern, littoral current, coastal erosion and deposition 99	
2.2.2.2	Change in bathymetry	99
2.2.3	Water Quality.....	99
2.2.3.1	Degradation of groundwater quality	99
2.2.3.2	Degradation of surface water quality.....	104
2.2.3.3	Degradation of coastal/marine water quality.....	106
2.2.4	Freshwater Ecology	108
2.2.4.1	Impacts.....	112
2.2.5	Marine Ecology	112
2.3	AIR.....	113
2.3.1	Meteorology/Climatology	113
2.3.2	Air Quality and Noise.....	120
2.3.2.1.1	Impact Assessment and Mitigation.....	122
2.3.2.1.1.1	Construction Phase	122
2.3.2.1.1.2	Operation Phase	122
2.3.3	Increase in ambient noise level.....	142
2.3.3.2.1	Construction Phase - NA.....	146
2.3.3.2.2	Operation Phase.....	146
2.4	PEOPLE	150
2.4.1	Impact Area.....	150
2.4.2	Displacement of settlers.....	177
2.4.3	In-Migration / Proliferation of informal settlers	178
2.4.4	Cultural/Lifestyle Change	178
2.4.5	Impacts on physical/cultural resources	178
2.4.6	Threat To Delivery Of Basic Services /Resource Competition	178
2.4.7	Threat to Public Health and Safety	178

2.4.8 Generation of Local Benefits.....	178
2.4.9 Traffic Congestion	178
CHAPTER III: ENVIRONMENTAL MANAGEMENT PLAN	180
3.1 Summary Matrix of the Impact Management Plan	180
CHAPTER IV: ENVIRONMENT RISK ASSESSMENT AND EMERGENCY RESPONSE POLICY AND GUIDELINES.....	185
4.1 Introduction	185
4.2 Scope and Coverage	185
4.3 Type of Risks.....	185
4.3.1 Safety Risks	185
4.3.2 Release of Toxic Substances.....	186
4.3.3 Physical Risks.....	187
Breakdown or Failure of Equipment and Facilities	187
4.3.4 Hazards	187
4.4 Emergency Response and Disaster Preparedness Plan (DPP)	188
1. Introduction.....	188
2. Purpose	189
3. Emergency Action Team (EAT).....	189
4. Standard Operating Procedures	190
5. Institutional Set Up	192
CHAPTER V. SOCIAL DEVELOPMENT PLAN (SDP) AND IEC FRAMEWORK	193
5.1 The Social Development Plan (SDP)	193
5.2 The Information, Education and Communications (IEC) Implementation Plan	203
CHAPTER VI: ENVIRONMENTAL COMPLIANCE MONITORING	204
6.1 Environmental Performance	204
6.2 Self-Monitoring Plan	210
6.3 Multi-Sectoral Monitoring Framework.....	215
6.3.1 Functions.....	215
6.3.2 MMT Formation and Operationalization.....	215
6.4 Environmental Guarantee And Monitoring Fund Commitments	215
CHAPTER VII: DECOMMISSIONING/ ABANDONMENT/ REHABILITATION POLICY	217
CHAPTER VIII: INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION	218
CHAPTER IX: BIBLIOGRAPHY.....	221
CHAPTER X: ANNEXES	223

EXECUTIVE SUMMARY

Project Fact Sheet / PD Summary

Project Information	
Name of Project	Increase in Production Capacity of the Steel Rolling Mill Plant
Plant Location and Address	<p>PHIVIDEC Industrial Estate, Brgy. San Martin, Municipality of Villanueva, Misamis Oriental</p> <p>Shown in Figure 0.1 is the PHIVIDEC Map showing SanMartin Steel as among the locators within PHIVIDEC.</p>
Project Area	<p>2.2464 hectares property owned and rented from PHIVIDEC by SanMartin Steel, Inc. in PHIVIDEC, Brgy. San Martin, Municipality of Villanueva, Province of Misamis Oriental.</p> <p>Shown in Figure 0.1 is the Project Location Map.</p>
Project Type	Iron and steel mill; Steel manufacturing
Project Capacity	Increase in rebar production capacity from 20,000 MTPY to 250,000 MTPY
Project Description	<p>Elegant Chemical Alloy Corporation commissioned the company in 2006. It was then Mindanao's only operating rebar mill. SMSI, around 2014 bought the Company together with its facilities and auxiliaries. However, when the whole Company was bought, there was no EIA Report, compliance reports nor monitoring reports turned over to SMSI.</p> <p>These Bar Rolling Mill Facilities and Deform Bar Manufacturing Plant have the following ECCs:</p> <ol style="list-style-type: none"> 1. ECC 10(43)05- 04-18 3979-37121 2. ECC 10 (43)03 06-26 3294-37121 <p>These ECCs of Elegant Alloy was then transferred to SMSI on August 25, 2015. Copy of the Deed of Sale between Elegant Alloy, Inc. and San Martin Steel, Inc. is attached as Annex B while the ECC transfer is attached as Annex C.</p> <p>This project which involves increase in rebar production capacity, is not covered by the previous ECC, thus, to include said increase in production capacity, an amendment was applied but only to ECC 10(43)05- 04-18 3979-37121 covering rebar operations. Also, SMSI wishes to amend the conditionalities attached to ECC 10(43)05- 04-18 3979-37121 to conform to the updated requirements of the EIS System and the expanded operations of SMSI.</p> <p>Along with SteelAsia's M5 in Davao, SMSI now is the only rebar manufacturing operator in Mindanao. The region's buyers have seen rebar costs reduced by over PhP 1,500 (USD 35) per ton. Davao consumers and distributors no longer needed to 'import' rebar from Manila, as the region had its own rebar mill which could be accessed for picked-up orders 24 hours a day, 7 days week. Besides the lower rebar cost, the impact was also immediately felt by the regions business community as mill created economic activity for logistics, operations supply and jobs and port activity.</p> <p>The two Mindanao mills are also able to cover for the unprecedented construction growth in the Luzon and Visayas islands, shipping rebar regularly to these regions. Villanueva Works offers PNS49 Rebar (sizes 10mm to 16mm, lengths 6M to 12M) with a Grade 230 (ASTM Grade 33) regular and weldable.</p>

Project Information																																																								
Rationale	<p>The steel industry in the Philippines is one of the most significant growth industries. Steel constitutes a basic industry prerequisite in a country's pursuit of development and industrialization. The central role of the industry stems from its linkages with numerous sectors, where its products serve as an essential input to countless uses, such as building and construction, automotive, shipbuilding and repair, electronics, packaging, etc. and it is equally important contributions to employment generation, growth, and promotion of industrial activity, etc. Therefore, ensuring a strong domestic steel and steel-based industry is vital in developing the competitive edge of a country in meeting the challenges of globalization.</p> <p>With the boost in infrastructure industry in the country together with the rehabilitation activities in Marawi and some parts of the country, there will be a bigger demand for reinforcing steel bars. The proponent is investing in the expansion of SMSI Plant to improve its production capacity and operations process to cater to the aforementioned increase in demand.</p> <p>Most importantly, the main focus of the management is to optimize the productivity of existing equipmen in order to ensure the increase the production output while maintaining the cost as low as possible.</p> <p>With its optimized capacity, SMSI can suffice up to 24% of the steel needs of the Mindanao market. This includes the steel needs of the rehabilitation works in Marawi as well as the big ticket construction projects of the government. In addition to volume, SMSI also brings to its customers the benefit of reliable supply, timely delivery and freight savings of at least P1000 per ton due to its proximity in the market.</p>																																																							
Project Components	<p>The components of the Project are all existing. These include the following:</p> <table><tr><th>Components</th><th>Existing</th><th>Proposed Changes</th></tr><tr><td>A. Major Project Components</td><td></td><td></td></tr><tr><td>• Furnace</td><td>√</td><td>same</td></tr><tr><td>• Smokestack</td><td>√</td><td>same</td></tr><tr><td>• Rolling Mill:</td><td>√</td><td>same</td></tr><tr><td>• Mill Train</td><td>√</td><td>same</td></tr><tr><td>• Cooling Bed</td><td>√</td><td>same</td></tr><tr><td>• Finished Goods Warehouse</td><td>√</td><td>same</td></tr><tr><td>• Electrical Substation</td><td>√</td><td>same</td></tr><tr><td>• Recirculating Water System</td><td>√</td><td>same</td></tr><tr><td>B. Other Facilities</td><td></td><td></td></tr><tr><td>• Admin Building</td><td>√</td><td>same</td></tr><tr><td>• QA Laboratory</td><td>√</td><td>same</td></tr><tr><td>C. Additional Facilities</td><td></td><td></td></tr><tr><td>• Hazardous Waste Facility</td><td>Nil</td><td>√</td></tr><tr><td>• Material Recycling Facility</td><td>Nil</td><td>√</td></tr><tr><td>• Clinic</td><td>Nil</td><td>√</td></tr><tr><td>• Materials Warehouse</td><td>Nil</td><td>√</td></tr></table>		Components	Existing	Proposed Changes	A. Major Project Components			• Furnace	√	same	• Smokestack	√	same	• Rolling Mill:	√	same	• Mill Train	√	same	• Cooling Bed	√	same	• Finished Goods Warehouse	√	same	• Electrical Substation	√	same	• Recirculating Water System	√	same	B. Other Facilities			• Admin Building	√	same	• QA Laboratory	√	same	C. Additional Facilities			• Hazardous Waste Facility	Nil	√	• Material Recycling Facility	Nil	√	• Clinic	Nil	√	• Materials Warehouse	Nil	√
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Manpower																																																								
Duration of Project	From acquisition in 2014, the project is expected to operate for a period of at least 40 years.																																																							
Project Schedule	After securing all the required and necessary clearances and permits, including the ECC Amendment, construction of the additional facilities including the optimization of the equipment will commence and will be completed in 14 months.																																																							

Project Information	
Total Project Cost	PhP 1,000,000,000.00.
Proponent Profile	
Name of Proponent	<p>San Martin Steel, Inc. (SMSI).</p> <p>SMSI is a wholly owned subsidiary of SteelAsia Manufacturing Corporation and part of the SteelAsia Group. Copy of the SEC Registration of San Martin Steel, Inc. is provided in Annex A. It was established for the purpose of acquiring and operating the existing steel rolling mill plant formerly of Elegant Alloy, Inc. that produces rebar.</p> <p>The SteelAsia Group is comprised of steel bar manufacturing companies. From 1966 to present, it has built and operated rolling mills across the archipelago. Currently, six SteelAsia Group rolling mills cover the major island groups of Luzon, Visayas and Mindanao with a combined manufacturing capacity of 2.3 million tons per year.</p> <p>The SteelAsia Group's operation systems have been internationally certified to:</p> <ul style="list-style-type: none"> • ISO 9001 Quality Management • ISO 14001 Environmental Management • OHSAS 18001 Occupation Health and Safety • ISO 17025 Testing Laboratory • UK Certification Authority for Reinforcing Steel (UK CARES) British Standard
Address	B2 Bldg., Bonifacio High Street, BGC, Taguig, Metro Manila
Authorized Signatory/ Representative	Mr. Roberto Cola Vice President
Contact Details	Landline number: (632) 856-6888 Mobile No.: +639178675921 Email address: RMCola@steelasia.com
Profile of the Preparer	
EIA Preparer	Mediatrix Business Consultancy
Consultant's Address	L29 Joy-Nostalg Center, 17 ADB Ave., Ortigas Center, Pasig City
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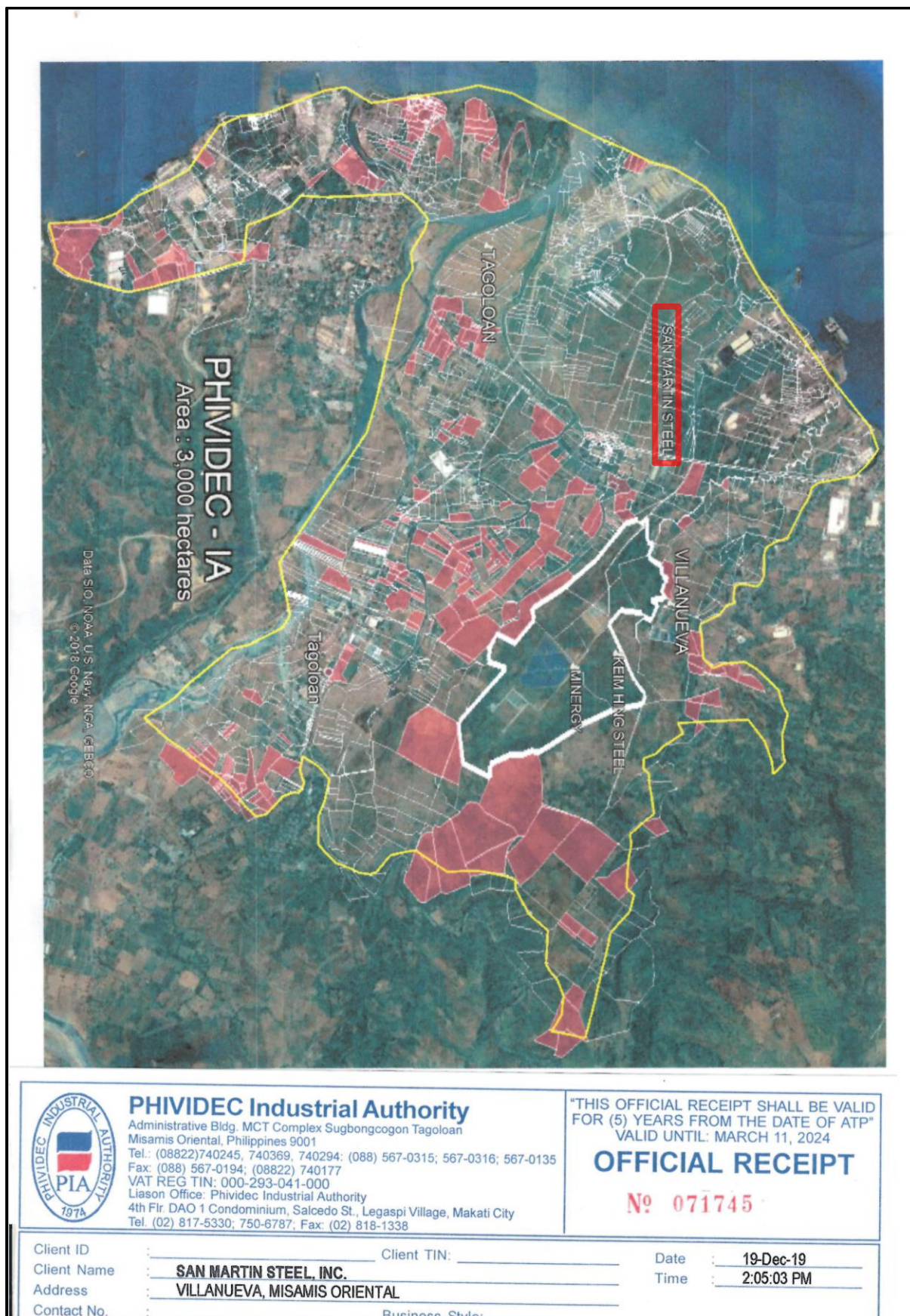


Figure 0.1: PHIVIDEC MAP superimposing the project site

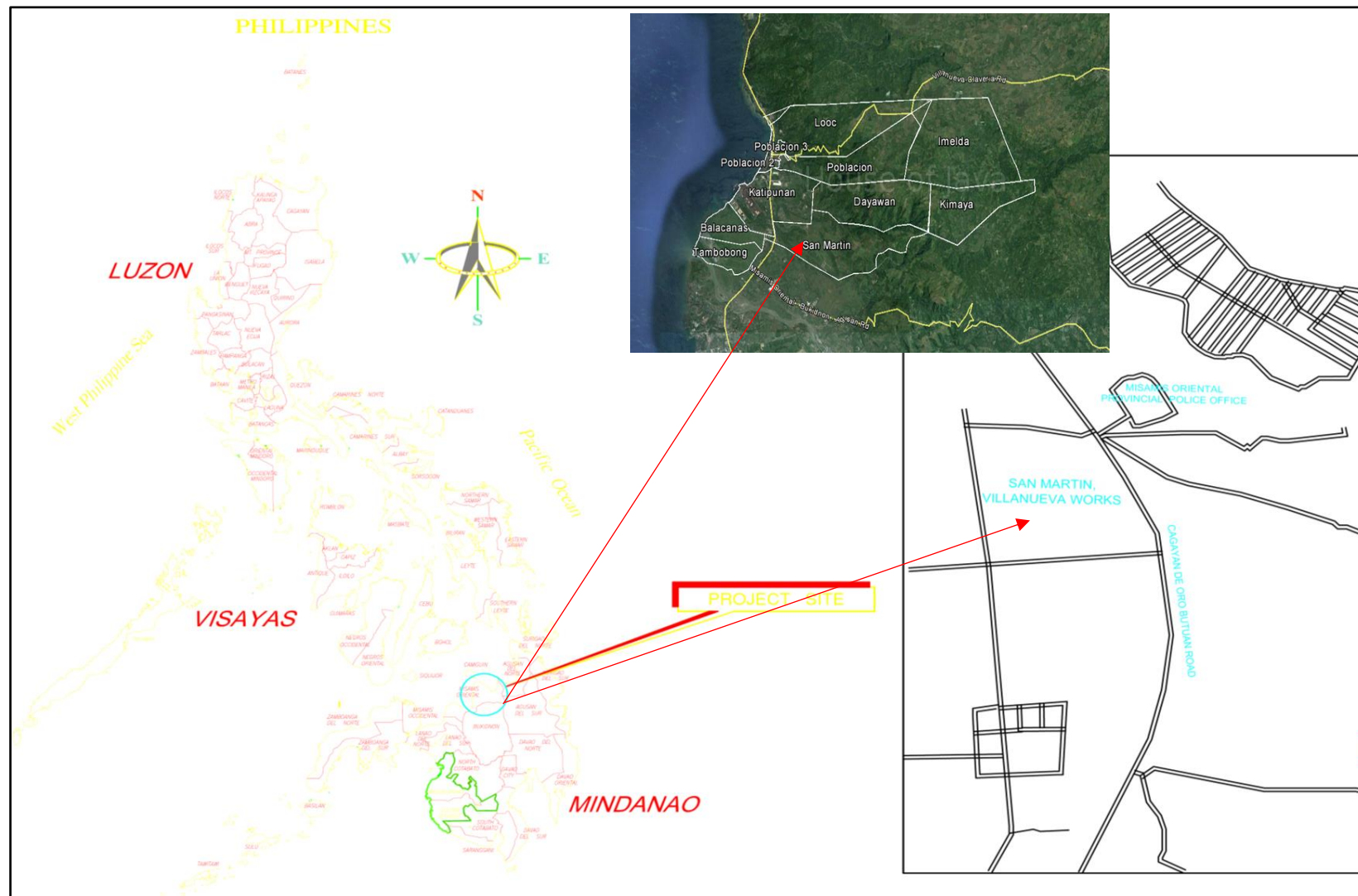


Figure 0.2: Location and Vicinity Map (source: San Martin Steel, Inc.)

Determination of impact area

The criteria used in determining the direct impact area (DIA) and the indirect impact area (IIA) are the guidelines provided under DAO 2003-30 and supplemented by DAO 2017-15.

Annex 2-2 of the Revised Procedural Manual (RPM) of DAO 2003-30 initially defined the Direct Impact Area (DIA) at the pre-EIA stage as the area where all “*project facilities are proposed to be constructed/situated and where all operations are proposed to be undertaken*”. However, this was revised by DAO 2017-15 to include the following:

- A. The DIA shall be delineated based on the results of the assessment of the Project’s impact on air, water, land and people.
- B. The IIA on the other hand, shall be delineated for impacts on people and shall include those in the vicinity of the DIA who will either benefit or be affected indirectly by the Project

With these, the result of the air dispersion modeling, noise modeling, ambient air and noise and water quality sampling were used to determine the areas directly affected by the emissions from the establishment. With this, the direct impact area (DIA) covers only the project site because based on the results of the air dispersion and noise modeling and air and water quality sampling, all of the ground level concentrations (GLCs) and results generated were well within the standards of the Clean Air Act, DENR Standards on Noise and water quality.

On the other hand, the indirect impact areas (IIA) cover the hauling route of materials needed to optimize the process and increase the capacity and of billets and finished products during operations and the community at the periphery of the project site.

Process Documentation in the Conduct of EIA

EIA Team

San Martin Steel, Inc. engaged the services of Mediatrix Business Consultancy to conduct the EIA for the project and to prepare the EPRMP Report. The EIA team, composed of professional experts on their respective fields and with the coordination and the technical people from the proponent, were organized based on the project’s EIA needs.

Table ES1: EIA Team

NAME	DESIGNATION	IPCO NUMBER	EXPERTISE	PARTICIPATION
Ms. Matilde Fernando, J.D.	Project Manager / EIA Team Leader	IPCO-035	Socio-Economic, Public Participation and community engagement, Public Health and Safety, Waste Management (Solid and Hazardous wastes Management)	Preparation of Study/ Report and consolidation of documents for the whole project study; Actual measurement of the facility, and preparation of As-built plans of the structure relevant to the requirements needed for the application
Engr. Ria Caramoan	Assistant Team Leader	IPCO-106	Air and water	Preparation of Project Description and water module
Engr. Fritzie Jane Salido	Chemical Engineer	IPCO - 113	Air and water and report consolidation	Report Consolidator
Mr. Alexis Fernando	Researcher	IPCO-034	Research and community engagement	Gathering of secondary information
Mr. Juvinal Esteban	Social Worker	IPCO-091	Social work and community engagement	Preparation of socio module
Sarah Tangonan	ComRel		Perception Survey and public participation	Conduct of Perception Survey and Public Participation
Ms. Cathrina Bautista	Research Assistant		Community engagement	Conduct of perception survey

Following are the proponent representatives who participated in the gathering and provision of information for the EPRMP:



Table ES1A: Company representative who provided assistance in the provision of information for the EPRMP

Consultant / Technical Person from Proponent	Areas of Expertise
Maximo Otadoy, Jr.	Plant Manager
Ronald Magsajo	Business development
Jun Alipio, Jr.	
Jaques Maandig	Resident Manager
Lorena Pading	Pollution Control Officer

EIA Schedule

Mediatrix Business Consultancy was engaged by San Martin Steel, Inc. in February 2016. As early as 2016, the project proponent has been coordinating with the stakeholders of the project especially with LGUs concerned. Stakeholder profiling proceeded immediately to prepare for the initial EIA processes. Public Scoping was held in Municipal Gymnasium of Villanueva; February 24, 2016 while the Technical Scoping was conducted last April 18, 2016. EIA baseline studies and impact assessment were conducted in May and the EIA Report was completed progressively.

Table ES2: EIA Milestone and Schedules

EIA Activity/Stage	Date
EIA Planning, Project and Stakeholder Profiling	January 2016
Preliminary IEC and consultation with the officials of San Martin	November 2015 to February 2016
Public Scoping	23 February 2016
Technical Scoping	April 18, 2016
Baseline studies	May 2016 to Feb. 2017
EIA study, modeling, impact assessment and mitigation plan	
EIA Report Preparation	
First Review	February 15, 2018
2 nd Review	
Public Hearing	
Final Review	

EIA Methodology

Pursuant to the Department Administrative Order (DAO) No. 30 Series of 2003 of the Revised Procedural Manual of the Philippine EIS System (PEISS) and EMB Memorandum Circular 005 dated July 7, 2014, the project is classified under Category A - Environmentally Critical Projects (ECPs) which requires an EIS Report for an Environmental Compliance Certificate (ECC) application.

The EIA for the proposed amendment conforms to the Revised Procedural Manual for DENR Administrative Order (DAO) 2003-30 and DAO 2017-15 in the conduct of the following activities, to wit: (i) IEC and Scoping, (ii) collection of primary and secondary data, (iii) identification/prediction/assessment of environmental impacts, (iv) formulation of EMP, and (v) development of EMoP. The baseline information are mainly primary and secondary data which were obtained from the Local Government Units (LGUs) and other government agencies. The data collected were based from the EIA Scoping and Screening Form presented in **Annex J**, which was finalized during the Technical Scoping on June 14, 2017.

Table ES-3 presents the detailed EIA methodology per environment sector/component and discusses how the current project environmental monitoring data/results were used in the assessment of the environmental performance of the company for its current operation.

Table ES3: EIA Methodology

EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
<i>Land</i>			
Geology/ Geomorphology,	Land use, land classification assessment, slope,	Secondary data, soil sampling and testing, review	The area investigated is prone to ground shaking hazards due to the presence of several earthquake generators in and

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Municipality of Villanueva, Misamis Oriental



EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
Pedology, Land Use & Classification	soil types and classification, erosion	of geological reports and maps	<p>near the region. These possible seismogenic structures include the active Tagoloan Fault, Central Mindanao Fault and the Mindanao Fault-Western Mindanao Extension. Figure 2.2.1.5.1.1b shows that the project falls near the location where earthquake magnitude of 6.5 -7.5 and with depth of 300 – 700 kilometers where recorded.</p> <p>The project site is underlain mainly by alluvial deposits mostly sandy silt associated with pebble to gravel size material being located near Macajalar Bay and fall under the 0.30g and 0.20g for Soft Soil and Medium Soil condition, respectively.</p> <p>The project is located within a private land owned and managed by the Phividec Industrial Authority, an industrial park which houses heavy industries such as powerplants, steel mill and sintering industries.</p> <p>The western part of the municipality has probably the most productive soil parent materials considering its flat landform and other factors concerning productions. However, most of these areas are already used for built up areas especially with the implementation of PD 538 creating the PHIVIDEDEC Industrial Estate.</p> <p>The remaining half towards the eastern side have soils development from a parent material that is generally deep to very deep, a pH thread of acid to strongly acid. Plant growth in this soil is good. Some of these areas are cultivated for agricultural production, some still have forest cover.</p> <p>Soil sampling was conducted at the project site in 10 April 2018. Soil sampling was conducted to investigate the elements, particularly heavy metals, which are present in the soil matrix within the project site. Heavy metals are a special concern since these substances are hazardous, even in small amounts and have a potential to contaminate the surrounding environment. Also, the aspects of soil erosion/soil quality/fertility were taken into consideration as there are some farming activities ongoing at the project site. Soil quality test was</p>

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EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
			<p>conducted at the project site using Swedish EPA Generic Guideline Value for Soil (2009), as there are no standards under the Philippine law.</p> <p>Heavy metals such as mercury, zinc, copper, manganese, iron, lead, chromium, boron, chloride and cadmium as well as Phosphorus, Potassium, organic matter and water retention were tested. Results of soil sampling were compared with Swedish EPA Generic Guideline Value for Soil (2009) for hexavalent chromium, potassium, phosphorus, total organic matter, total nitrogen and pH. This sampling and analysis were undertaken to determine whether soil require urgent remediation due to unmitigated contamination. Although all of the parameters were detected in the Project area, they are all below the Dutch target values and Swedish EPA Generic Guideline Value for Soil. This shows that pedology is still unaffected by heavy metal contamination. Although the present DENR-EMB guideline does not have a definitive acceptable standard or limits on the presence of heavy metals on soils, SanMartin Steel conducted the sampling to establish the baseline.</p>
Terrestrial Biology – Wildlife and Vegetation	Flora and fauna species inventory, species endemicity and conservation status, species abundance, frequency and distribution	Use of secondary data	The project area is already developed, and all facilities are already existing and constructed. There are few trees at the project site, 4 mango trees but no vegetation present.
<i>Water</i>			Based on the assessment of the project site, no waterbody is present within the project area. Tagoloan River's nearest area to the project site is about 2.53 kms while Macajalar Bay is about 1.71 km.
Hydrology/Hydrogeology	Regional hydrogeology, catchment and drainage system	Use of secondary data, water balance analysis, interviews	
Water Quality	Physico-chemical and bacteriological characteristics of applicable bodies of water	Primary data were secured through water sampling and laboratory analysis	The PAG ASA projections showed that rainfalls can increase at certain months of the year by only 2.9 % compared to maximum decrease at other months of the year of 10.4 %, suggesting that rainfall aberrations in the Region should not cause heavy flooding in/adjacent to the project site.
Freshwater Ecology	Accounting of all existing benthic habitats, species, composition, density, and diversity of sea grass resources and associated macro benthic algae in front of the project site ,	Use of primary and secondary data	Based on the 1997 Groundwater Availability Map of the Philippines, the Project Site falls under local to less extensive and productive aquifers with

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EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
	commercially-important macro invertebrates in the inter-tidal areas, plankton community		<p>moderate potential recharge. The classification is attributed to the scarcity of productive wells in the area.</p> <p>The project will use the existing deepwells at the project site which can still cater the water requirements for the project while implementing waste water recycling. The plant will also utilize rainwater harvesting in the future as its method for collecting rain and later used in the processing of materials.</p>
<i>Air</i>			
Air Quality	Ambient air quality and noise levels	Primary data through sampling and laboratory analysis	<p>The ambient TSP, PM₁₀, PM_{2.5}, SO₂, NO₂, and heavy metals (As, Cd, Cr⁶, Pb, & Hg) concentrations were measured at the identified sampling points. The selection of the sampling stations was based on the locations of receptors, source, and prevalent wind direction. Methods for sampling and analysis conformed to methods prescribed in Sec. 1(b) Rule VII Part II of the Clean Air Act IRR. The resulting ambient air concentrations were compared with the National Ambient Air Quality Guidelines Values (NAAQGV), Rule VII, Part II and the National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations Section 1 Rule XXVI Part VII of the Clean Air Act IRR.</p> <p>The monitoring results show that the concentrations of TSP, PM₁₀, NO₂, and SO₂ for 1-hour averaging period in all stations are below the CAA limits of 300 µg/Ncm for TSP, 200 µg/Ncm for PM₁₀, 260 µg/Ncm for NO₂, and 340 µg/Ncm for SO₂, respectively. Heavy metals concentrations (As, Cd, Cr⁶, Pb, & Hg) in all stations are below the method detection limit.</p> <p>Moreover, the results of monitoring for 24-hour averaging period are also within the CAA limit.</p>
Meteorology/Climatology	Monthly average rainfall, climatological normal and extremes, wind rose diagrams, and frequency of tropical cyclones	Use and review of secondary data	<p>The climate of the project site belongs to Type IV as referred to the climate map of the Philippines based on the Modified Coronas system of classification. The Type IV climate has more or less rainfall distributed evenly throughout the year.</p>
Air Dispersion Modeling	Worst case scenario identification, use of meteorological data	Use of AUSPLUME Model	

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Municipality of Villanueva, Misamis Oriental



EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
Noise		Sampling of noise	<p>The noise standard used are the residential areas as prescribed in Section 78, Table 1 of the 1978 NPCC Rules and Regulations, Environmental Quality Standard for Noise in general areas.</p> <p>Significant noise was contributed by vehicles playing near the stations, especially those stations which were situated in populated communities, with houses close to each other. Motorcycles and tricycles were main modes of transportation particularly for communities although there were few cars that pass.</p> <p>During sampling, there were also activities that contribute to the noise levels measured, like youths playing, sounds from karaoke and many others (background noise). Activities like these are part of the community culture and so they were considered valid for inclusion in the measurement of baseline noise data.</p>
<i>Climate Change</i>			
Temperature change	<p>Seasonal Temperature increase (in °C) in 2020 and 2050 under medium range emission scenario in Misamis Oriental</p> <p>Monthly Average Temperature without Climate Change</p> <p>Monthly Average Temperature with Climate Change (2006-2035)</p>	Effects of Temperature Increase	The historic average annual ambient air temperature indicates that there is little monthly or seasonal variation in average temperatures.
Rainfall change	<p>Seasonal rainfall change (in %) in 2020 and 2050 under medium range emission scenario in Misamis Oriental</p> <p>Monthly Average Rainfall without Climate Change (1980-2010)</p> <p>Monthly Average Rainfall with Climate Change (2006-2035)</p>	Effects of change in rainfall pattern	The climate change scenario for the Philippines published by PAGASA in February 2011 indicated that the Province of Misamis Oriental will have a fluctuating amount of rainfall.

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
	Monthly Average Rainfall with Climate Change (2006-2065)		
Greenhouse Gas Assessment	GHG Emissions based on IPCC 2006 Guidelines and USEPA Procedure	Fuel oil consumption vs GHG emissions	The total overall estimated CO ₂ emission based on IPCC 2006 and USEPA is 136,175.33 metric tons per year. The Philippines Initial National Communication (INC) on Climate Change has projected 122,344 Gg of CO ₂ for 2008 for energy sector. Using these projections of INC, the Project operation is expected to contribute an approximately 0.034084% of the total CO ₂ emission. In the global levels projection of CO ₂ emission for 2020 under the USEPA Sectoral Trend in Global Energy Use and Greenhouse Gas Emissions, Climate Protection Division, Office of Air and Radiation, the estimated contribution of the Project globally is 0.000461%. When such a comparison is made, this total emerges as a small contribution to the total global anthropogenic CO ₂ load. If this total is a measure of responsibility for global warming, on an absolute magnitude, the Project can still be considered to be on the low-end greenhouse gas emitters in the world.
<i>People: Socio-Economic, Health</i>			
Public health and Demography	Morbidity and mortality trends, Demographic data of impact area: - Number of households and household size - Land area, - Population, - Population density /growth - gender and age profile, - literacy rate, profile of educational attainment	Interviews with key elected officials of the barangays (from barangay captains to councilors and the social welfare barangay officers/ barangay health workers); analysis of secondary health data; Use of secondary data from RHU and NSO; Interviews with the locals; household-level survey	Questions related to health and sanitation in the affected communities were included in the perception survey.
Socio-economics	Socioeconomic data: Main sources of Income, Employment rate/ profile, sources of livelihood, Poverty incidence, commercial establishments and activities, banking and financial institutions	Perception surveys, Interviews with municipal and barangay officials; analysis of secondary data; analysis of survey results Provision of traffic management flow in a traffic management plan Provision of housing options for workers within the vicinity	Manpower at the Plant does not discriminate against gender and age as long as the worker is qualified and fit to work. Also, equal protection clause on employment is considered by prioritizing local employment in the barangay/s and within the affected municipality for technical staff and workers.

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
			<p>Perception surveys were done in from January 7 to 10, 2017. A total of 1,100 households were randomly interviewed and surveyed, which corresponds to 20% of the population of Brgy. San Martin in year 2010 according to the Philippine Statistics Authority.</p> <p>A total of 177 respondents were laborer/skilled, 130 were self-employed, 22 respondents were drivers, another 60 respondents (10.08%), 79 respondents were Government Employees, 5 elected officials, 130 have other types of occupation, 10 did not provide their response and the remaining 497 respondents are jobless.</p> <p>For the respondents' monthly income, 325 respondents (54.62%) answered to be earning between Php 1,000-5,000. 130 respondents (21.85%) earn a monthly income of Php 5,001-10,000 while 140 respondents (23.53%) obtains a monthly salary of Php 10,001-above.</p> <p>66 households (55.46%) have a family size between 2-5 persons. 46 households (38.66%) answered the range between 6-10 persons while 7 households (5.88%) have 11-15 persons in their family. According to the survey, all respondents and households are residents of San Martin.</p> <p>In terms of the types of houses, 46 households (38.66%) are concrete, 44 households (36.97%) are made of nipa, bamboo, 27 (22.69%) mixed concrete, and 2 (1.68%) are salvage material. Roofs of these houses are made of steel roof (yero) (45.95%), concrete (35.14%), nipa, and bamboo (17.57%) and salvage material (1.35%).</p> <p>For the households' method of cooking and fuel, majority (49.25%) uses wood, other households use LPG/Butane (34.33%), 9 households (6.72%) use charcoal, another 9 households (6.72%) use kerosene while the remaining 4 households (2.99%) use electric stove.</p> <p>In terms of their sources of water, 112 households (40.73%) acquires water from artesian well, 112 households (40.73%) use purified water. 45 households (16.36%) obtains water from</p>

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
			<p>the water district while the remaining 6 households (2.18%) get water from deep wells. Most households use water for drinking/cooking (49.58%) as well as washing (49.58%) while 2 households (0.83%) use water for farming.</p> <p>88 households (25.36%) have television sets in their homes, 82 households (23.63%) have electric fans, 68 households (19.60%) possesses radio, 58 households (16.71%) owns a CD/DVD player, 28 households (8.07%) have computers while 23 households (6.63%) owns airconditioners.</p> <p>Majority of the respondents (57.03%) do not own any vehicle but 175 respondents (27.34%) own motorcycle, 60 respondents (9.38%) have bicycles, 30 respondents (4.69%) holds a car (sedan), 5 respondents (0.78%) owns a van/jeepney and the remaining 5 respondents (0.78%) answered the others option. Note: Multiple responses</p> <p>Health situation, Environmental awareness and Utilities</p> <p>Each 119 households had a sick family member for the past years and all consulted a doctor although there are multiple responses for this question. The top three causes of illness in the area are Fever/Headache (44.55%), Cough/Flu (39.55%), and Diabetes/Highblood (15.45%), one household (0.45%) answered the others option.</p> <p>In terms of toilet facilities, 115 households (93.50%) have water closet toilets while 8 households (6.50%) have an open pit toilet.</p> <p>All 595 respondents (100%) experienced Calamity for the last 10 (ten) years.</p> <p>With the implementation of the project, there will be change in lifestyle of the community that would improve their standard of living. This will be brought about by stable jobs and higher household incomes. As a result, the affected families will be capable of giving their children proper education and widen their opportunities. The company, by example, shall encourage modest lifestyle and simple living standards in accordance with its philosophy. On the</p>

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



EIA Study Module	Parameters/Scope	Baseline Sampling and Methodology	Findings
			contrary, the company will encourage families to participate in livelihood projects that will be sponsored by the company.
<i>Environmental Risk Assessment</i>			
Risk Assessment	Safety risks and physical risks	Consequence and Frequency analyses to be undertaken using the methodology described in the Revised Procedural Manual for DAO 2003-30	

Over-all, the environmental performance of the Plant is compliant with the standards set by law and by DENR and the environmental safeguards/measures for the current project operation are sufficient and effective as evidenced by its continuing Plant's environmental performance without violation as shown in the test results compliant with the standards set by DENR and by law which are reported quarterly in EMB Region 10. Although there will be increase in capacity, no additional measures are installed because the existing mitigation measures can still accommodate the possible impacts. Moreover, to save on water, rainwater collection as enhancement measure will be implemented as well as additional safety measures for the workers will be in place to ensure safety.

Public participation, scoping and consultation in the conduct of the EIA Study

Pursuant to DAO 2003-30, MC 2010-14, and DAO 2017-15, SMSI has conducted a series of public participation activities through pre-scoping Information, Education and Communication (IEC) via FGD/KII, perception survey, public scoping and informal discussions with the Municipal and Barangay Officials of San Martin and Villanueva from November 2016 regarding the amendment of the project.

Perception Survey

The perception survey was conducted on August 28 to 30, 2016. A total of 383 households were randomly interviewed and surveyed. The Malabanan Sur population of 9,123 as of 2015 was used.

Public Scoping

On 24 February 2016, the public scoping with the stakeholder was held to discuss about the (project including its impacts and benefits) and provide them the opportunity to present their issues and concerns as well as provide their clarifications on pertinent matters concerning the same project. Consultations were done through public scoping and these were attended by Brgy. San Martin officials and residents. Public Hearing will be conducted next to present the results of the EIA Report to the stakeholders after EMB completes the EIS screening.

Provided below is a summary of issues and concerns and how these were addressed and responded to.

Table ES4: Public Scoping Issues and Concerns

Module	Concern	Name and Affiliation	Proponent's Response
Project Description	Kind of Furnace, employment and waste	SB Councilor Leoncio Abejo	The Proponent responded that the existing furnace of the Plant will be enhanced; some of its parts will be replaced to improve the process; The Proponent added that it is the Company's policy to prioritize hiring from residents. More than 80% of San Martin employees are from Misamis Oriental. About 40% are from Villanueva.
Air	Dust from the process, standard height of stack, noise and taxes due to local government	Kagawad Celso Casino, Brgy. San Martin	The Proponent responded that there is no dust from the process because it only involves reheating; The smokestack of the Plant is currently 36 meters and was already inspected by EMB10. On noise, the Proponent will look at the concern and address immediately. As to taxes due to the local government, SanMartin Steel, Inc.

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



			will pay what is due to the government even if it is located in the industrial estate.
	Can SanMartin provide measures to mitigate the dust outside the Plant brought about by vehicles plying the access road; is employment or hiring done with PESO, all hires should be reported to PESO; CSR for San Martin before ECC issuance	Kap. Jeric Emano, Brgy. San Martin	SAN Martin will strictly implement speed limits of its vehicles and contractors and will provide additional water sprinkling to minimize dust emission. The HR of SMI will coordinate and report to PESO all employees hired. The Proponent noted the request for CSR prior to ECC issuance.
	Air emissions; Recommended Plant inspection by the Sangguniang Bayan	Edgar Caday, OSHNET	Air modelling will be conducted to determine the pollutants and the affected area; the proponent noted the recommendation for site inspection.
	Air pollution may reach their barangay	Capt. Elmer Hermil, Brgy. Imelda	
	Black smoke coming out of the Plant's roof	Auxilladora Veimen	The proponent responded that they will closely look into the concern because the smokestack is currently 36 meters and was already inspected by EMB10. The issue on horizontal spread of smoke is noted and will be addressed immediately.
Others			
MMT	MMT formation as a requirement of the current ECC transferred to San martin	Oliver Elio	Engr. Alex Jimenez responded that MMT was not formed because the capacity is limited and thus MMT is not required. Once the ECC amendment is issued increasing the capacity to 250,000 MTPY, MMT will be required. EMB Region 10 will determine if this project will be clustered with other MMTs since this is considered small compared to bigger industries.
	Include him as a representative of the Senior Citizens Association (OSCA) in the Plant inspection to monitor the activities of the Plant	Romeo Talipan, OSCA	The Proponent noted the suggestion.
Project Description	Kind of Furnace, employment and waste	SB Councilor Leoncio Abejo	The Proponent responded that the existing furnace of the Plant will be enhanced; some of its parts will be replaced to improve the process; The Proponent added that it is the Company's policy to prioritize hiring from local residents. More than 80% of SanMartin employees are from Misamis Oriental. About 40% are from Villanueva.
Air	Dust from the process, standard height of stack, noise and taxes due to local government	Kagawad Celso Casino, Brgy. San Martin	The Proponent responded that there is no dust from the process because it only involves reheating; The smokestack of the Plant is currently 35 meters and was already inspected by EMB10. On noise, the Proponent will look at the concern and address immediately. As to taxes due to the local government, SanMartin Steel, Inc. will pay what is due to the government even if it is located in the industrial estate.
	Can SanMartin provide measures to mitigate the dust outside the Plant brought about by	Kap. Jeric Emano, Brgy. San Martin	SAN Martin will strictly implement speed limits of its vehicles and contractors and will provide additional water sprinkling to minimize dust emission.

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



	vehicles plying the access road; is employment or hiring done with PESO, all hires should be reported to PESO; CSR for San Martin before ECC issuance		The HR of SMI will coordinate and report to PESO all employees hired. The Proponent noted the request for CSR prior to ECC issuance.
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	Include him as a representative of the Senior Citizens Association (OSCA) in the Plant inspection to monitor the activities of the Plant	Romeo Talipan, OSCA	The Proponent noted the suggestion.

EIA Summary

Summary of Alternatives Considered in terms of Siting, Technology Selection/Operation Processes and Design

Following were the criteria used:

Technology Selection/Operation Processes

As a member of the Steel Asia group of companies, the technology and the processes to be used in the increase in production capacity of San Martin Steel Rolling Mill is common to their other existing plants in the country. The production capacity of each plant may be different but they will use the more modern rebar rolling technology and for this project, upgrading of the technology will be undertaken.

Resources

In terms of water source, the existing capacity of their own deepwell within the Plant compound can still supply the Plant's water requirements which is reused and recycled. In terms of power supply, power from local cooperative is used with standby generator sets.

Logistics

Steel manufacturing is essentially a transportation business as it requires a lot of moving & handling for its raw materials and finished goods. The plant is sited near the port and major highways where customers can optimize the logistics cost.

Manpower Availability

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



This Projects needs around 386 personnel to run and maintain the facilities 24/7 at two shifts. Manpower at the Plant does not discriminate against gender and age as long as the worker is qualified and fit to work. Also, equal protection clause on employment is considered by prioritizing local employment in the barangay/s and within the affected municipality for technical staff and workers.

Land

The land area must accommodate all the facilities needed in a contiguous manner. In addition, it should not require a long time for land conversion and expensive site development. It should have sufficient elevation for flooding. The Project site is an existing plant within an industrial area.

Carbon footprint

The proponent's policy is to adopt practices to minimize fuel use. These include optimized trip planning/routing to increase fuel efficiency, reducing the number of kilometers each truck travels daily and minimizing travel time. This is being implemented by SteelAsia that it why it is locating in places near the development areas.

The following locations in Cebu were evaluated using these criteria.

Table ES5: Summary of Alternatives Considered

SITE	AREA	DISTANCE		ENVIRONMENTAL IMPACT	REMARKS
		PORT	AIRPORT		
Municipality of Sibonga	60 hectares	54.4 Kms or 1hr & 15mins	64.8 Kms or 1hr & 30mins	85% Flat, 15% Rolling	Ownership issues and area is cut by old Cebu Railway system
Carcar City - Brgy. Ocaña	18 hectares	48.8 Kms or 1hr & 10mins	59.2 kms or 1hr & 20mins	70% Flat, 30% Rolling	Found out that portion of the property is occupied by school
Municipality of San Fernando	6.6 has (expandable to 10 has)	33.7 kms or 42 mins	44 kms or 1 hr	30% Flat, 70% Rolling	Not considered due to limited area
Bogo City	25 hectares	105 kms or 1hr & 54mins	100 kms or 1hr & 58mins		Too far from market and port facility
Toledo City - Brgy. Dumlog	13.18 hectares				Limited area
Municipality of Concepcion, Iloilo	91 hectares	112 kms or 1hr & 36mins	111 kms or 1hr & 44mins	Rolling terrain per google map; Beside proposed 270 MW Coal-fired Power Plant owned by A. Brown Company	Distance to Iloilo City is 107 kms or 1hr & 36mins Located in the upper portion of Panay Island near Municipality of Estancia
MUNICIPALITY OF CARMEN	15.77 hectares	39.4 kms or 54 mins	39.8 kms or 58 mins	60% Flat, 40% Rolling	One access road but long frontage area
	100% Titled			Nearest distance to river (shallow during dry months) is 20 meters	Nearest distance to National H-way is 700 meters via Municipal Road
	Residential			Has existing lagoon/pond	National H-way elevation 25 ft; Site lowest elevation 45ft; Site highest elevation 85 ft
Sitio Kirahon, Villanueva	industrial				Chosen as additional site

Environmental Impacts of Each Alternative

Following are the environmental impacts of each alternative:

In terms of location, the potential impacts in all locations are the same. However, other areas were not considered because of existing, and power sources and the land classification is not yet industrial.

Environmental characteristics of the project site were also considered in the site selection. The location is clear and flat area. Being in a topographically flat area, hazards associated with slope instability,



erosion and mass wasting are insignificant. The location of the project facilities was also evaluated in terms of geohazard susceptibility based on information from government agencies such as the Mines and Geosciences Bureau (MGB) and the Philippine Institute of Volcanology and Seismology (PHIVOLCS). Generally, the project area's susceptibility to earthquake-triggered slope failure and rainfall-triggered slope failure are low. With regard to seismic vulnerability and liquefaction potential, the potential ground-shaking and liquefaction susceptibility of the project site is also low.

There are four active fault lines in Misamis Oriental that might result once quake happen according to the provincial administration through its Disaster Risk Reduction Management Office (PDRMO). Fernando Dy Jr., officer-in-charge of PDRMO, disclosed the the Office is intensifying its programs to avert catastrophes. He identified the faults to be present in Cabanglasan town in Bukidnon province, Barangay Iponan, and the municipalities of Tagoloan and Alubijid in Misamis Oriental. Should these fault lines move, the municipalities of Lagonglong, Balingasag, and Jasaan will be affected since they are within the Cabanglasan fault. The Cabanglasan fault traverses east of Misamis Oriental. Also, Villanueva, Claveria, and Tagoloan towns are located near the Tagoloan fault while Opol is at the Iponan fault and the province of Lanao del Norte, which is near the Alubijid fault.

Massive earthquake drills in coordination with with the Department of Education (DepEd) are the priority because the schools in municipalities that will likely be affected. There established sites or Safe Haven near schools, so that in case there will be an earthquake, a safe place will be ready for them. An identification of the properties is set in August to determine establishments or residences found along the fault lines that will most likely be affected once earthquake occurs. Markings will be placed in areas that can be possibly affected. Then, they will be warned of the dangers they are facing. Currently, risk reduction rather than really already looking for relocation sites as it is not easy to relocate these affected residents is the priority. More discussions are provided and summarized in the next two chapters.

No Project Option

If the project will not proceed, there will be no additional disturbance to the environment. However, the 'no project' option must be weighed against the economic benefits that the project would bring to the host barangays and to the national and regional economies. The economic benefits that would be derived from the project are:

- Potential to create jobs during the operations phase;
- Local taxes include the local distribution of real property taxes and local business tax;
- Capital investment;
- Contribution to the combined Gross Regional Domestic Product (GRDP) for Region 10;
- The overall impact of these economic contributors from the project to the national economy will be added to the annual GDP.

Also, if this increase in production capacity project will not materialize, social development such as livelihood projects, skills training, scholarship programs and medical assistance for the residents of San Martin, in particular will not be realized. Also, the prospective multiplier effect of the project such as business opportunities, support to basic services like infrastructure and medical assistance and other opportunities for the community and LGU will likely lose when the project is not pursued.

Having at least 60% of the market share, there will also be scarcity in the supply and availability of quality construction materials availability which will bring up the cost of construction materials and sacrifice the integrity of the infrastructure development plan in the country. Also, rehabilitation program for the calamity and war-stricken areas will be delayed.

Concise integrated summary of the main impacts and residual effects after applying mitigation

The Project's major impact given in a worst-case scenario of drought is water resource use competition. However, when that time comes, the Project will be forced to stop its operation because it will not be feasible to operate the mill in such worst-case scenario.

The specific measures to address the issues on water resource competition are the following:

- Water reuse and recycling to reduce water requirement
- Water harvesting



Risks and Uncertainties relating to the findings and implications for decision-making

Based on the EIA conducted, there are insignificant risks and uncertainties for the Project because mitigation and management plans have been laid down and the Proponent's mother company, the SteelAsia Group of Companies has been in the business for more than 51 years.

CHAPTER I: PROJECT DESCRIPTION

San Martin Steel, Inc. is a subsidiary of SteelAsia Manufacturing Corporation (SAMC). The Steel Rolling Mill Project of San Martin Steel, Inc. is the 7th Plant of SAMC. Copy of the SEC Registration is attached as Annex A.

This project together with its facilities and auxiliaries has been bought by SMSI from Elegant Chemical Alloy Corporation. This project which will involve increase in rebar production capacity, is not covered by the previous ECC, thus, to include said increase of production capacity, an amendment shall be applied. Also, SMSI wishes to amend conditionalities attached to ECC 10(43)05- 04-18 3979-37121 to conform to the requirements of the EIS System and the increased capacity for the operations of SMSI. ECC transfer has already been effected. However, no report on EIA, SMR or CMR was transferred to San Martin Steel thus the unavailability of environmental information to be used by SMSI as its baseline.

Copy of the ECC transfer is attached as Annex B.

1.1 Project Location and Area

1.1.1 Project Location

Shown in Figures 1.1.1.1, 1.1.1.2 and 1.1.1.3 are the maps showing the project's location in Brgy. San Martin, PHIVIDE, Villanueva, Misamis Oriental.



Figure 1.1.1.1: Project Location Map / Study Area

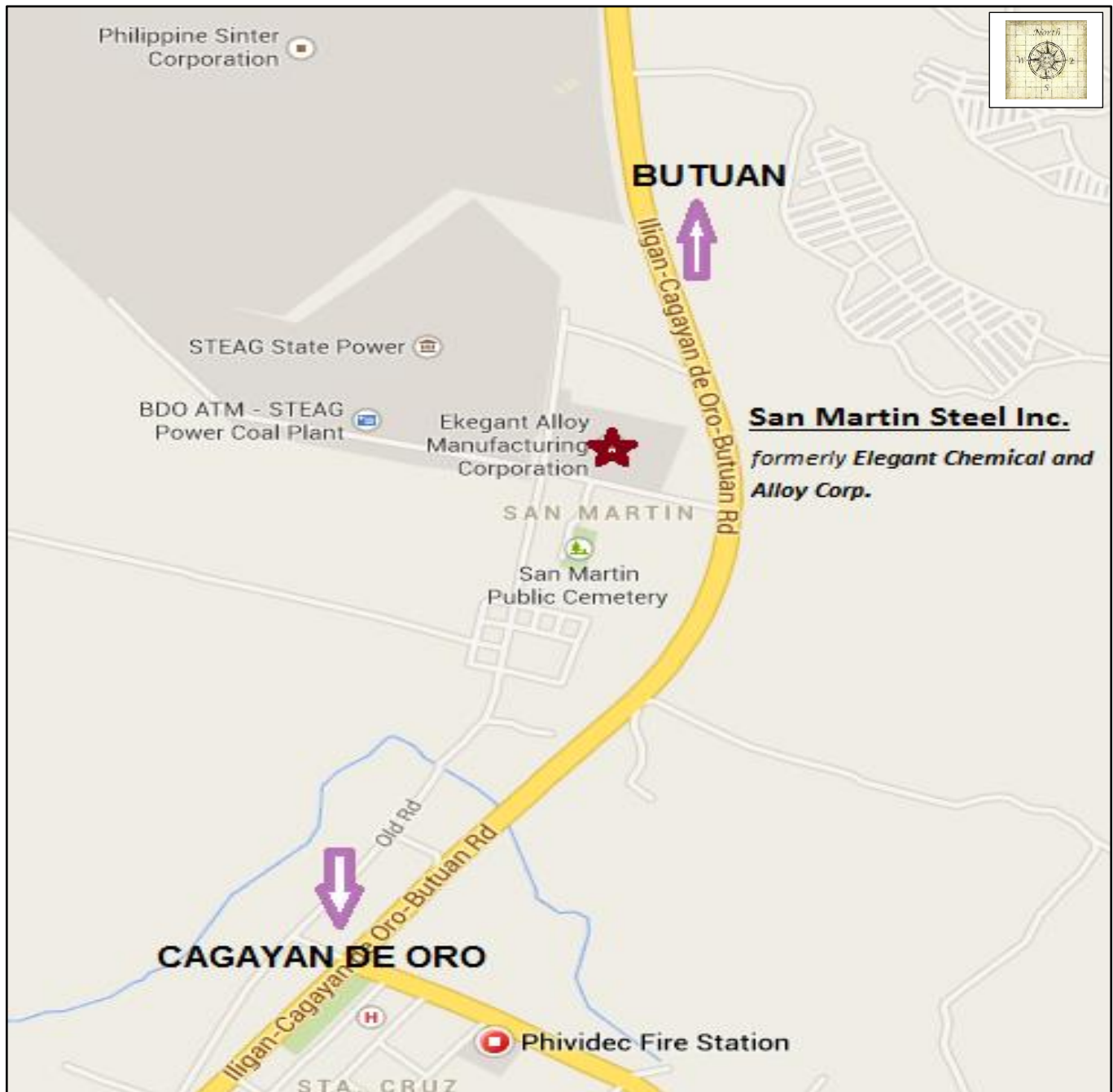


Figure 1.1.1.2: Project location in the Misamis Oriental Provincial Map
(Source: SMSI using the Google Street Map of Villanueva)

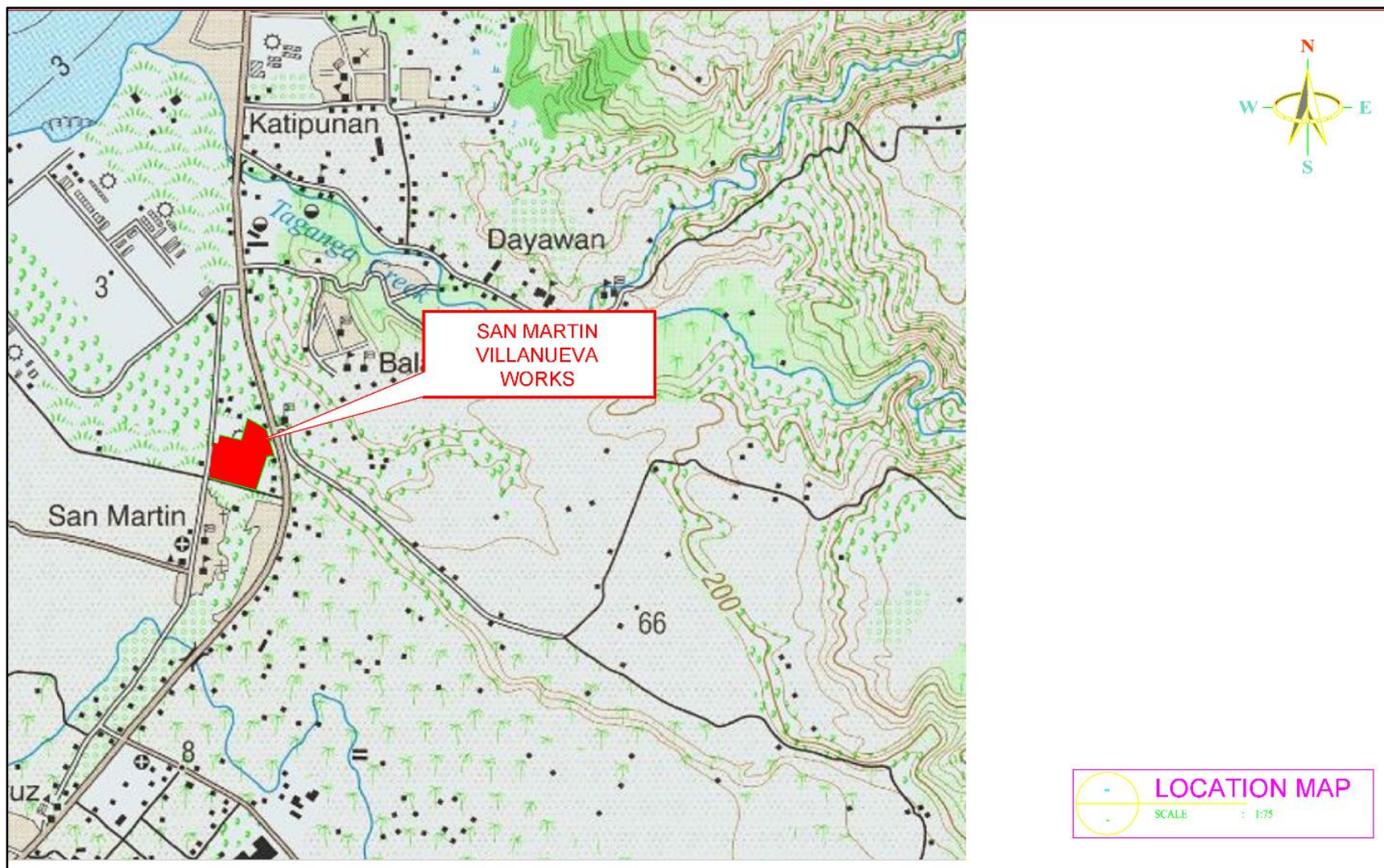


Figure 1.1.1.3: Project Location Map superimposing the project site (source: SMSI)



Provided below are photographs of the project site.





Plate 1: Photographs of the Project Site

Determination of impact area

The criteria used in determining the direct impact area (DIA) and the indirect impact area (IIA) are the guidelines provided under DAO 2003-30 and supplemented by DAO 2017-15.

Annex 2-2 of the Revised Procedural Manual (RPM) of DAO 2003-30 initially defined the Direct Impact Area (DIA) at the pre-EIA stage as the area where all “*project facilities are proposed to be constructed/situated and where all operations are proposed to be undertaken*”. However, this was revised by DAO 2017-15 to include the following:

- C. The DIA shall be delineated based on the results of the assessment of the Project’s impact on air, water, land and people.
- D. The IIA on the other hand, shall be delineated for impacts on people and shall include those in the vicinity of the DIA who will either benefit or be affected indirectly by the Project

With these, the result of the air dispersion modeling, noise modeling, ambient air and noise and water quality sampling were used to determine the areas directly affected by the emissions from the establishment. With this, the direct impact area (DIA) covers only the project site because based on the results of the air dispersion and noise modeling and air and water quality sampling, all of the ground level concentrations (GLCs) and results generated were well within the standards of the Clean Air Act, DENR Standards on Noise and water quality.

On the other hand, the indirect impact areas (IIA) cover the hauling route of construction materials during construction stage and of billets and finished products during operations and the community at the periphery of the project site.

The map of the Impact Area is shown in **Figure 1.1.1.4**.

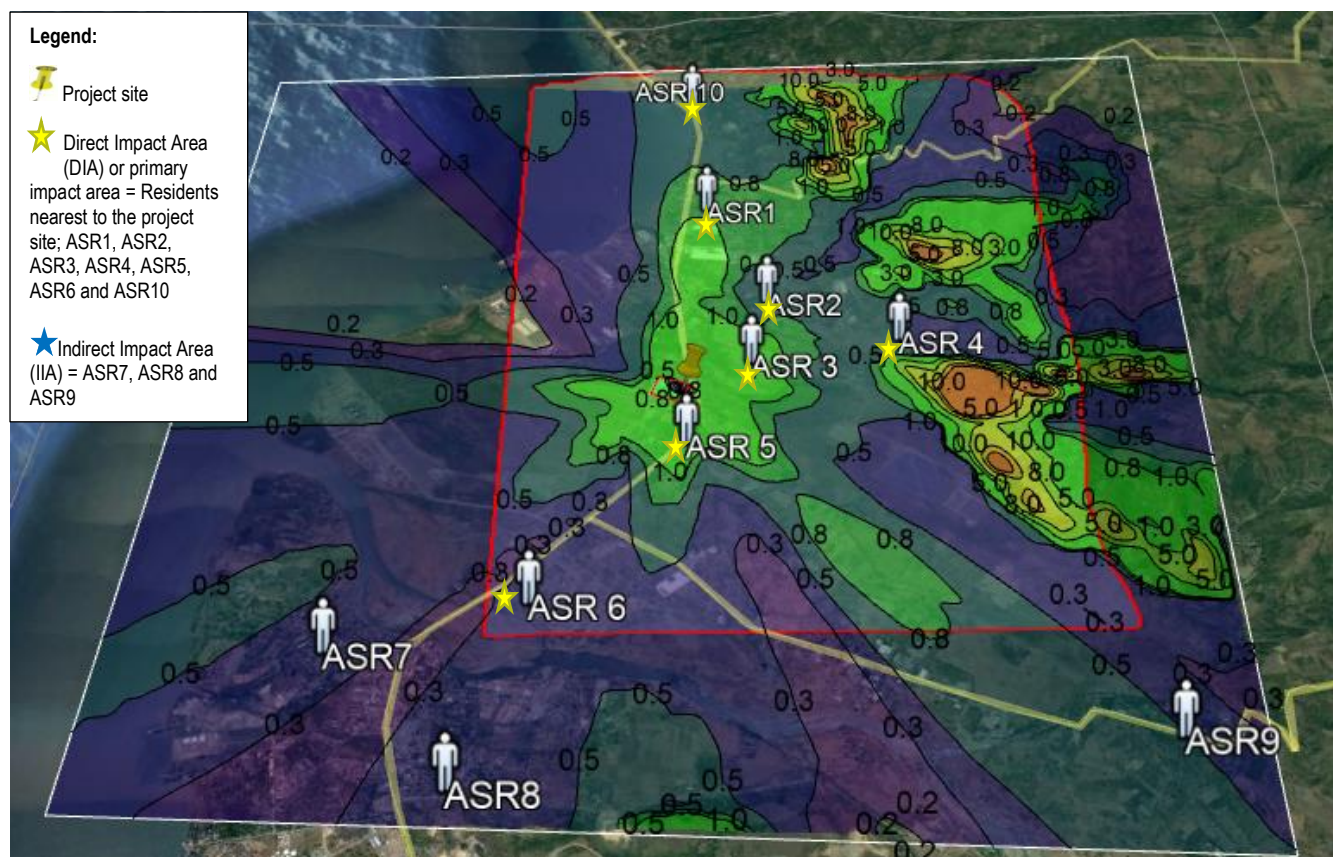


Figure 1.1.1.4: Primary impact area (approx. 5 X 6 km, 2-3 km from stack) based on particulate dispersion based on location of Hot Spot Areas and Location of ASRs

1.1.2 Geographic coordinates of the Project Site

Provided below is the geographic coordinates of the project area:

Table 1.1: Coordinates of the Project Site

Point	Latitude	Longitude
SMI1	8°33'54.39"N	124°46'10.45"E
SMI2	8°33'47.87"N	124°46'8.45"E
SMI3	8°33'52.42"N	124°46'17.36"E
SMI4	8°33'46.27"N	124°46'16.14"E

Shown in Figure 1.1.2.1 is the project area identified by the coordinates, Figure 1.1.2.2 is the vicinity map and Figure 1.1.2.3 shows the project site and its neighboring industries.



Figure 1.1.2.1: Location Map in Google Earth Map (Source: Google Earth Map)

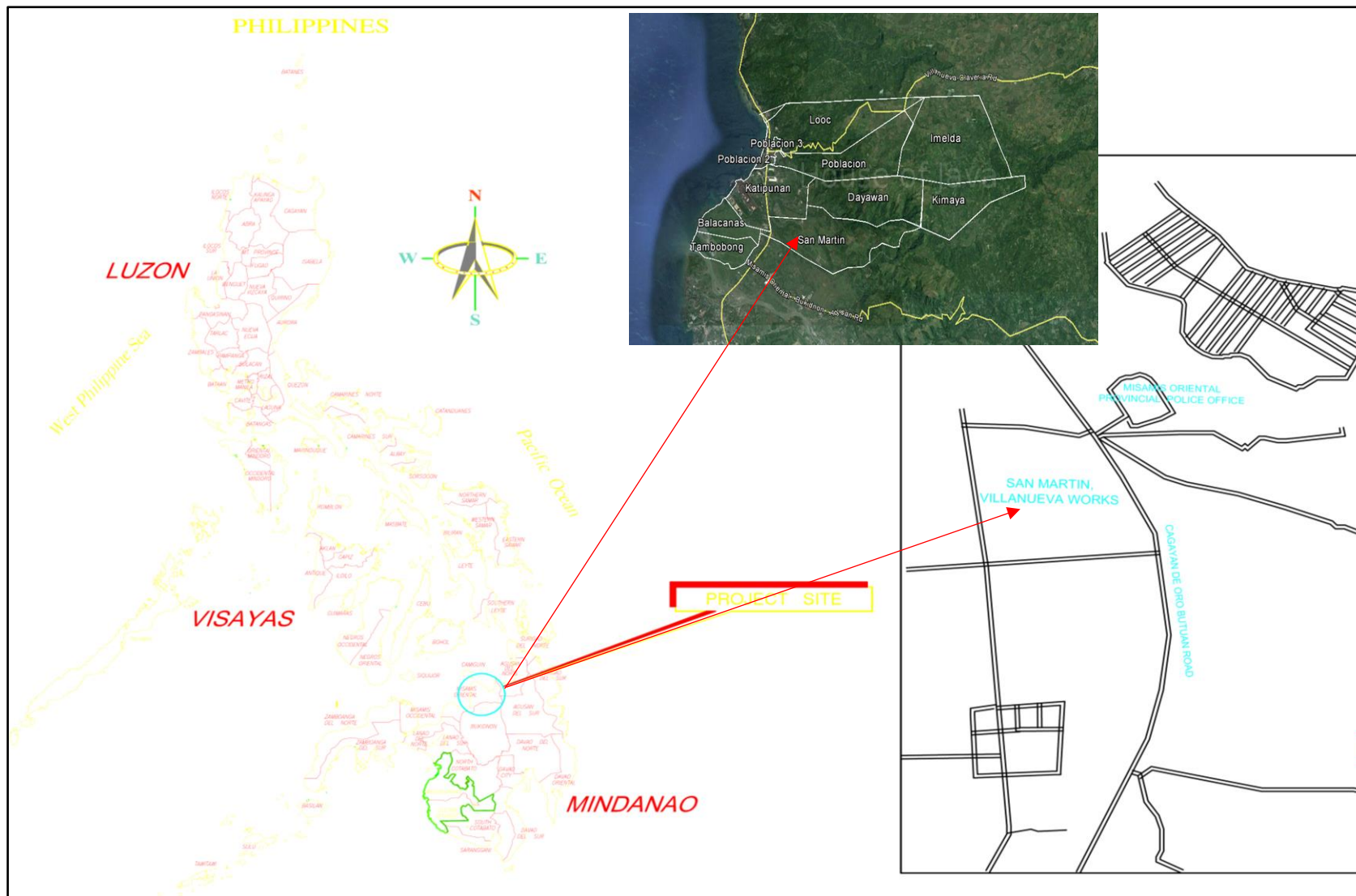


Figure 1.1.2.2: Vicinity Map (source: San Martin Steel, Inc.)

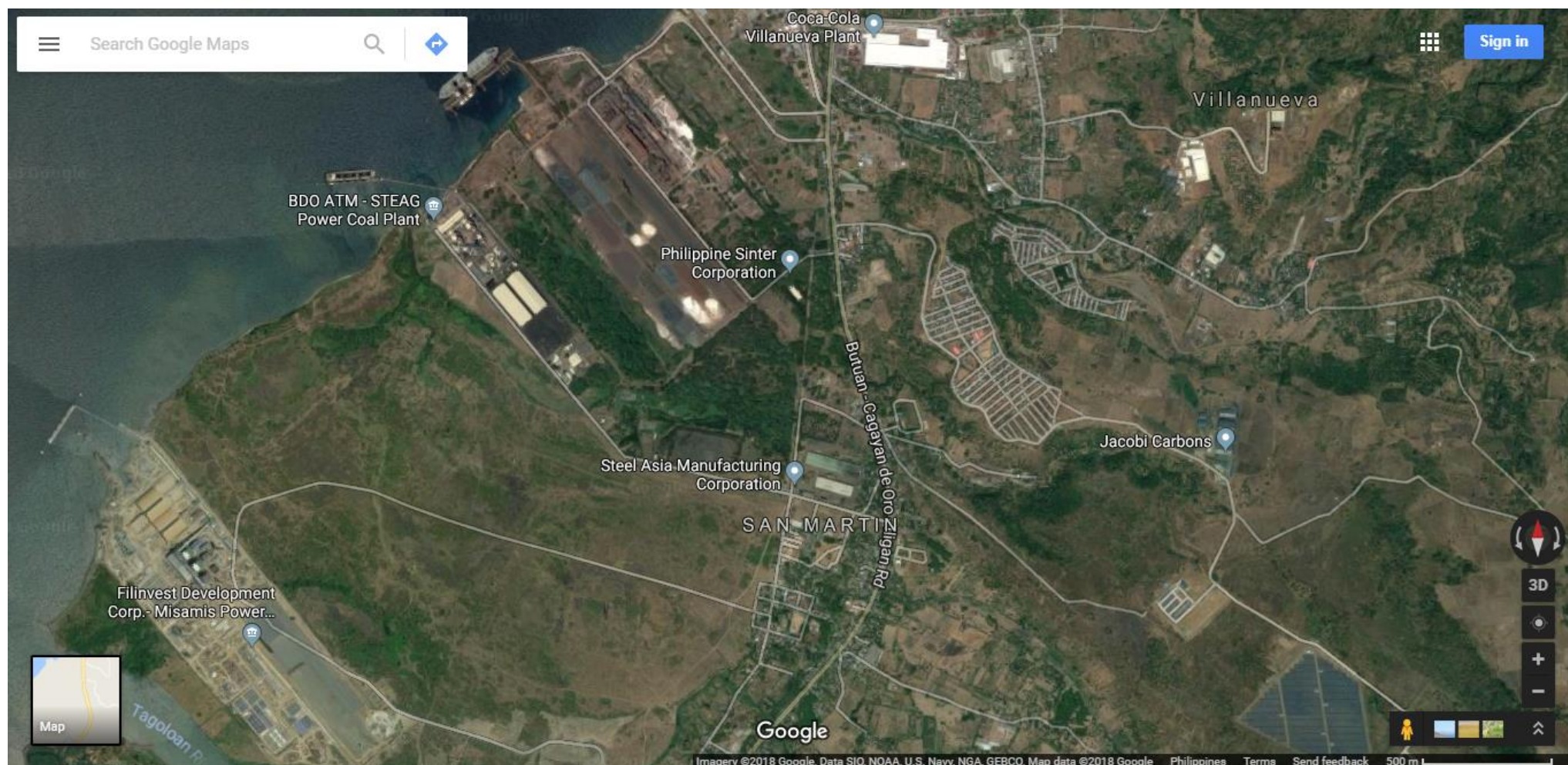


Figure 1.1.2.3: The Project Site and its neighboring industries (source: San Martin Steel, Inc.)



1.1.3 Discussion on the Accessibility of the Project Site/Area

The site can be reached from Manila either by sea or by plane. There are several flights of Philippine Airlines and Cebu Pacific to and from Manila and nearby provinces such as Cebu to Misamis Oriental. Sea transports as through the roll-on, roll-off (RORO) routes.

There are local land transportation available in the area with several terminals such as Katipunan Public Market for jeepney and trisikad; jeepney terminal in Poblacion 2 and a Motorela Terminal in Poblacion. There are also trisikad terminals in Poblacion 1, Poblacion 2, Katipunan and Dayawan. Maharlika Highway is the main road artery to the Phividec and the project site. The access road to the site is within the Phividec property/land.

Air Transport (Source: www.cebupacific.com/public-utilities)

To access the project site, air transport may be used from whichever destination because there are a number of daily flights to and from Cagayan De Oro. The Laguindingan airport is quite a new airport which is set to implement an expansion program to accommodate more flights. Philippine Airlines and Cebu Pacific are the principal airlines taking care of most domestic flights.

Sea Transport (Source: Cebu Ports Authority)

Sea Transport is also available in accessing the project site like the Villanueva Port. Although the Port of Villanueva is small, it caters to cargo vessels (50%) and tankers (43.75%) and others at 6.25%.

Ship

The shipping lines that operate in Misamis Oriental are Trans-Asia Shipping Lines, Carlos A. Gothong Lines, Superferry of the Aboitiz Shipping and Sulpicio Lines among others.

Figure 1.1.3.1 shows the map of the road access to and from the project site.

1.2 Project Rationale

Following are the major rationale for the project:

- Infrastructure growth in the Mindanao region are seen in the coming years and the rehabilitation of Marawi. With these, demand for rebars will increase.
- To support housing construction in the region. A number of housing projects is expected to be implemented thus the demand for rebars and steel products.
- Support construction of power plants, BPO, office spaces and tourism projects. Same with housing projects, construction of power plants, BPO, office spaces and tourism projects is expected to increase the demand for rebars and steel products.
- Support the Visayas reconstruction projects

In summary, new construction will require more REBARs which are best supplied by a local/community steel mill thus the objective to locate the mill near the area where these developments are expected.

The steel industry in the Philippines is one of the most significant growth industries. Steel constitutes a basic industry prerequisite in a country's pursuit of development and industrialization. The central role of the industry stems from its linkages with numerous sectors, where its products serve as an essential input to countless uses, such as building and construction and it is equally important contributions to employment generation, growth, and promotion of industrial activity, etc. Therefore, ensuring a strong domestic steel and steel-based industry is vital in developing the competitive edge of a country in meeting the challenges of globalization.

With the boost in infrastructure industry in the country together with the rehabilitation activities in some parts of the country like Marawi, there will be a bigger demand for reinforcing steel bars in the future. With its optimized capacity, SMSI can suffice up to 24% of the steel needs of the Mindanao market. This includes the steel needs of the rehabilitation works in Marawi as well as the big ticket construction projects of the government. In addition to volume, SMSI also brings to its customers the benefit of reliable supply, timely delivery and freight savings of at least P1000 per ton due to its proximity in the market.

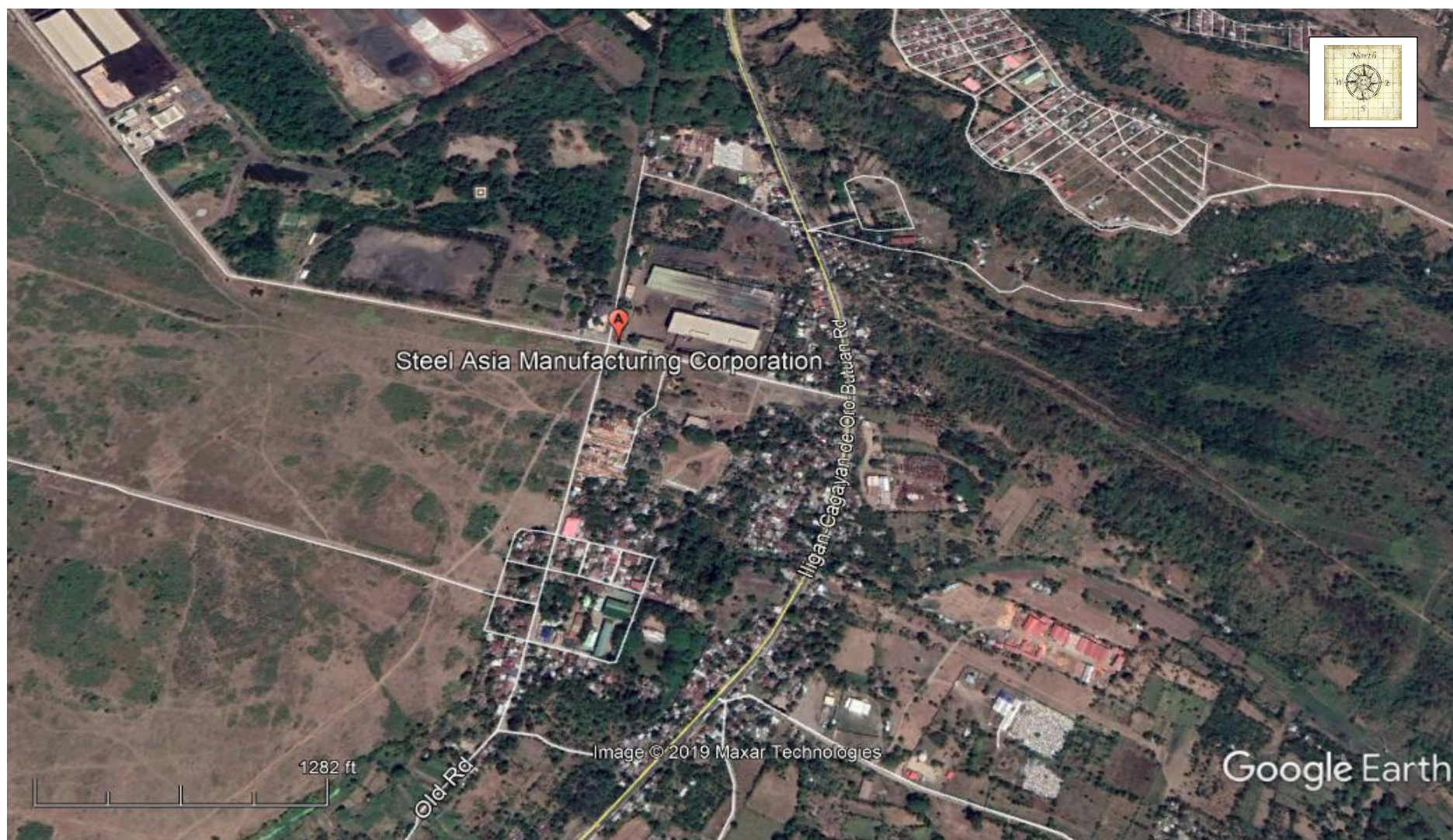


Figure 1.1.3.1: Map providing the different access routes to and from the Project Site



1.3 Project Alternatives

1.3.1 Criteria Used In Determining Preliminary Options

Following were the criteria used in determining project options:

Siting

There was no other locations considered because this project was acquired and bought directly from a Elegant Alloy which previously operates the Plant as a rolling mill and melt shop.

Technology Selection/Operation Processes

As a member of the Steel Asia group of companies, the technology and the processes that will be used to optimize the Plant's capacity in the San Martin Steel Rolling Mill is common to their other existing plants in the country. The production capacity of each plant may be different, but they will use the more modern rebar rolling technology to upgrade this project.

Manufacturing of rebars requires substantial amount of energy during heating of billets in a Reheating Furnace and in the Rolling Mill Stands where the heated billets are "resized" from 150mm x 150mm square to rebar sizes ranging from 8 mm to 36 mm in diameter.

Logistics

Steel manufacturing is essentially a transportation business as it requires a lot of moving & handling for its raw materials and finished goods. The plant is already sited near the port, major highways and customers can optimize the logistics cost.

Manpower Availability

This Projects needs around 386 personnel to run and maintain the facilities 24/7 at two shifts. Manpower at the Plant does not discriminate against gender and age as long as the worker is qualified and fit to work. Also, equal protection clause on employment is considered by prioritizing local employment in the barangay/s and within the affected municipality for technical staff and workers.

Land

The land area must accommodate all the facilities needed in a contiguous manner. In addition it should not require a long time for land conversion and expensive site development. It should have sufficient elevation for flooding. This was met by the choice of the site in SanMartin because the land is already industrial.

Carbon footprint

The proponent's policy is to adopt practices to minimize fuel use. These include optimized trip planning/routing to increase fuel efficiency, reducing the number of kilometers each truck travels daily and minimizing travel time. This is the reason why SteelAsia group chooses to locate in areas where developments are also located.

1.3.2 Environmental Impact of Each Alternative

In terms of location, the potential impacts in all locations are the same. However, other areas were not considered because of existing mangrove plantation, lack of sustainable water and power sources and the land classification is not yet industrial.

Environmental characteristics of the project site were also considered in the site selection. The location is clear and flat area. Being in a topographically flat area, hazards associated with slope instability, erosion and mass wasting are expected to be insignificant. The location of the project facilities was also evaluated in terms of geohazard susceptibility based on information from government agencies such as the Mines and Geosciences Bureau (MGB) and the Philippine Institute of Volcanology and Seismology (PHIVOLCS). The impacts are discussed and summarized in detail in the next two chapters.

1.3.3 No Project Option

If the project will not proceed, there will be no additional disturbance to the environment. However, the 'no project' option must be weighed against the economic benefits that the project would bring to the



host barangays and to the national and regional economies. The economic benefits that would be derived from the project are:

- Potential to create jobs during the construction and operations phase;
- Local taxes include the local distribution of real property taxes and local business tax;
- Capital investment;
- Contribution to the combined Gross Regional Domestic Product (GRDP) for Region 10;
- The overall impact of these economic contributors from the project to the national economy will be added to the annual GDP.

Also, if this increase in production capacity project will not materialize, social development such as livelihood projects, skills training, scholarship programs and medical assistance for the residents of San Martin, in particular will not be realized. Also, the prospective multiplier effect of the project such as business opportunities, support to basic services like infrastructure and medical assistance and other opportunities for the community and LGU will likely lose when the project is not pursued.

Having at least 60% of the market share, inability of the SMSI Plant to produce the capacity will bring scarcity in the supply and availability of quality construction materials which will bring up the cost of construction materials and sacrifice the integrity of the infrastructure development plan in the country. Also, rehabilitation program for the calamity and war-stricken areas will be delayed.

Most importantly, supply of quality rebars can be assured to avoid buildings' collapse because of substandard materials.

1.4 Project Components

This section provides the project's major components and support facilities.

1.4.1 General lay-out of facilities

Shown in Figure 1.4.1.1 is the general lay-out of facilities under the Site Development Plan.

1.4.2 Map showing the location and boundaries of project area, location and footprint of main and support facilities and proposed buffers

Provided in Figure 1.4.1.2 is the map showing the location and boundaries of project area.

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental

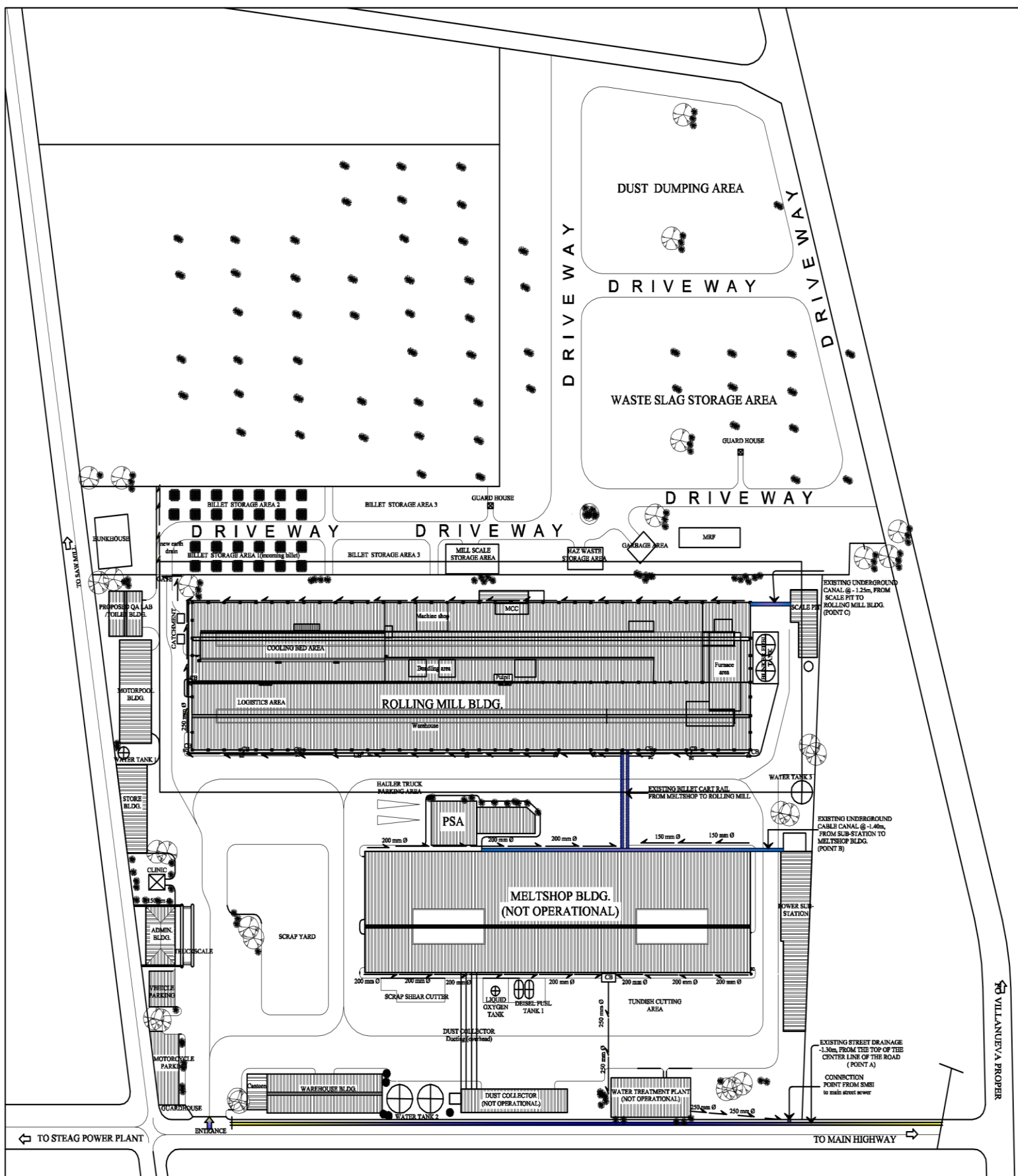


Figure 1. 4.1.1: Project Lay-out / Site Development Plan



Figure 1.1.1.1: Project Location Map / Study Area map showing the location and boundaries of project area



1.4.3 Major Components:

At present, the following major components were already installed at the Plant since the Plant has been in operation previously by Elegant and was then transferred to San Martin Steel. However, it is the capacity that will be increased from 20,000 MTPY to 250,000 MTPY and the Rehabilitation and improvement of existing components and facilities and inclusion of MRF and HW Storage Facilities.

The major modification that will be implemented to affect the increase in capacity refers to equipment optimization only. This includes replacement and repair of some parts for equipment efficiency. This includes the following:

- Provision of CNC Lathe
- Order new/ additional gears
- Installation of pinion gear
- Purchase Gear Coupling
- Acquisition of Chino Pyrometer
- Acquisition of Vacuum circuit breaker, AC motors for rotary shear; Soft Start/Stop Reduction Gear Motor; hot metal detector
- Acquisition of Inverters & Reconditioning of Wound Rotor
- Additional parts for PLC Upgrade
- Purchase of Trochoid pumps & burner for reheating furnace.
- Acquisition of 300KVA generator set.
- Spare, Clutch & Brake Assy installation
- Universal Cross Joint Installation
- Acquisition of Vacuum Magnetic Contactor
- Rehabilitation of gearboxes
- Provision of additional 1 unit Combustion Air Blower assay
- Repair of old Entry Pusher Hydraulic Cylinder
- Purchase of spare pumps/motors

The Rolling Mill is composed of 14 rolling stands. It has 2 convertible stands for flexibility and ease of the rolling process. It has on-board utilities such as air, oil, water, power and hydraulics to minimize downtime during size change.

1.4.4 Ancillary/Support Facilities

The following are the project's ancillary/support facilities.

Table 1.4.3.1: The project's ancillary/support facilities

Ancillary Facilities	Description
Billet storage area / Billet yard	Storage area for billets
Finish Goods Warehouse	Storage for the manufactured wire-rods and rebars
Roll Shop	Area where rebars are refurbished where grinders and polishers are used to ensure the brightest possible finish. Roll shop allows a company to keep the stock of cold rolled strip steel in top condition and monitor the age and condition of steel.
Low Sulfur Fuel Station	The project has 1 Fuel Tank System for storing Low Sulfur Fuel Oil (LSFO). The system consists of the LPG/LNG tank, unloading device, gasification unit, piping with supports, fire protection system and control system, etc.
Main Electric Cabin	The Plant's internal power source connected to an outside energy source through a local cooperative.
Fuel Storage	Storage area for Low Sulfur Fuel Oil (LSFO) or mixed with diesel is already in place. Use of this fuel were among the mitigating measures for air emission as these fuels' emissions are compliant with the standards set by the Clean Air Act. Storage of these fuel are secured with bundwalls which has a capacity equivalent to the fuel storage to avoid oil/fuel spill.



	<p>A Day Tank Fuel Storage Tank is also provided with a capacity that will last for a day.</p> <p>Moreover, the following mitigation measures were implemented by SanMartin Steel in the past years from the time they took over the Plant operations:</p> <ul style="list-style-type: none"> • Provision of Hazardous Waste Storage Area for waste oils & other hazardous materials • Provision of secondary containment for oil drums & diesel fuel tanks • Provision of oil skimmer for mechanical clean up in case of accidental spillage • Proper labelling of oil drums & diesel tanks
Oxygen/Nitrogen	Capacity 5,710 m ³ /hr at 8 Bars; Compressed air is being used as atomizer of the fuel for complete combustion in the furnace, also used in pneumatics for instrumentation and controls of equipment.
Generator set / Emergency power system	This will serve as an emergency power of the rolling mill if there is power outage. This plant requires a mobile generator set with a diesel engine to supply all key equipment and facilities such as lighting and power for safety purposes and cranes to ensure all deliveries are in time to make customer satisfied. The generator set is also set with compatible cooling system, noise reduction system, intake and exhaust system, and electronic control system.
Substation	The plant has already an existing substation to provide power supply to the Rolling Mill and plant auxiliaries.
Water Retention Pond	3 collecting ponds with a volume of 30,000 cu.m, 3,400 cu.m, 26,600 or a total of 60,000 cu.m.
Substation	The plant capacity is requiring one package of 69 KV substation to be built in a 2000 square meter area which will consist of a 31.5 MVA power transformer will be installed as the power supply of Rolling Mill and plant auxiliaries. Harmonic filters will also be installed for the rolling mill to be compliant with the Philippine grid code on the system power quality such voltage and frequency variations, flicker severity and harmonic distortions. Electric utility company will provide the power requirement of the mill, they will also provide the tapping point and the distribution line going to the rolling mill's electric substation.
Fabrication	It is the downstream industry of rebar manufacturing. This process involves Shearing, Bending, Threading, Tagging & Color Coding, Bundling, Storage and Loading of Finished Goods.
Generator Set/Emergency Power System	This will serve as an emergency power of the rolling mill if there is power outage. This plant requires a closed type mobile generator set with a diesel engine and a capacity of 1MVA/800kW standby power to supply all key equipment and facilities such as lighting and power for safety purposes and cranes to ensure all deliveries are in time to make customer satisfied. The generator set is also set with compatible cooling system, noise reduction system, intake and exhaust system, and electronic control system.
Fire Protection System	<p>A fire protection system according to the National Fire Protection Association (NFPA) requirement will be provided for the entire plant. The system will provide indepth capability for early detection, alarm, containment and suppression of fires. The extent of the system will vary with the magnitude of combustibles present in an area and the magnitude of possible loss from fire. The system will consist of:</p> <p>1 Fire Water Supply System for:</p>



	1.1 Outside hydrant system of the plant 1.2 Stand pipe system for all buildings 1.3 Deluge sprinkler system for oil filled transformers 1.4 Wet pipe sprinkler system for turbine oil area and lubricant storage area in warehouse. 2 Foam type protection system for fuel oil tanks 3 Halon Protection System for switchgear, MCC, battery and battery charger and control rooms 4 Portable fire extinguishers in various buildings; and 5 Fire Detection and Alarm System
Guard house	
Garage	
QA Lab	

1.4.5 Pollution Control Devices and Corresponding Facilities Being Served or Connected

The project will use the following pollution control facilities:

- Waste and Scales Area**

Area dedicated for scales formed on the outer surfaces of plates, sheets or profiles when they are being produced by rolling red hot iron or steel billets in rolling mills. Mill scale is composed of iron oxides mostly ferric and is bluish black in color. It is usually less than 1 mm thick and initially adheres to the steel surface and protects it from atmospheric corrosion. Scales will be collected in containers and will be for recycling in SteelAsia Melt shop plants.

- Material Recovery Facility**

Domestic solid waste as well as wrongly-sized rebars will be generated. Material Recovery Facility (MRF) will be provided for domestic solid waste while scrap bars will be hauled to be used as raw material for other plant's melt shop. Solid Wastes will be properly segregated and to be disposed in the Material Recovery Facility of Villanueva. Domestic Waste are treated through septic vaults and siphoning regularly.

Scales are formed on the outer surfaces of plates, sheets or profiles when they are being produced by rolling red hot iron or steel billets in rolling mills. Mill scale is composed of iron oxides mostly ferric and is bluish black in color. It is usually less than 1 mm thick and initially adheres to the steel surface and protects it from atmospheric corrosion. Scales will be collected in containers and will be for recycling in SteelAsia Melt shop plants.

For hazardous wastes that will be generated such as busted bulbs and lamps, LED lamps, used oil and used batteries, disposal will be done thru 3rd party DENR-accredited Treaters. Used oil will be collected and put inside sealed drums, stored in a company designated Material Recovery Facility (MRF) inside the plant. It will be transported and treated by a DENR accredited TSD facility.

Busted Fluorescent Bulbs will be put in a container, stored inside the plant MRF in accumulation until there are sufficient inventory for proper disposal through a DENR accredited TSD facility.

Contaminated rags and gloves will also be put in bags, stored inside the plant MRF in accumulation until there is sufficient inventory for proper disposal through a DENR accredited TSD facility.

Used automotive batteries will be traded-in to designated suppliers.

- Recirculating Water System**

The Water System is already installed. It will be improved to include the Indirect Cooling System, Direct Cooling System, Emergency Water Supply System and Sludge Treatment System to serve the needs of the Plant.



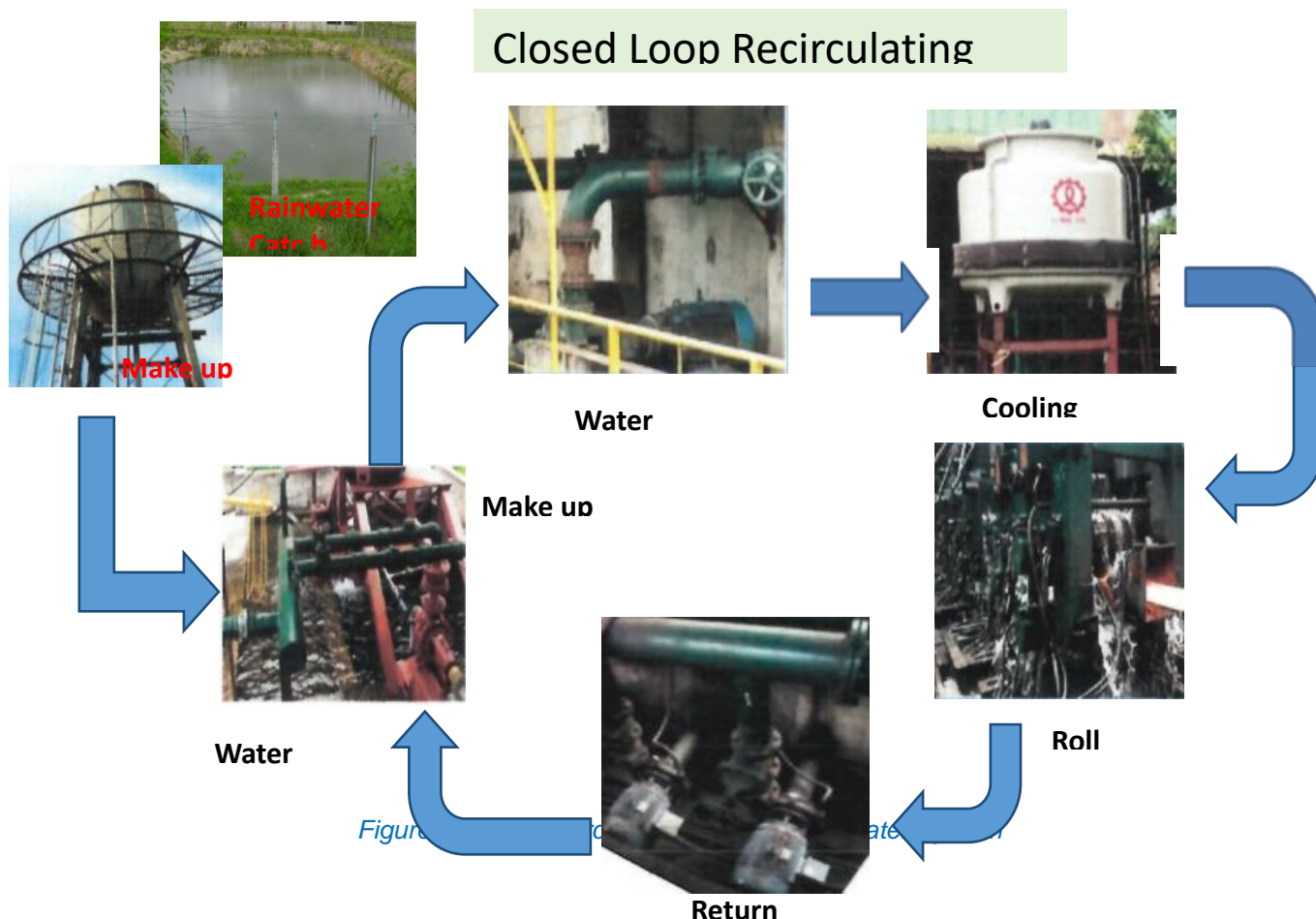
The Indirect Cooling Water System's main users are furnace, roughing equipment, finishing equipment, BGV area, hydraulic units, air conditioner, compressed air station, camera housing. The indirect water system does not directly contact with the equipment. During the indirect heat exchange, only the water temperature rises but the water quality doesn't change. After cooling down, water will be pumped to the user and then recycled. There are sets of cooling tower adopted in this system and separate group of pumps for traditional equipment and furnace. In order to ensure uninterrupted water supply for furnace, the furnace circulating pump has two power source including one emergency power.

The Direct Cooling System's main users are furnace exit area, roughing mill area, finishing mill area, quenching and flushing. The direct water system has a direct contact with the equipment. During the heat exchange, not only the temperature rises but also the water quality is changed and there isn't residual pressure. The return water flow to the underground scale pit by gravity with flushing pipes to push the scales and residuals to the scale pit. The water from the pit will then be pumped to the sedimentation basin to remove suspended solids and grease, then flow to a water pool, then pump to sand filters. Backwashing style is air and water alternately. Air is supplied by a blower and backwash water is supplied by pump. Mud produced from sedimentation and filter system will flow in the sludge water pit.

The furnace need an emergency water supply for a duration of 8 hours upon loss of power. The emergency water is supplied by a diesel pump which will come to work automatically in case of traditional power off in order to ensure uninterrupted water supply in the furnace.

The main process of the Sludge Treatment System is a backwash waste of filters, mud/scales from sedimentation basin that will flow in the sludge water pit and then pumped into the sludge thickener. The sludge from the thickener will then be discharged to a drying bed where it will be dried naturally and then a grab bucket will transfer it to the sludge disposal truck.

The primary water source for process water are the existing deepwells located at the project site. Shown below is the San Martin Recirculating Water System which implements water recycling.



In summary, following are the project's components which are already installed but will be undertaking upgrade to meet the requirements of efficiency for the increase in production capacity.

Table 1.4: Comparative Summary of Project Components

Project Components	Capacity / Specification @ 20,000 mt	Capacity / Specification @ 250,000 mt
Furnace	30 mt/hour	30 mt/hour
Smokestack	1 unit	1 unit
Rolling Mill:		
Mill Train	17 stands	17 stands
Cooling Bed	1 unit	1 unit
Finished Goods Warehouse	45000 mt	45000 mt
Electrical Substation	1 substation facility	1 substation facility
Recirculating Water System	1152 cubic meter	1152 cubic meter
Other Facilities		
Admin Building	1 ADM bldg	1 ADM bldg
QA Laboratory	1 QA Lab	1 QA Lab
Hazardous Waste Facility	None	1 Hazardous Waste Facility
Material Recycling Facility	None	1 Material Recycling Facility
Clinic	None	1 Clinic
Materials Warehouse	1 WHS Storage Area	2 WHS Storage Area

The air pollution related emission is the emission from the stack of the Reheating Furnace and the dust on the road caused by trucks. There are no control measures installed except the embedded recuperator which improves the air emission by contributing to optimized fuel combustion. For dust caused by trucks



going in and out of the Plant, road watering / water sprinkling is being implemented.

For Emissions Monitoring of Furnace and other combustion equipment to analyze SO_x, NO_x, PM and CO emissions, the Plant uses Hand-held Gas Analyzer, employs annual Smoke Stack testing by a DENR Accredited testing provider, quarterly Ambient Air and Noise quality testing by a DENR Accredited testing provider and annual Genset Emission testing by a DENR Accredited testing provider.

1.5 Process /Technology

1.5.1 Processing/Manufacturing Technology

Provided below is the rebar production process.

Rolling Mill

Billets shall be fed & heated in a reheating furnace then undergo size reduction in a series of rolling mill stands. Then, the rolled steel bars shall pass through a quenching system where it is rapidly cooled. The cooled bars shall then be cut into the desired length, then sorted, bundled and stockpiled prior to delivery. The production capacity of the rolling mill will be 250,000 Metric Tons annually. Illustration is shown below.

Shown in the Plates below are illustrations of the processes involved in the Rolling Mill.

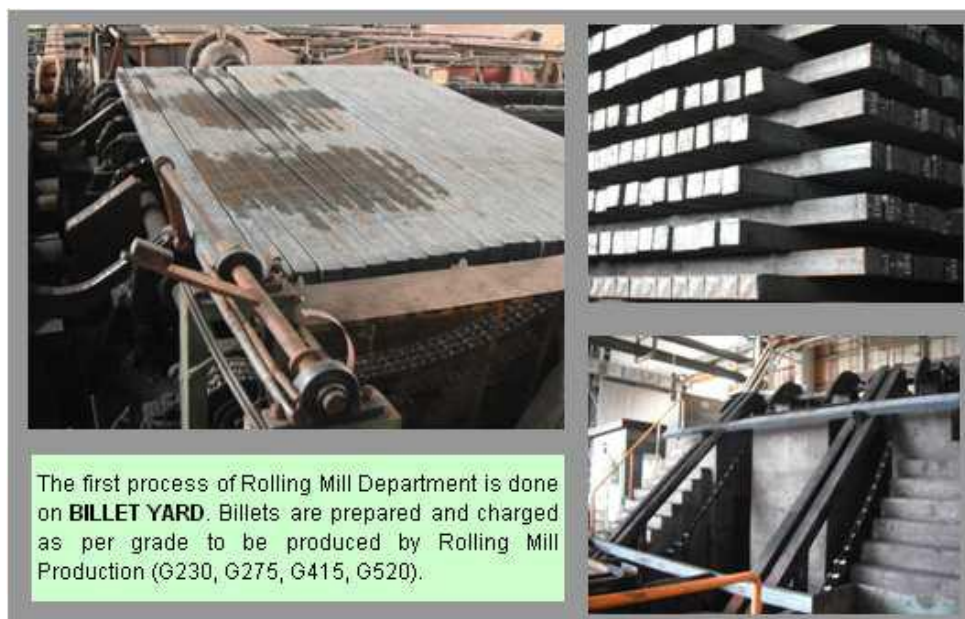


Plate 2: Billet yard



Plate 3: Reheating Furnace

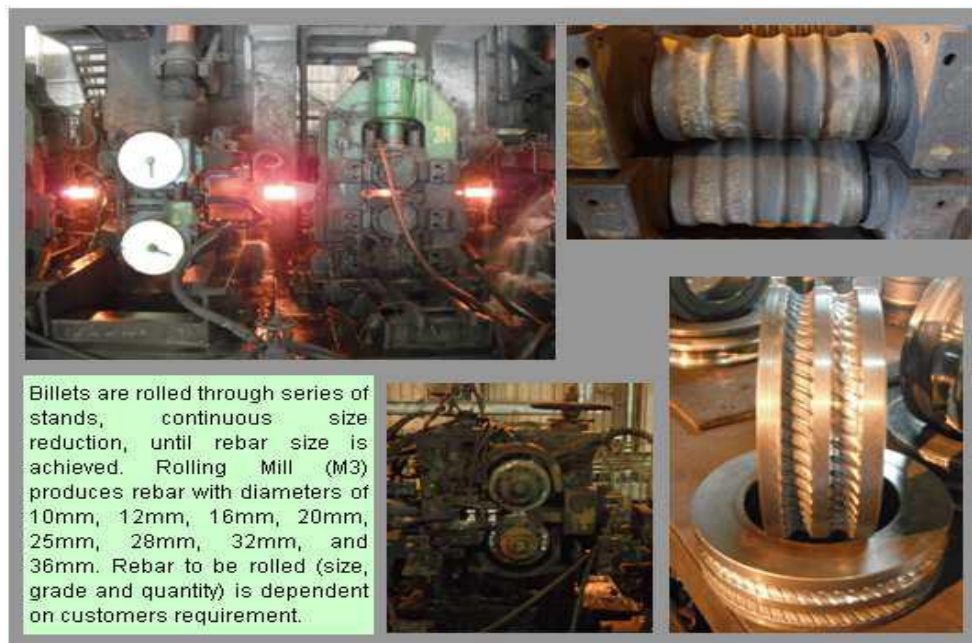


Plate 4: Resizing





Plate 5: Use of Tempcore



Plate 6: Use of Dividing Shear

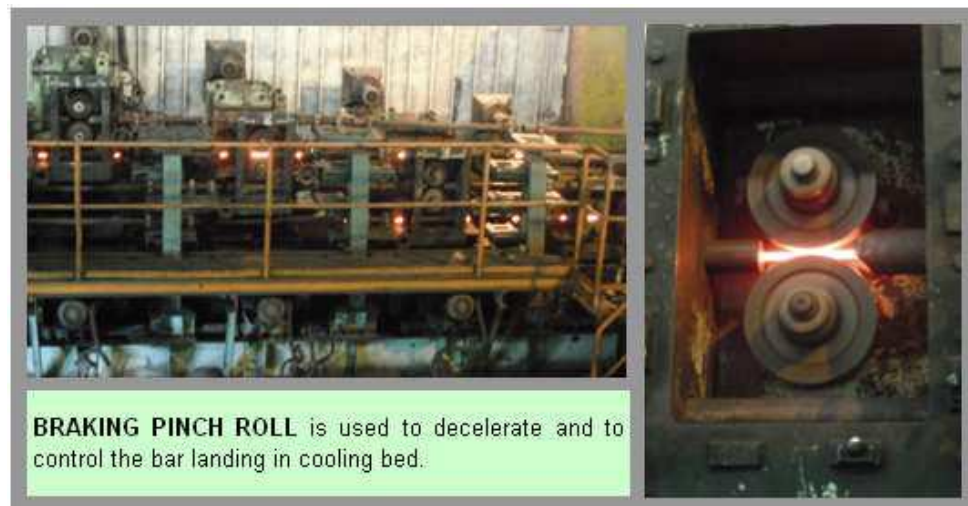


Plate 7: Use of Braking Pinch Roll

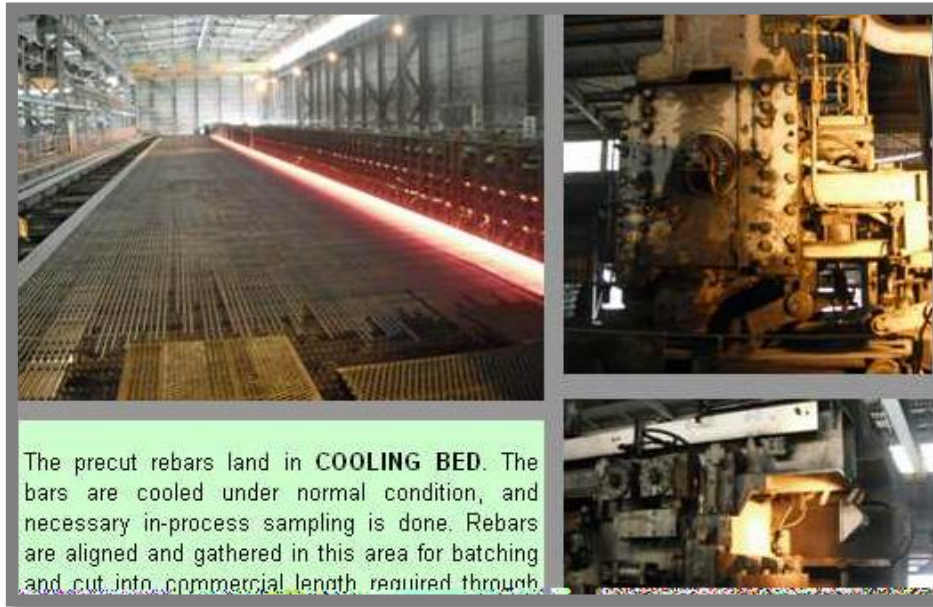


Plate 8: Cooling



Plate 9: Inspection

Provided below is an illustration of the rebar production process.

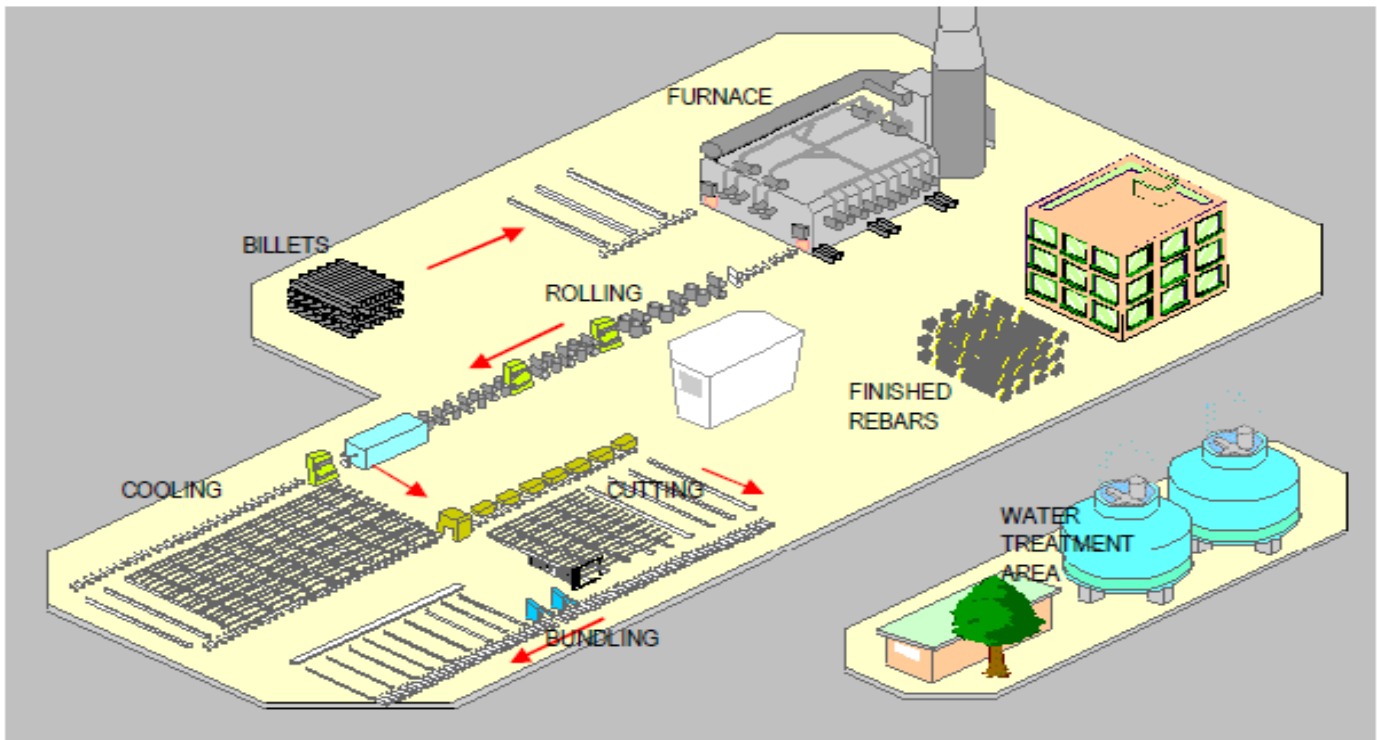


Figure 1.6: Rebars Production Process

Operation Flow Process

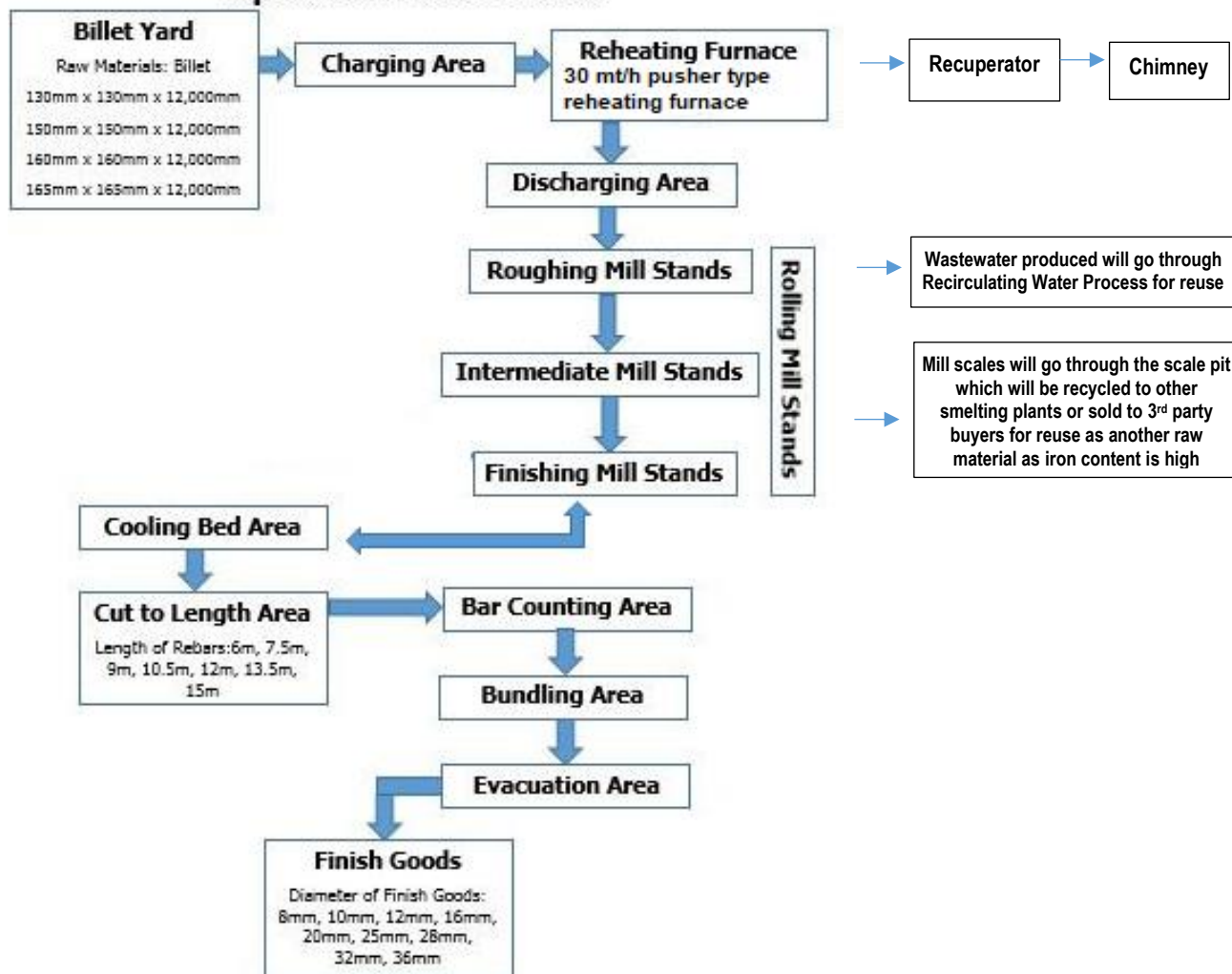


Figure 1.7: Process Flow

Water Balance

SanMartin Steel has 3 deepwells as follows:

- Deepwell No. 1 with a capacity of 6 cu. m./day
- Deepwell No. 2 with a capacity of 6 cu. m./day
- Deepwell No. 3 with a capacity of 6 cu. m./day

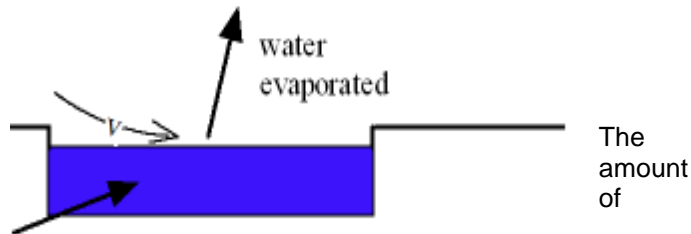
For its increase in production capacity, only Deepwell No.1 will be used as 6 cu.m./day capacity can supply the water needs of the Plant.

Provided in the succeeding Figures are the following information:

- Figure 1.11: Water Flow Diagram
- Figure 1.12: Water Balance for the current capacity of 20,000 MTPY
- Figure 1.13: Water Balance for the increased capacity of 250,000 MTPY
- Figure 1.14: Water Flow Diagram

Water Balance: Discussion

- **Open Settling Pond:**
Evaporation of water from a water surface - like an open tank, depends on water temperature, air temperature, air humidity and air velocity above the water surface.



evaporated water can be expressed as:

$$g_s = \Theta A (x_s - x) / 3600 \quad (1)$$

or

$$g_h = \Theta A (x_s - x) \quad (2)$$

where

g_s = amount of evaporated water per second (kg/s)

g_h = amount of evaporated water per hour (kg/h)

$\Theta = (25 + 19 v)$ = evaporation coefficient (kg/m²h)

v = velocity of air above the water surface (m/s)

A = water surface area (m²)

x_s = [maximum humidity ratio of saturated air](#) at the same temperature as the water surface (kg/kg) (kg H₂O in kg Dry Air)

x = [humidity ratio air](#) (kg/kg) (kg H₂O in kg Dry Air)



Settling Pond – Actual Image

Actual Data Gathered: Wind Velocity = 2.0 m/s
 RH mean from PAGASA R.10 = 76.8 %
 Air Temperature in deg Celsius = 27 °C
 Water Temperature in deg Celsius = 33 °C
 Area of Open pond = 24 x 8 = 192 m²

With air velocity above the water surface 2.0 m/s the evaporation coefficient can be calculated as:

$$\begin{aligned} \Theta &= (25 + 19 (2.0 \text{ m/s})) \\ &= 63 \text{ kg/m}^2\text{h} \end{aligned}$$

Area (A) = 192 m²

Using a psychrometric chart / Mollier Diagram,

At 33 °C, $x_s = 0.0285$ (kg/kg) (kg H₂O in kg Dry Air); and

Air @ 27 °C with 76.8 % RH, $x = 0.0173$ (kg/kg) (kg H₂O in kg Dry Air)

The evaporation from the surface can be calculated as:

$$\begin{aligned} g_s &= \Theta A (x_s - x) / 3600 \\ &= (25 + 19 (2.0 \text{ m/s})) (192 \text{ m}^2) [(0.0285 \text{ (kg/kg)} - 0.0173 \text{ (kg/kg)})] / 3600 \\ &= 0.038 \text{ kg/s} \\ g_h &= 137 \text{ kg/h} \end{aligned}$$

where density H₂O = 1000 kg/m³ = specific volume = 1 m³/1000 kg

hence:

$$= 137 \text{ kg/h} / 1000 \text{ kg/m}^3$$

$$= 0.1368 \text{ m}^3/\text{h} \text{ amount water evaporated}$$

Source: https://www.engineeringtoolbox.com/evaporation-water-surface-d_690.html
https://www.engineeringtoolbox.com/psychrometric-chart-d_816.html

**Cooling Tower 1:****Evaporation Loss Calculation:**

Evaporation Loss in cooling tower is calculated by the following empirical equation:

$$Ev1 = 0.00085 \times R \times 1.8 \times C$$

E = Evaporation Loss (m³/hr)

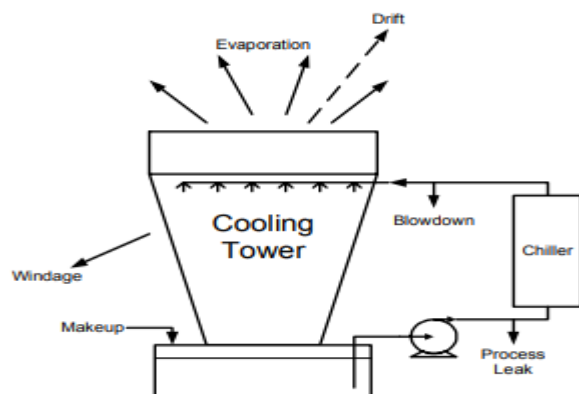
C = Circulating Cooling Water (m³/hr) = 510 m³/h

R = Range in °Celsius = (32-28)°C

$$Ev1 = 0.00085 \times R \times 1.8 \times C$$

$$= 0.00085 \times (32-28)^{\circ}\text{C} \times 1.8 \times 510 \text{ m}^3/\text{h}$$

$$= 3.1212 \text{ m}^3/\text{h} (^{\circ}\text{C})$$

**Windage or Drift Loss Calculation:**

$$\text{Induced Draft Cooling Tower} = D = 0.1 \times C/100 = 0.1 \times 510/100 = \mathbf{0.51 \text{ m}^3/\text{h}}$$

Blow Down: given by Supplier = 0.97 m³/hr

$$B = E / (\text{COC} - 1)$$

COC = Cycle of Concentration

$$0.97 \text{ m}^3/\text{hr} = 3.1212 \text{ m}^3/\text{hr} / (\text{COC} - 1)$$

$$\text{COC} = 4.21 \approx 4$$

Cooling Tower 2:

$$Ev2 = 0.00085 \times R \times 1.8 \times C$$

E = Evaporation Loss (m³/hr)

C = Circulating Cooling Water (m³/hr) = 18 m³/h

R = Range in °Celsius = (29-26)°C

$$Ev2 = 0.00085 \times R \times 1.8 \times C$$

$$= 0.00085 \times (29-26)^{\circ}\text{C} \times 1.8 \times 18 \text{ m}^3/\text{h}$$

$$= 0.0826 \text{ m}^3/\text{h} (^{\circ}\text{C})$$

Windage or Drift Loss Calculation:

$$\text{Induced Draft Cooling Tower} = D = 0.1 \times C/100 = 0.1 \times 18/100 = \mathbf{0.018 \text{ m}^3/\text{h}}$$

**Blow Down: given by Supplier = 0.14 m³/hr**

$$B = E / (\text{COC} - 1)$$

$$0.14 \text{ m}^3/\text{hr} = 0.0826 \text{ m}^3/\text{h} / (\text{COC} - 1)$$

$$\text{COC} = 0.94 \approx 1$$

**Cooling Tower 3:**

$$E3 = 0.00085 \times R \times 1.8 \times C$$

E = Evaporation Loss (m³/hr)

C = Circulating Cooling Water (m³/hr) = 23 m³/h

R = Range in °Celsius = (31-28)°C

$$E3 = 0.00085 \times R \times 1.8 \times C$$

$$= 0.00085 \times (31-28)^\circ\text{C} \times 1.8 \times 23 \text{ m}^3/\text{h}$$

$$= 0.1056 \text{ m}^3/\text{h} (^\circ\text{C})$$

Windage or Drift Loss Calculation:

Induced Draft Cooling Tower = $D = 0.1 \times C/100 = 0.1$

$$\times 23/100 = \mathbf{0.023 \text{ m}^3/\text{h}}$$

**Blow Down: given by Supplier = 0.14 m³/hr**

$$B = E / (\text{COC} - 1)$$

$$\mathbf{0.14 \text{ m}^3/\text{hr} = 0.1056 \text{ m}^3/\text{h} / (\text{COC} - 1)}$$

$$\text{COC} = 1.75 \approx 2$$

Cooling Tower 4:

$$E4 = 0.00085 \times R \times 1.8 \times C$$

E = Evaporation Loss (m³/hr)

C = Circulating Cooling Water (m³/hr) = 7.8 m³/h

R = Range in °Celsius = (33-30)°C

$$E4 = 0.00085 \times R \times 1.8 \times C$$

$$= 0.00085 \times (33-30)^\circ\text{C} \times 1.8 \times 7.8 \text{ m}^3/\text{h}$$

$$= 0.0358 \text{ m}^3/\text{h} (^\circ\text{C})$$

Windage or Drift Loss Calculation:

Induced Draft Cooling Tower = $D = 0.1 \times C/100 = 0.1 \times$

$$7.8/100 = \mathbf{0.0078 \text{ m}^3/\text{h}}$$

**Blow Down: given by Supplier = 0.14 m³/hr**

$$B = E / (\text{COC} - 1)$$

$$\mathbf{0.14 \text{ m}^3/\text{hr} = 0.0358 \text{ m}^3/\text{h} / (\text{COC} - 1)}$$

$$\text{COC} = 1.25 \approx 2$$

Make Up water (MU) Calculations:

M = Make up water requirement in m³/hr

E = Evaporation Loss in m³/hr

D = Drift Loss in m³/hr

B = Blow Down in m³/hr

$$E \text{ total} = 3.3452 \text{ m}^3/\text{hr}$$

$$D \text{ total} = 0.5588 \text{ m}^3/\text{hr}$$

$$B \text{ total} = 1.39 \text{ m}^3/\text{hr}$$

$$\mathbf{MU \text{ total} = E \text{ total} + D \text{ total} + B \text{ total}}$$

$$= 3.3452 \text{ m}^3/\text{hr} + 0.5588 \text{ m}^3/\text{hr} + 1.39 \text{ m}^3/\text{hr}$$

$$= \mathbf{5.294 \text{ m}^3/\text{hr}}$$

Reference links:

<http://www.veoliawatertech.com/crownsolutions/ressources/documents/2/21963,Water-pp417-418.pdf>

WATER FLOW DIAGRAM

WATER SOURCES AND ITS POINT OF APPLICATIONS

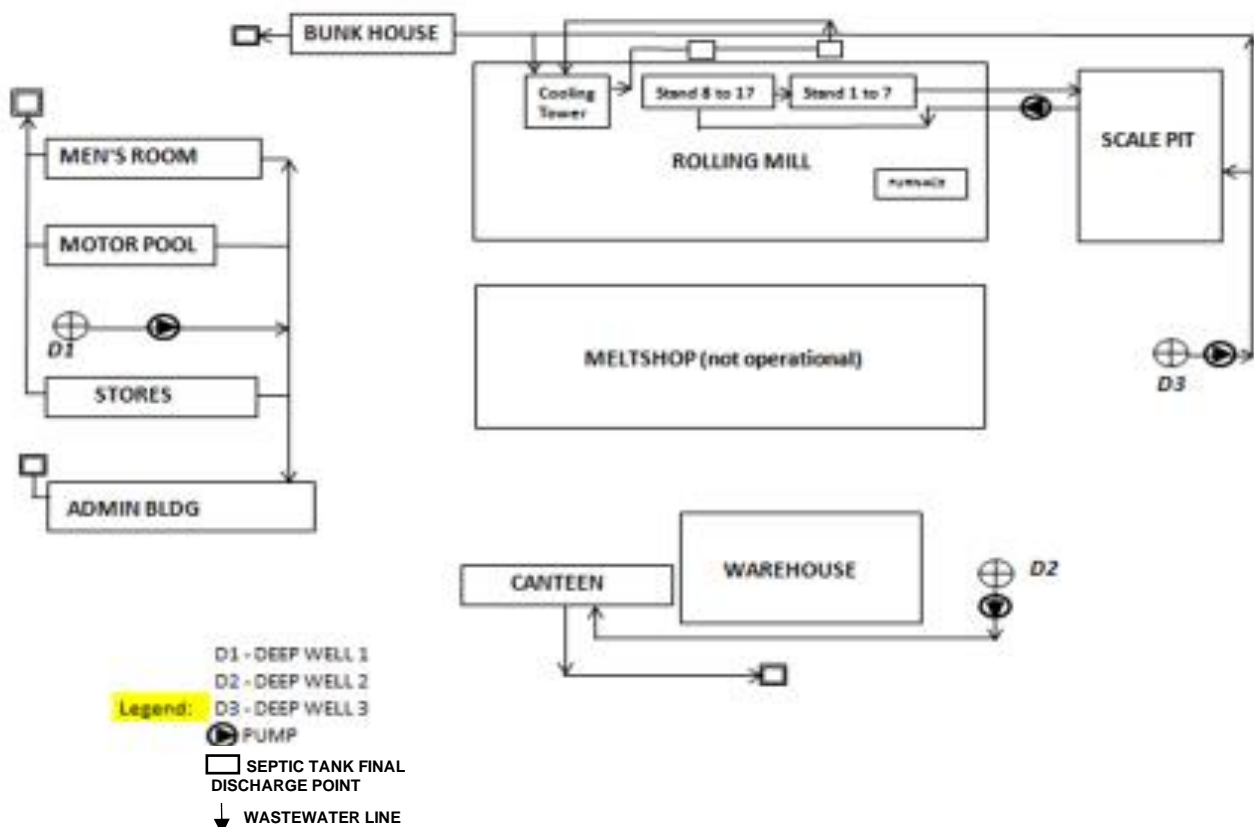


Figure 1.11: Water Flow Diagram

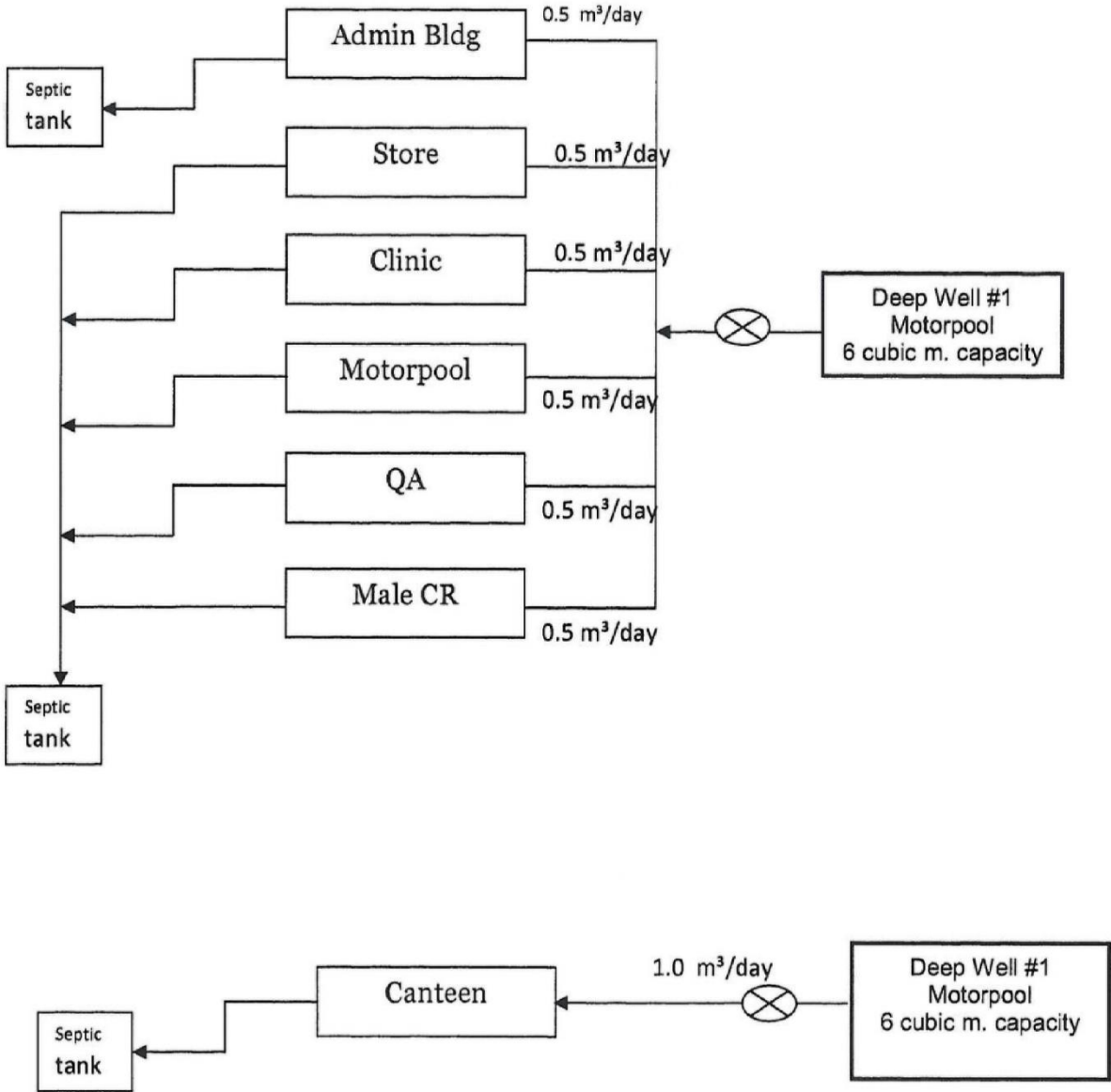


Figure 1.12: Water Balance of the current capacity of 20,000 MTPY

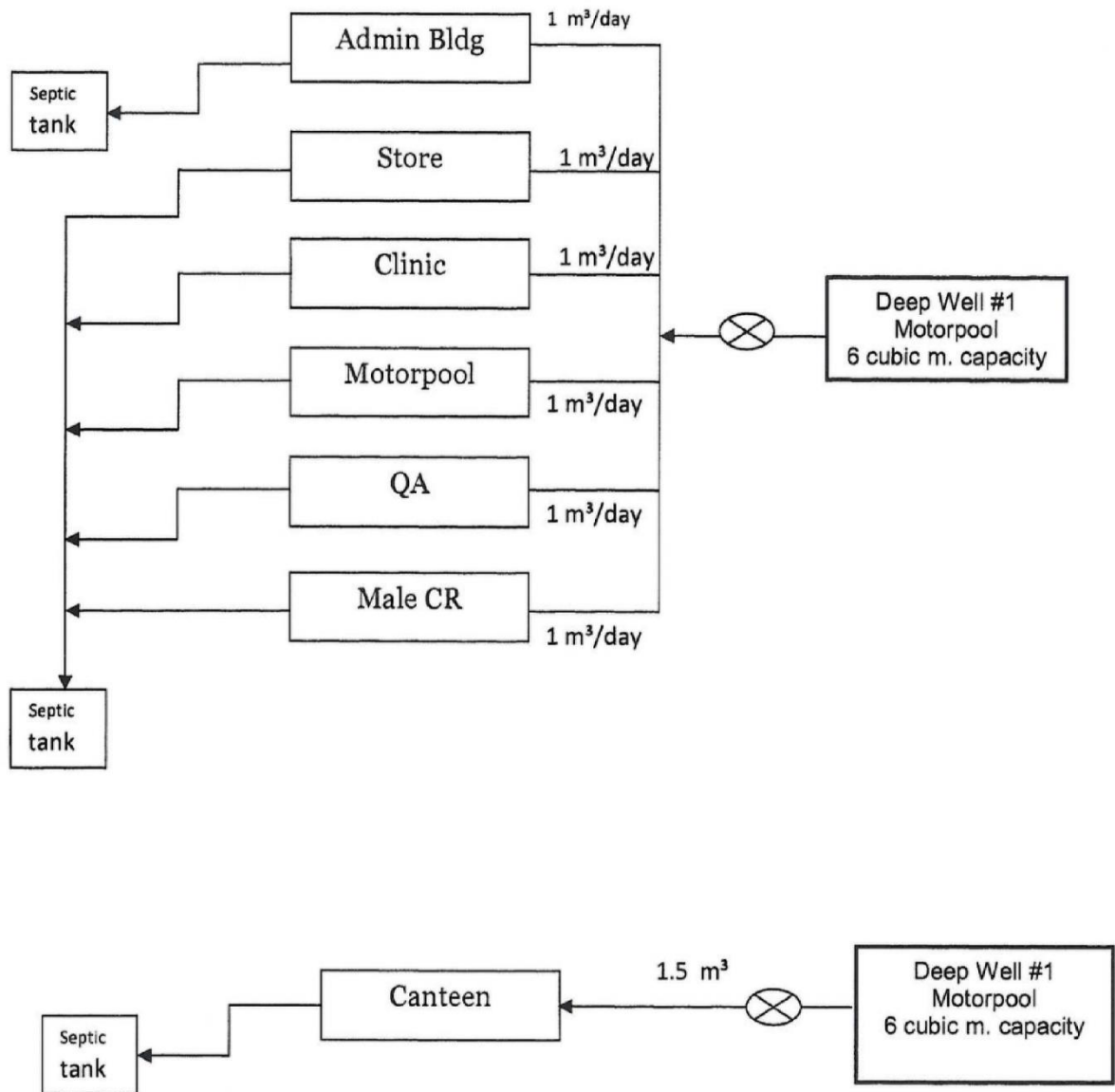


Figure 1.13: Water Balance for the increased capacity of 250,000 MTPY

Shown in Figures 1.14 and 1.15 are the process flow sheet of comparison of material balance for the 20,000 MTPY and 250,000 MTPY respectively.

MATERIAL BALANCE

20,000 MT Capacity

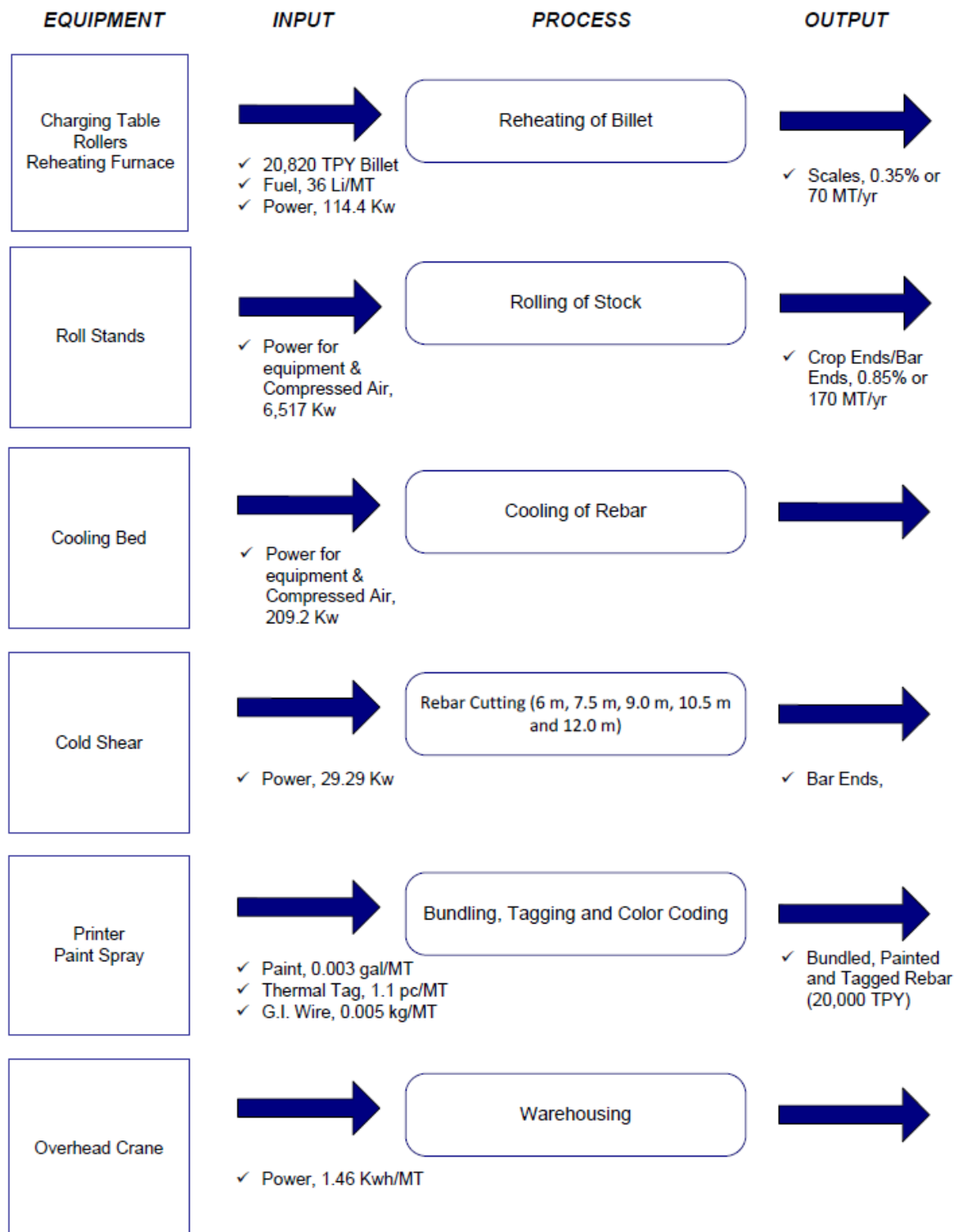


Figure 1.14: Process flow sheet with material balance for the current capacity of 20,000 MTPY



MATERIAL BALANCE

250,000 MT Capacity

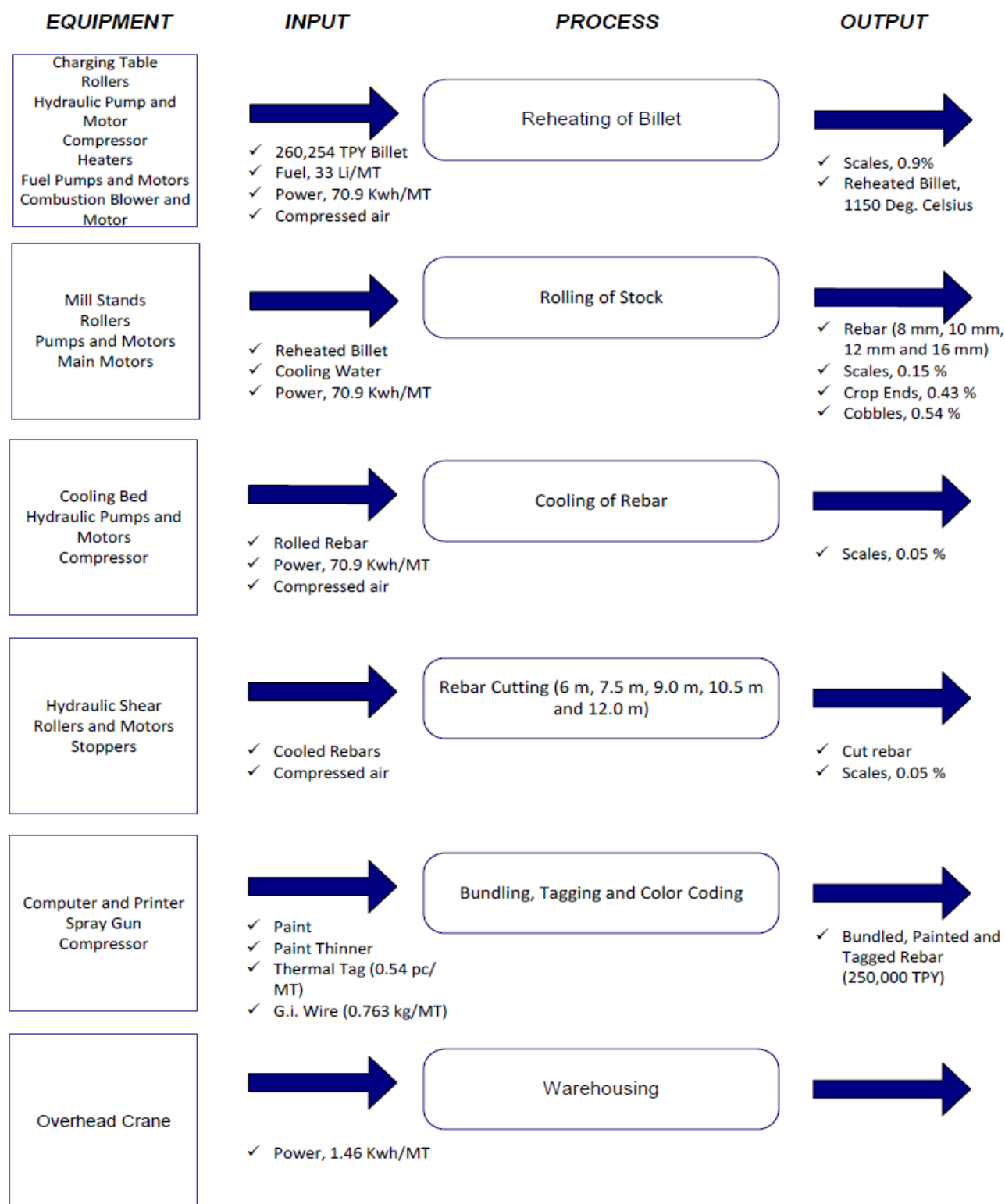


Figure 1.15: Process flow sheet with material balance for the current capacity of 250,000 MTPY



Materials/product handling and transport including storage of products

Raw Materials which are steel billets are stored at the billet yard while finished foods or rebards are prepared in the inspection table which will then be transported through accredited haulers/trucks.

1.5.2 Pollution Control Devices and waste management system

Disposal procedures of hazardous, solid and domestic wastes are as follows:

- Scales is formed on the outer surfaces of plates, sheets or profiles when they are being produced by rolling red hot iron or steel billets in rolling mills. Mill scale is composed of iron oxides mostly ferric and is bluish black in color. It is usually less than 1mm thick and initially adheres to the steel surface and protects it from atmospheric corrosion. Scales will be collected in containers and will be for sale abroad for recycling in sinter plants.
- Used oil will be collected and put inside sealed drums, stored in a company designated Material Recovery Facility (MRF) inside the plant. It will be transported and treated by a DENR accredited TSD facility.
- Busted Fluorescent Bulbs will be put in a container, stored inside the plant MRF in accumulation until there are sufficient inventory for proper disposal through a DENR accredited TSD facility.
- Contaminated rags and gloves will also be put in bags, stored inside the plant MRF in accumulation until there is sufficient inventory for proper disposal through a DENR accredited TSD facility.
- Used automotive batteries will be traded-in to designated suppliers.
- Solid Wastes will be properly segregated and to be disposed in the Material Recovery Facility of San Martin.
- Domestic Waste will be treated through the septic vault and regular siphoning

1.5.3 Operations and Maintenance of Facility

All equipment for the process require maintenance for all of the operation's process. Regular maintenance checks are conducted as frequent as daily maintenance depending on the equipment. Maintenance are undertaken for the following sections:

- Furnace Section
- Rolling Mill Section
- High Speed Block Section

Wastes associated in the maintenance are used oil and contaminated rags which are being treated and disposed of by DENR-accredited 3rd party treaters.

1.6 Project Size

The target increased capacity of the annual production is 250,000 metric tons of rebars.

The total project area is 2.2464 hectares.

1.7 Development Plan, Description of Project Phases and Corresponding Timeframes

Provided in Figure 1.4 is the Site Development Plan.

Pre-Construction

Securing of necessary permits and clearances such as Environmental Compliance Certificate, Building Permit, etc. are being undertaken.

Construction

Development phase is comprised mostly of rehabilitation because the Plant and all other facilities except for MRF and HazWaste Facilities are already existing.

Provided in Annex L shows the following Permits of SanMartin Steel:

1. Permit to Operate
2. Discharge Permit
3. Hazardous Waste Generator ID

Operation

This phase involves the processing of desired product. Detailed process is shown in the illustrations in Plates 1 to 9 and in Figures 1.6, 1.7 and 1.9. Target start of the production of the increased capacity operation will be as soon as the ECC is secured.

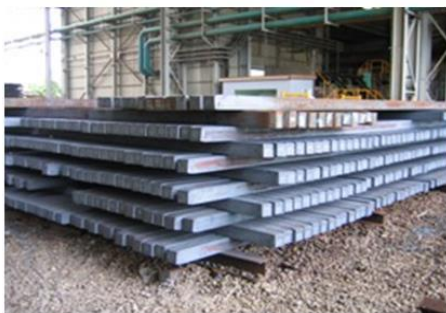
The facility will produce PNS 49 and 211 concrete reinforcing steel bars at an annual capacity of 250,000 metric tons.

In order to produce rebars, billets shall be reheated then shall undergo the size reduction in a series of mill stands through rolling process. Each stand contains a pair of rolls that shall be set-up in accordance with the desired bar diameter. The rolls need to be reset each time a new bar diameter is desired. Larger size rebars shall require less number of passes through the stands while smaller ones shall require more passes. Hence, smaller diameter rebars takes longer time to be produced.

After passing through the rolling stands they passed through a quenching water box to impart the target mechanical properties and temporarily stored in the cooling bed. Bars are air-cooled while on cooling bed. Chains carry the bars and transport them to the conveyor. Slow speed of chains allows sufficient time for bars to cool down. The cooled rolled bars shall then be cut to the desired lengths. The ends of the bars are sheared off by a shearing machine. Ends are sheared because they are often bent or cracked.

The finished product shall then be sorted, bundled and stocked prior to delivery.

Raw Material (Steel Billets)



Processing



Storage

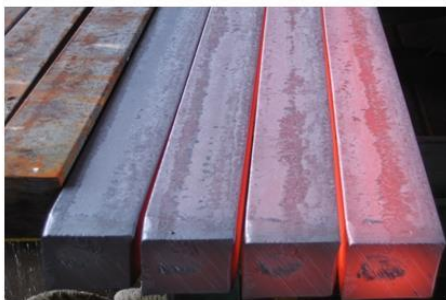


Figure 1.9: Illustration of the Rebars Manufacturing Process

Abandonment

The formulation of the detailed decommissioning plan will be done by the proponent within the specified timeframe as part of the post-ECC requirement. It will be submitted for approval to the LGU and government agencies concerned on the activities such as Environmental Site Assessment to determine contaminants left by the operation, method and equipment to be used for dismantling of structures, clean-up plan and demobilization scheme before proceeding.

Demobilization during post construction will be conducted by the Proponent with the contractors as per EMB requirements which include all activities and costs for transport of all construction equipment used, all excess materials, disassembly and transport of temporary facilities (office, stock room, quarters, etc.)

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



used during construction, removal and disposal of all construction debris and general clean up of construction site. SAN MARTIN STEEL will also require its contractor to post performance bond together with the 10% retention to take care of any defects and damages left behind after demobilization.

Considering that the project has a lifespan of at least 40 years, continuous maintenance, enhancement and upgrading will be done to ensure high production efficiency, environmentally compliant and safe facility. Structures and plant equipment will be assessed regularly for the project to continue its operation beyond its lifespan.

In terms of Environmental Performance, regular monitoring is being implemented such as conduct of Ambient Air Monitoring which shows that the Plant's ambient air emission is within the standards set by the Clean Air Act or RA 8749. Stack Monitoring is also being conducted. Stack emission test results for 2016 and 2017 and showed that emission is within the standards set by the Clean Air Act or RA 8749.

Ambient Noise Quality Monitoring is also being conducted. Ambient noise test results showed that the Plant's ambient noise is within the standards set by the DENR. Ambient water quality is also being monitored even if the project is closed loop.

Detailed environmental performance is shown in Chapter VI.

Shown below is the Project Schedule:

TABLE 1.7.1: GANTT CHART OF ACTIVITIES

Activity	Description	Year	1	2	3	5	5 th year, Q1	5 th year, Q2	5 th year, Q3	5 th year, Q4	5 th year, Q4
1	Provision of CNC Lathe	Target									
		Completion Status		100%							
2	Order new/ additional gears	Target									
		Completion Status				100%					
3	Installation of pinion gear	Target									
		Completion Status		100%							
4	Purchase Gear Coupling	Target									
		Completion Status			100%						
5	Acquisition of Chino Pyrometer	Target									
		Completion Status		100%							
6	Acquisition of Vacuum circuit breaker, AC motors for rotary shear; Soft Start/Stop Reduction Gear Motor ; hot metal detector	Target									
		Completion Status			100%						
7	Acquisition of Inverters & Reconditioning of Wound Rotor	Target									
		Completion Status			100%						

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



8	Additional parts for PLC Upgrade	Target									
		Completion Status			100%						
9	Purchase of Trochoid pumps & burner for reheating furnace.	Target									
		Completion Status			100%						
10	Acquisition of 300KVA generator set.	Target									
		Completion Status						80%			
11	Spare, Clutch & Brake Assy installation	Target									
		Completion Status			100%						
12	Universal Cross Joint Installation	Target									
		Completion Status					100%				
13	Acquisition of Vacuum Magnetic Contactor	Target									
		Completion Status				0%					
14	Rehabilitation of gearboxes	Target									
		Completion Status					40%				
15	Provision of additional 1 unit Combustion Air Blower assy.	Target									
		Completion Status				0%					
16	Repair of old Entry Pusher Hydraulic Cylinder	Target									
		Completion Status				0%					
17	Purchase of spare pumps/motors	Target									
		Completion Status				0%					
		Target									
		Completion Status									
		Target									
		Completion Status									

1.8 Manpower

Provided below is the manpower requirement during construction and operations phase of the project.

Pre-Construction/ Construction

Manpower requirement is minimal during this stage because the works will be limited only to the rehabilitation and upgrading of the Plant.

Operation

Provided below is the tabulation of the existing manpower at the Plant which do not discriminate against gender and age as long as the worker is qualified and fit to work. Also, equal protection clause on employment is considered by prioritizing local employment in the barangay/s and within the affected municipality for technical staff and workers.

Provided in Table 1.17 is the manpower requirement which considered gender equality for various jobs.

Table 1.17: Manpower Composition

	Title / Position	16 - 2 Shifts	24 - 2 Shifts	Minimum Qualifications	
Accounting	Accounts Payables	1	1	Graduate of BS Accountancy	
	Plant Cost Accountant		1	Graduate of BS Accountancy	Preferably Licensed
Electrical Maintenance					
	Supervisor		1	Graduate of BS Electrical Engineering	Preferably Licensed
	Asst. Supervisor-SIC	2	3	Graduate of BS Electrical Engineering	Preferably Licensed
	Electrical Maintenance Staff 1	1	1	Graduate of BS Electrical Engineering	
	EM Manager	1	1	Graduate of BS Electrical Engineering	Preferably Licensed
	Spares and Planning Engineer	1	1	Graduate of BS Electrical Engineering	Preferably Licensed
	Technician	8	8	Graduate of BS Electrical Engineering Technology	
Human Resources / Admin					
	Admin Assistant		1	College Graduate	
	Company nurse	2	3	Graduate of BS Nursing	Preferably Licensed
	Company driver	1	1	High School Graduate/Vocational	With Drivers License 123
	Construction Management Engineer		1	Graduate of BS Civil Engineering	Preferably Licensed
	HR Assistant		1	College Graduate	
	HR Senior Staff	1	1	College Graduate	
	Resident Manager		1	Graduate of BS Civil Engineering	Preferably Licensed
IT	IT Specialist	1	2	Graduate of BS IT/Computer Engineering/Computer Science	
Logistics	Asst. Shift Supervisor	2	2	College Graduate	
	Cargo Controller	2	2	College Graduate	
	Cargo Processor	2	2	College Graduate	
	Checker	3	3	College Graduate	
	Crane Operator	6	6	Vocational Graduate	With NCII Certificate
	Distribution Assistant	17	17	High School Graduate	
	Documentation Assistant	1	1	College Graduate	

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



	Inventory Coordinator	1	1	College Graduate	
	Logistics Supervisor	1	1	College Graduate	
	Truck Scale Operator	2	2	College Graduate	
Mechanical Maintenance	Crane Engineer		1	Graduate of BS Mechanical Engineering	Preferably Licensed
	Asst. Supervisor - SIC	2	2	Graduate of BS Mechanical Engineering	Preferably Licensed
	Asst. Supervisor - Day Crew	1	1	Graduate of BS Mechanical Engineering	Preferably Licensed
	Asst. Supervisor			Graduate of BS Mechanical Engineering	Preferably Licensed
	Asst. Supervisor		1	Graduate of BS Mechanical Engineering	Preferably Licensed
	CAD Operator	1	1	College Graduate	
	Electrical Crane Technician	1	2	College Graduate	
	Heavy Equipment Operator 2	1	1	Vocational Graduate	
	Mechanical Crane Technician	1	2	College Graduate	
	Mechanical Maintenance & Spares Planner (Staff 1)	1	1	Graduate of BS Mechanical Engineering	Preferably Licensed
	Mechanical Maintenance Staff		1	Graduate of BS Mechanical Engineering	Preferably Licensed
	Mechanical Manager	1	1	Graduate of BS Mechanical Engineering	Preferably Licensed
	Mechanical Technician 1	11	13	College Graduate	
	Mobile Equipment Mechanic		1	Vocational Graduate	
Production	Adjuster	6	13	College Graduate	
	Assistant Furnace Technician	2	2	Vocational Graduate	
	Assistant Supervisor - SIC	1	2	Graduate of BS Mechanical Engineering	Preferably Licensed
	Billet Charger Operator	2	2	Vocational Graduate	
	Billet Charging Bed Tender		2	Vocational Graduate	
	Billet Discharge Operator		2	Vocational Graduate	
	Billet Yard Coordinator	1	1	College Graduate	
	Billet Yard Staff 1	2	2	College Graduate	
	Cold Shear Operator	2	4	College Graduate	
	Crane Operator	2	5	Vocational Graduate	
	Dumptruck Driver	1	1	Vocational Graduate	
	Finishing End Tender	24	35	Vocational Graduate	
	Forklift/Heavy Equipment Operator	0	2	Vocational Graduate	
	Furnace Engineer	1	1	Graduate of BS Mechanical Engineering	Preferably Licensed

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



	Furnace Heater	3	3	Vocational Graduate	
	Inspection Bed Checker	1	2	Vocational Graduate	
	Process Engineer		1	Graduate of BS Industrial Engineering	
	Production Manager	1	1	Graduate of BS Mechanical Engineering	Preferably Licensed
	Production Staff	2	1	College Graduate	
	Pulpit Operator	4	5	Graduate of BS Mechanical Engineering	Preferably Licensed
	Scrap Yard Coordinator	1	1	College Graduate	
	Tagger	1	2	Vocational Graduate	
QA	QA Sampler	2	3	College Graduate	
	QA Staff	2	3	College Graduate	
	QA Asst. Supervisor	1	1	College Graduate	
HES	Document Control Officer	1	1	College Graduate	
	QMS Specialist/ PCO	1	1	College Graduate	
	Safety Officer	1	2	Graduate of Any Engineering Courses	
Rolls & Tackle	Assembly Technician 1	2	2	Vocational Graduate	
	Autocad Operator	1	1	College Graduate	
	Engineer	2	2	Graduate of BS Mechanical Engineering	Preferably Licensed
	Engineer 2	1	1	Graduate of BS Mechanical Engineering	Preferably Licensed
	Guide Assembly Technician/ Welder	1	1	Vocational Graduate	
	Guidesman	2	2	Vocational Graduate	
	Lubeman	2	2	Vocational Graduate	
	Machinist	6	6	College Graduate	
	Tackleman	2	2	Vocational Graduate	
	Welder/Guide Assembly Technician 1	2	2	Vocational Graduate	
Store	Store Staff	2	2	College Graduate	
	Storekeeper	2	2	College Graduate	
	Store - Section Head		1	College Graduate	
		166	220		

There are no additional manpower requirement for the modification because the existing manpower can still accommodate the work requirements.

1.9 Indicative Project Investment Cost

The indicative project cost is PhP 1,000,000,000.00.

CHAPTER II: ASSESSMENT OF ENVIRONMENTAL IMPACTS

2.1 LAND

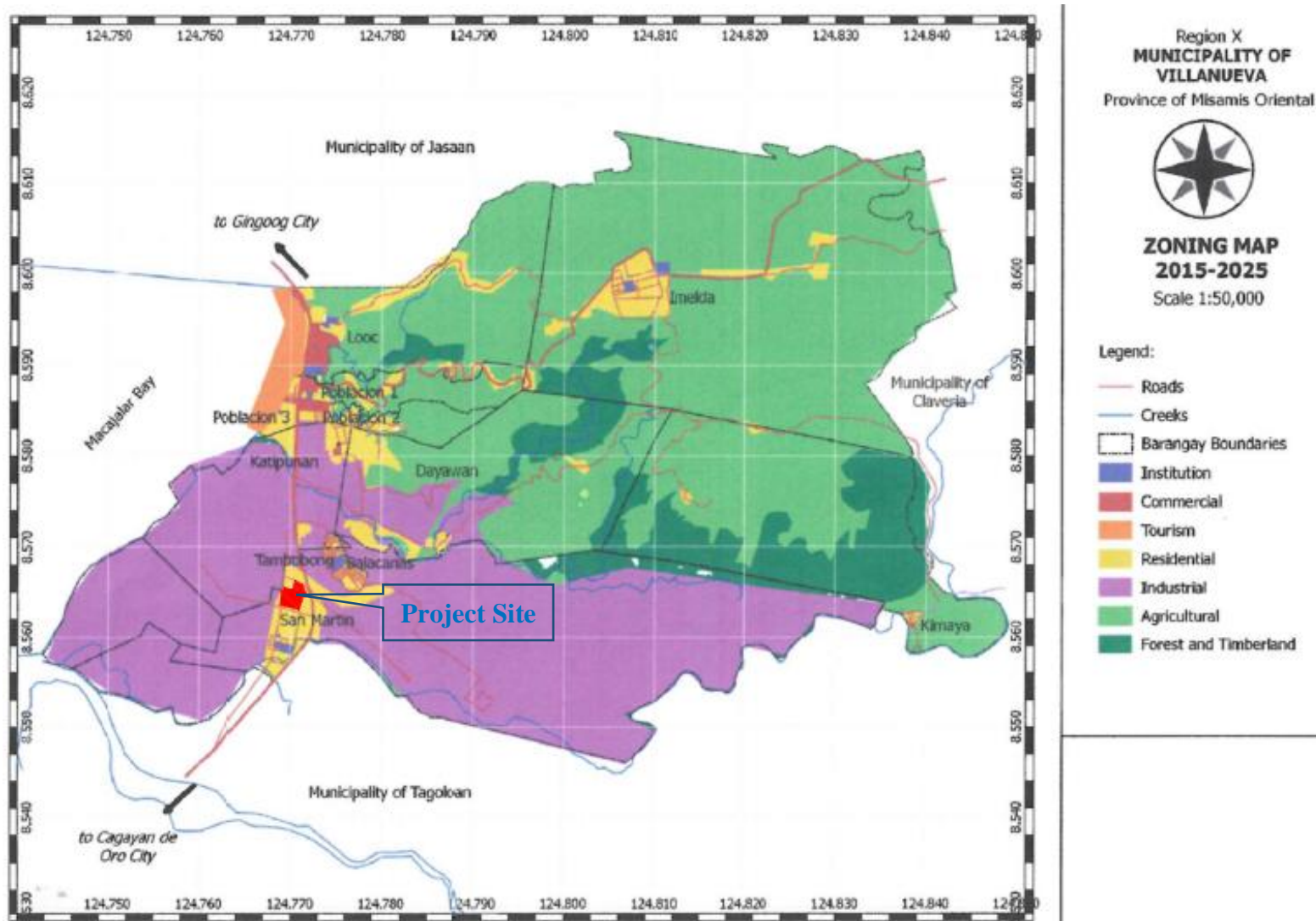
2.1.1 Land Use and Classification

Impact on compatibility with existing land use

The project site is located in PHIVIDE, an industrial park in Villanueva, Misamis Oriental. As per the Tax Declaration, the lots owned SanMartin Steel and leased from Phividec are all classified as Industrial lots. Company owned lots are registered as San Martin Steel Inc. while the leased lots are registered as Phividec Industrial Authority.

Provided in Annex K is the Certification of PHIVIDE stating that the project area is within the PHIVIDE Industrial Estate – Special Economic Zone.

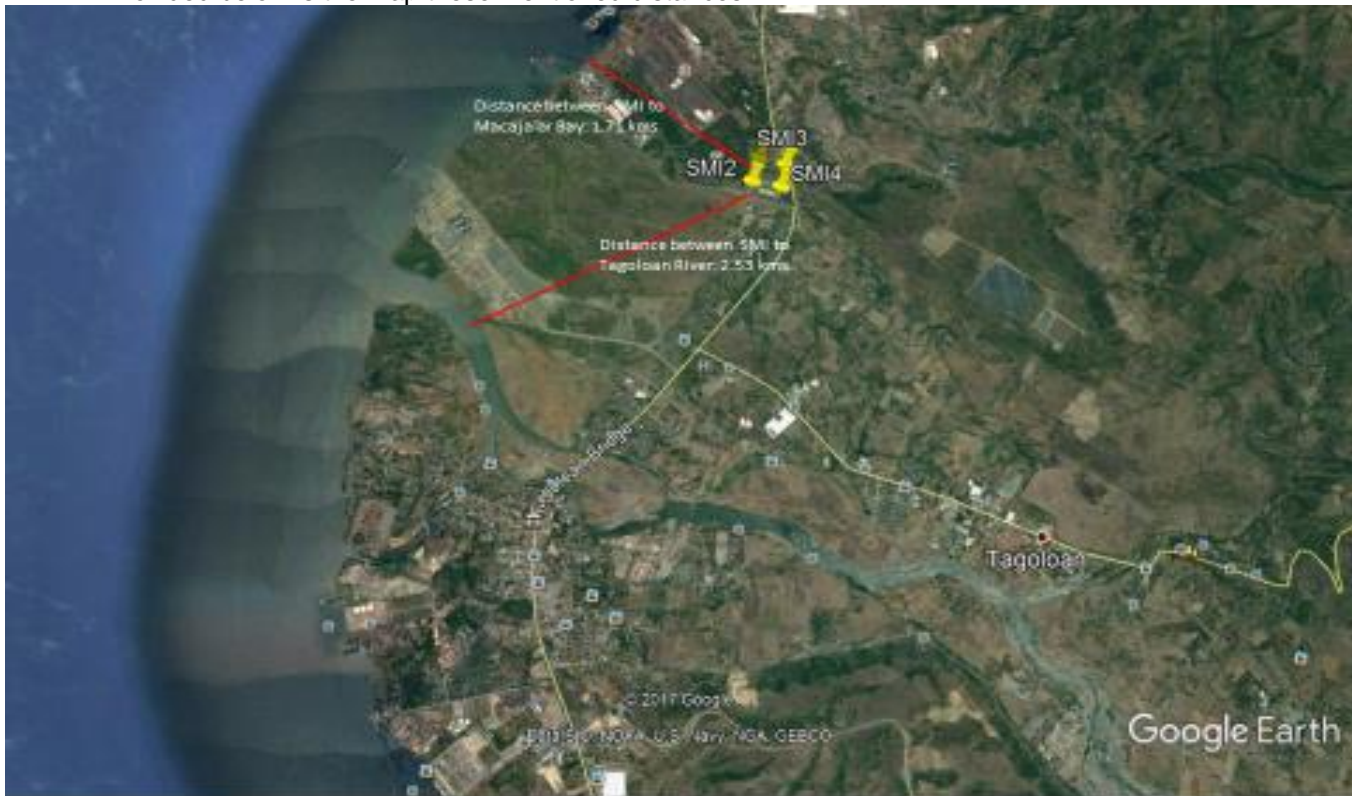
However, as per the Zoning Map provided in Figure 2.1.1, the Project area (red colored area) is surrounded by residential classified lots (yellow colored zone). The rest are already Industrial lots (violet colored zone). Enlarged map is attached in the hard copy of the EPRMP.



Impact on compatibility with classification as an Environmentally Critical Areas ECA

There is no ECA at or near the Project area. The nearest body of water is Tagoloan River which nearest area / point is about 2.53 kms while Macajalar Bay is about 1.71 km. Thus, the Project has no impact on compatibility with classification as an ECA.

Provided below is the map these mentioned distances.



Distance to nearest ECA:

- Macajalar Bay (2.53kms)
- Tagoloan River (1.71 kms)

Figure 2.1.2: Map of the nearest ECA

Impact in existing land tenure issue/s

There are no possible land issues since the area of the project site is already owned by the proponent and is in an industrial park location. Transfer of title is now on process.

Impairment of visual aesthetics

There will be no impairment of visual aesthetics because the project is located in an area classified as heavy industrial area and the Plant site will be designed to suit the aesthetic perspective. Moreover, the Project and the Proponent will cooperate and coordinate with the LGU of San Martin if there will be plans and programs with respect of the LGU's Tourism Plan.

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

There will be no devaluation of land value as a result of improper solid waste management and other related impacts because the Project will implement Solid Waste Management Plan which will include an area for Material Recovery Facility and Hazardous Waste area for used oil and batteries and busted bulbs. These are among the associated facilities of the Plant.



2.1.2 Geology/Geomorphology

2.1.2.1 General Geology

2.1.2.1.1 Tectonic Setting

The study area is found within a tectonically active region known as the Philippine Mobile Belt (PMB). In Luzon Island, PMB is bounded by two oppositely dipping subduction zones; namely, the Manila Trench on the west and the Philippine Trench-East Luzon Trough on the east. The Manila Trench is the morphological expression of the eastward subduction of the South China Sea marginal basin lithosphere beneath the Philippine Mobile Belt (Barrier et al, 1991). The Philippine Trench-East Luzon Trough, on the other hand, represents the westward oblique subduction of Eocene Philippine Sea Plate (Cardwell *et al.*, 1980; Fitch, 1972 and Hamburger et al., 1983 in Aurelio; Sajona et al., 1993). Convergence of the Philippine Mobile Belt and the surrounding blocks is associated with seismicity and formation of volcanic chains in the region (Barrier et al, 1991; Daligdig and Besana, 1993).

The deformation of the Philippine Mobile Belt is further influenced by movement along the Philippine Fault Zone. This fault system, the movement of which is generally considered to be left-lateral, extends more than 1,200 kilometers, transecting the Philippine archipelago from Luzon to Eastern Mindanao (Aurelio, 1996). Its age of initiation is still controversial, although extensive studies (e.g. Barrier et al, 1988 and Aurelio et al, 1990 and Barrier et al., 1991) of the fault in Luzon and Visayas indicate that fault activity began during the Pliocene. The trace of the Philippine fault is defined by young geomorphic features including fault scarps, sinistral stream offsets, fault parallel ridges and narrow, elongated troughs (Barrier et al, 1991).

The province of Misamis Oriental including the project is geologically situated on the northern part of Mindanao Island west of the so-called "Philippine Mobile Belt" (PMB), a highly seismic belt that transects the archipelago. The project located at Barangay San Martin of Villanueva, Misamis Oriental is approximately two kilometers west of the Tagoloan Fault, 16 kilometers southwest of Cabanglasan Fault, 42 kilometers southwest of Central Mindanao Fault and 126 kilometers northeast of Mindanao Fault-Western Mindanao Extension (Figure 2.2.1.1).

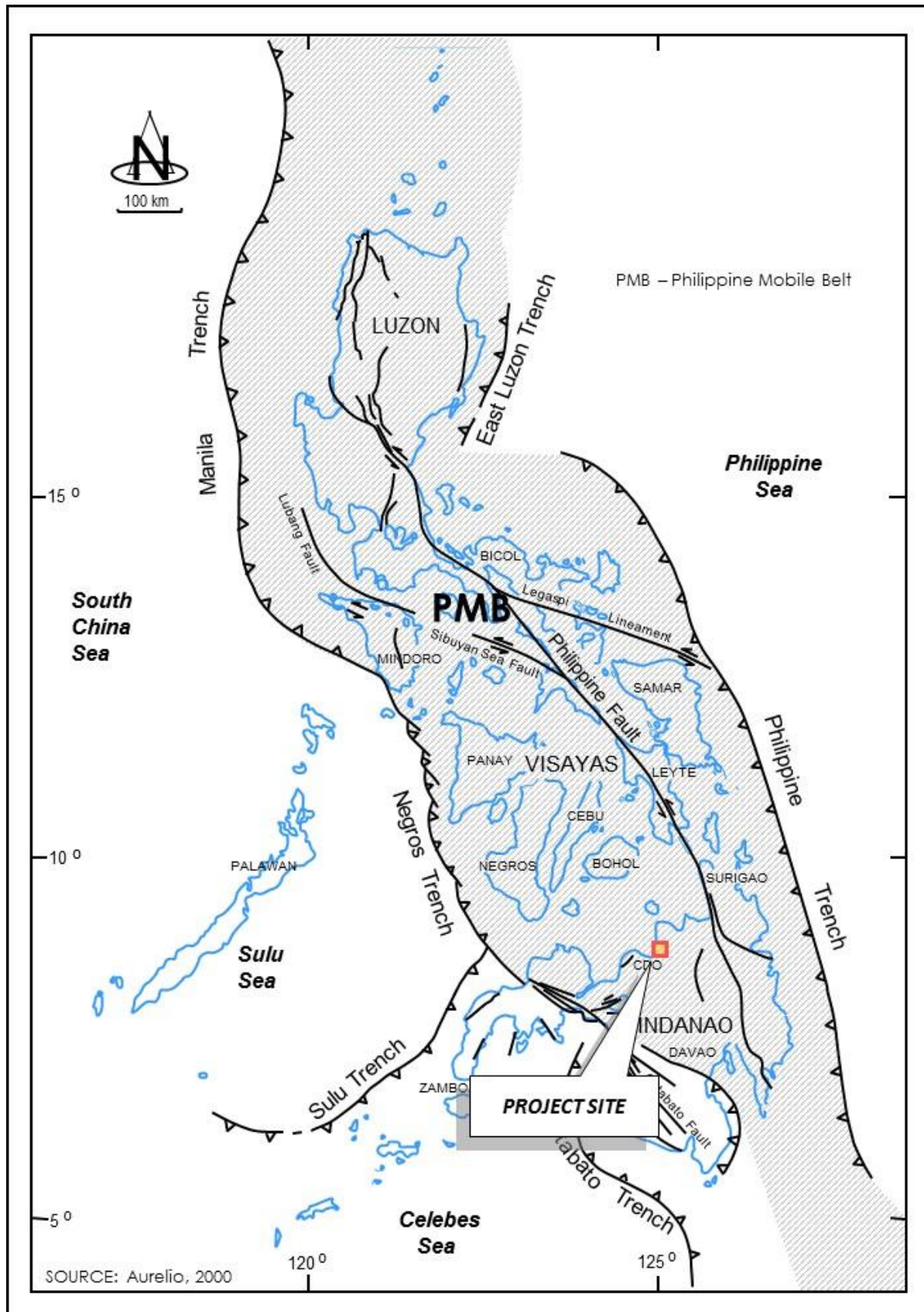


Figure 2.2.1.1 Tectonic Map of the Philippines (Source: Aurelio 2000)

2.1.2.1.2 Stratigraphy

The Municipality of Villanueva including the project site is underlain mainly by alluvial deposits consisting of pebble, gravel and boulder size material. The coarse clastic, which are from granules to boulder sizes, are composed dominantly of andesite with lesser amount of cherty and serpentinized rock. Feldspar, quartz, magnetite and ferromagnesian minerals compose the finer clastics. This is bordered by sequence of sedimentary beds of conglomerate, tuffaceous silt and coralline limestone (Figure 2.2.1.2). Components of conglomerates are mostly andesite with lesser amount of bull quartz, cherty materials, and serpentinized rocks cemented by tuffaceous materials.

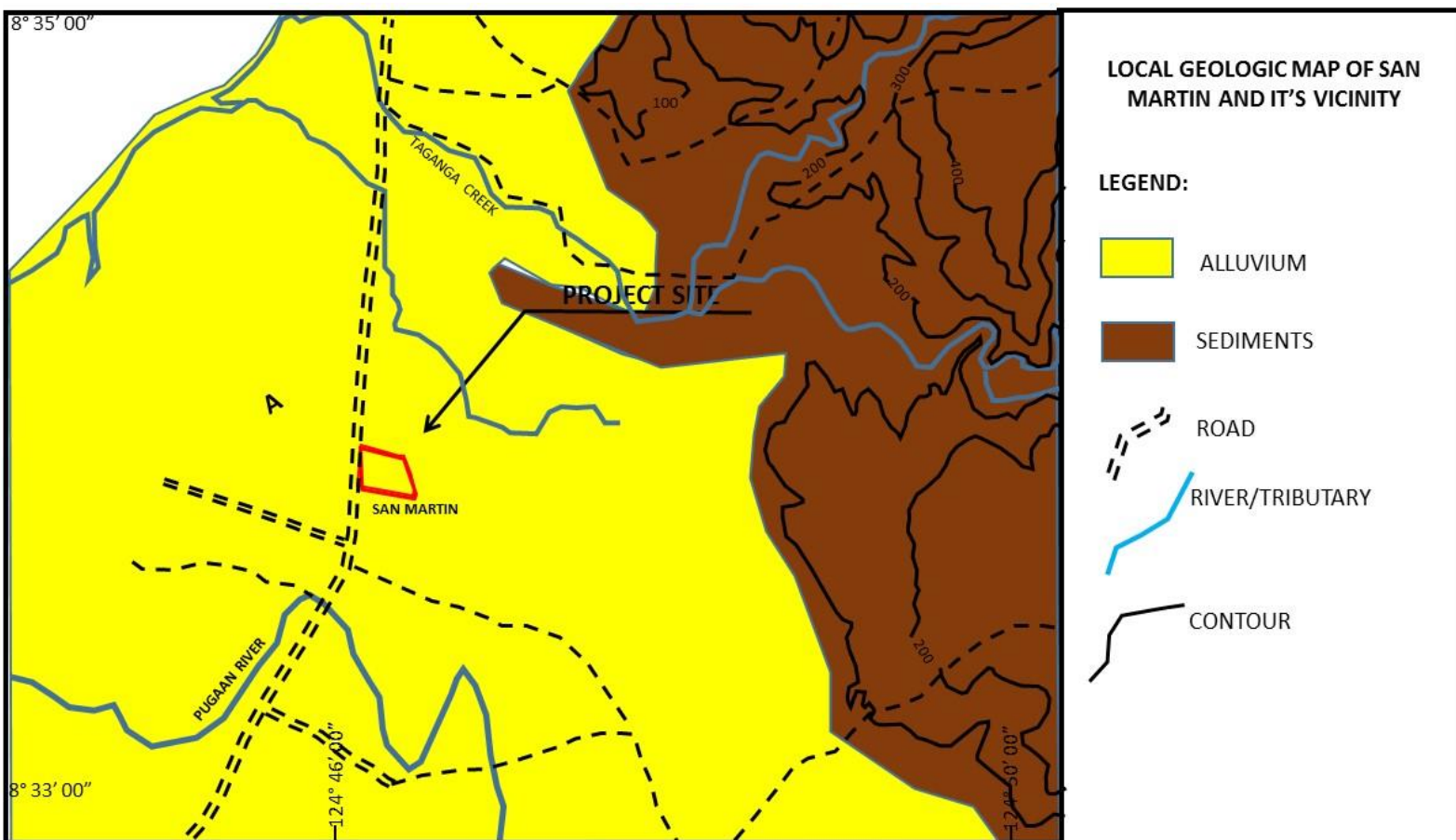


Figure 2.1.2.1.2.1: General Geology of San Martin, Villanueva, Misamis Oriental and Its Vicinity
(Source: Adapted from MGB Geological Investigation of Tagoloan and Villanueva, Misamis Oriental)

2.1.2.1.2a Surficial Deposit and Engineering Characteristics

Two test pits were excavated to check the underlying subsoil of the project. Exposed in the 0.50 meters test pits are mostly pebble to gravel size andesitic to cherty rock associated with silty material. (Photo 2.2.1.2a1, and 2.2.1.2a2 shows the subsoil profile of the test pits).



Photo 2.2.1.2a1: Subsoil Profile of TP 1 consisting of gravel to pebble size andesitic material associated with silty soil



Photo 2.2.1.2a2: Subsoil Profile of BH 2

2.1.2.1.3 Geologic Structure

The most prominent geologic structure in the region nearest to the project area is the northwest trending Tagoloan Fault approximately located 2 kilometers east of the project (Refer to Figure 2.1.2.1.3.1 and Phivolcs certification). Other active major faults in the region proximal to the project site include the Cabanglasan Fault, Central Mindanao Fault and Mindanao-Western Mindanao Extension Fault.

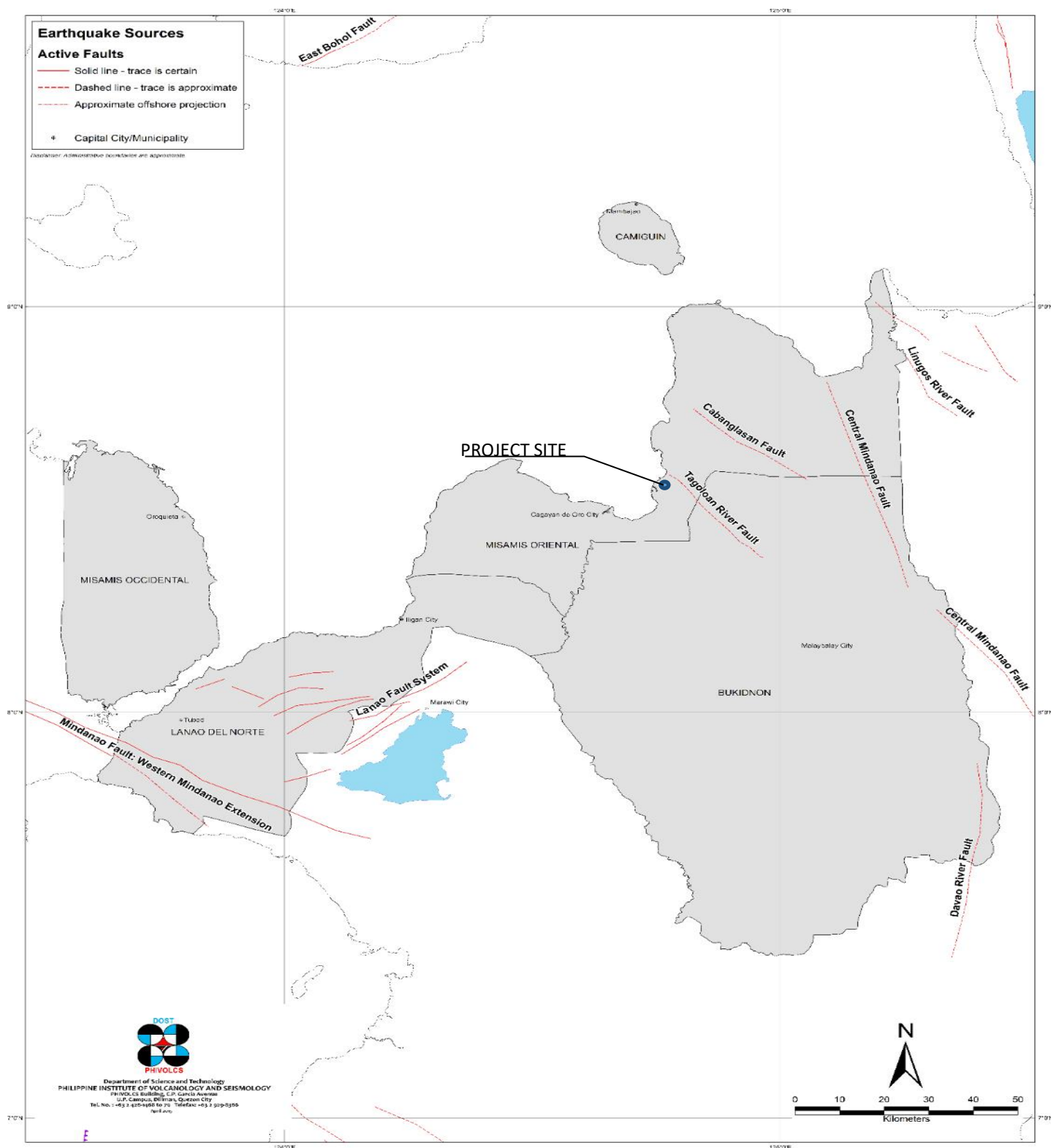


Figure 2.1.2.1.3.1: Active Faults and Trenches in Region X

2.1.2.1.4 Change in surface landform/ topography/ terrain/slope

San Martin, Villanueva, Misamis Oriental including the project area is characterized by generally flat terrain and has an elevation ranging from 0 meters to 10meters above sea level and is drained by Pugaan River located ± 900 meters southwest of project site (Figure 2.2.1.4).

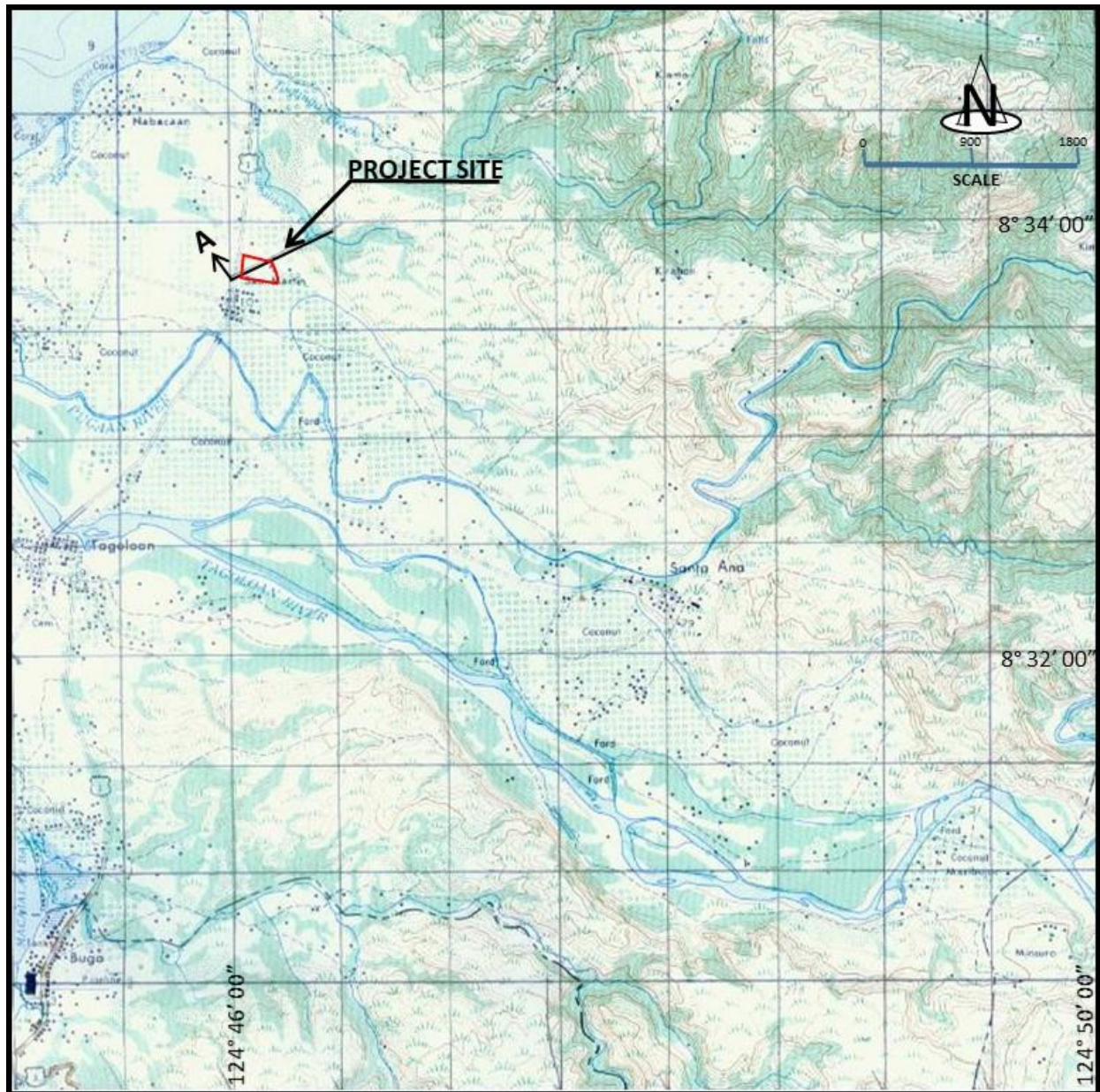


Figure 2.2.1.4: Topographic Map of the Project Site (NAMRIA MAP)

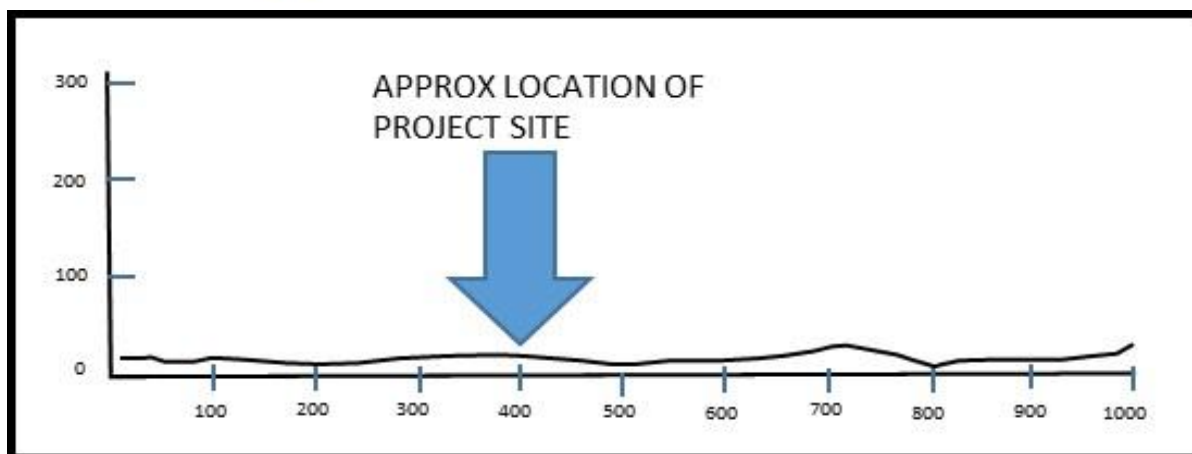


Figure 2.2.1.4b: Topographic Map of the Project Site

2.1.2.1.5 Hazard Maps and Discussions of Impacts/Effects of Natural Hazards on the Project

“Natural Hazards” are the natural processes or phenomena occurring in the biosphere that may constitute a damaging event. It can be classified by origin: geological, hydrometeorological or biological.

2.1.2.1.5.1 Geologic Hazard

2.1.2.1.5.1.1 Earthquake Hazards

Earthquake is the perceptible trembling to violent shaking of ground caused by either tectonic movements or volcanic activity. The Philippines is located near or along the so called “earthquake belt” and is prone to seismic hazards. Area that are susceptible to this seismic hazard are those underlain by unconsolidated soils and sediments deposited on the low-lying areas (Figure 2.2.1.5.1.1).

The area investigated is prone to ground shaking hazards due to the presence of several earthquake generators in and near the region. These possible seismogenic structures include the active Tagoloan Fault, Cabanglasan Fault, Central Mindanao Fault and the Mindanao Fault-Western Mindanao Extension. Figure 2.2.1.5.1.1b shows that the project falls near the location where earthquake magnitude of 5.5 -6.5 and with depth of 0 – 69 kilometers were recorded.

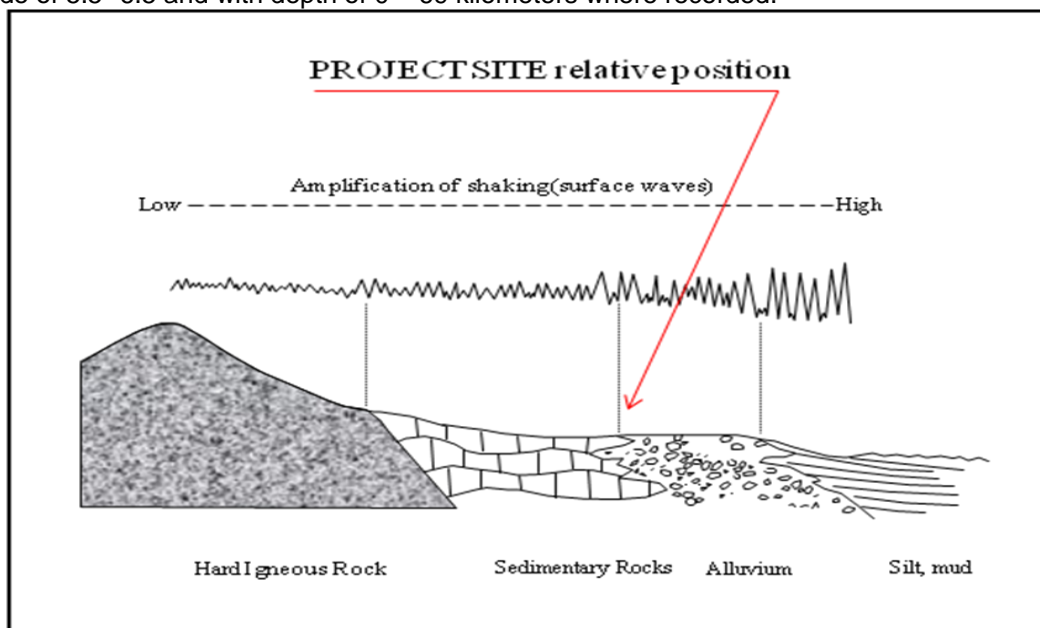


Figure 2.2.1.5.1.1: Generalized Relationship Between Near Surface Earth Material and Amplification of Shaking During a Seismic Event (Keller E. A. 1985)

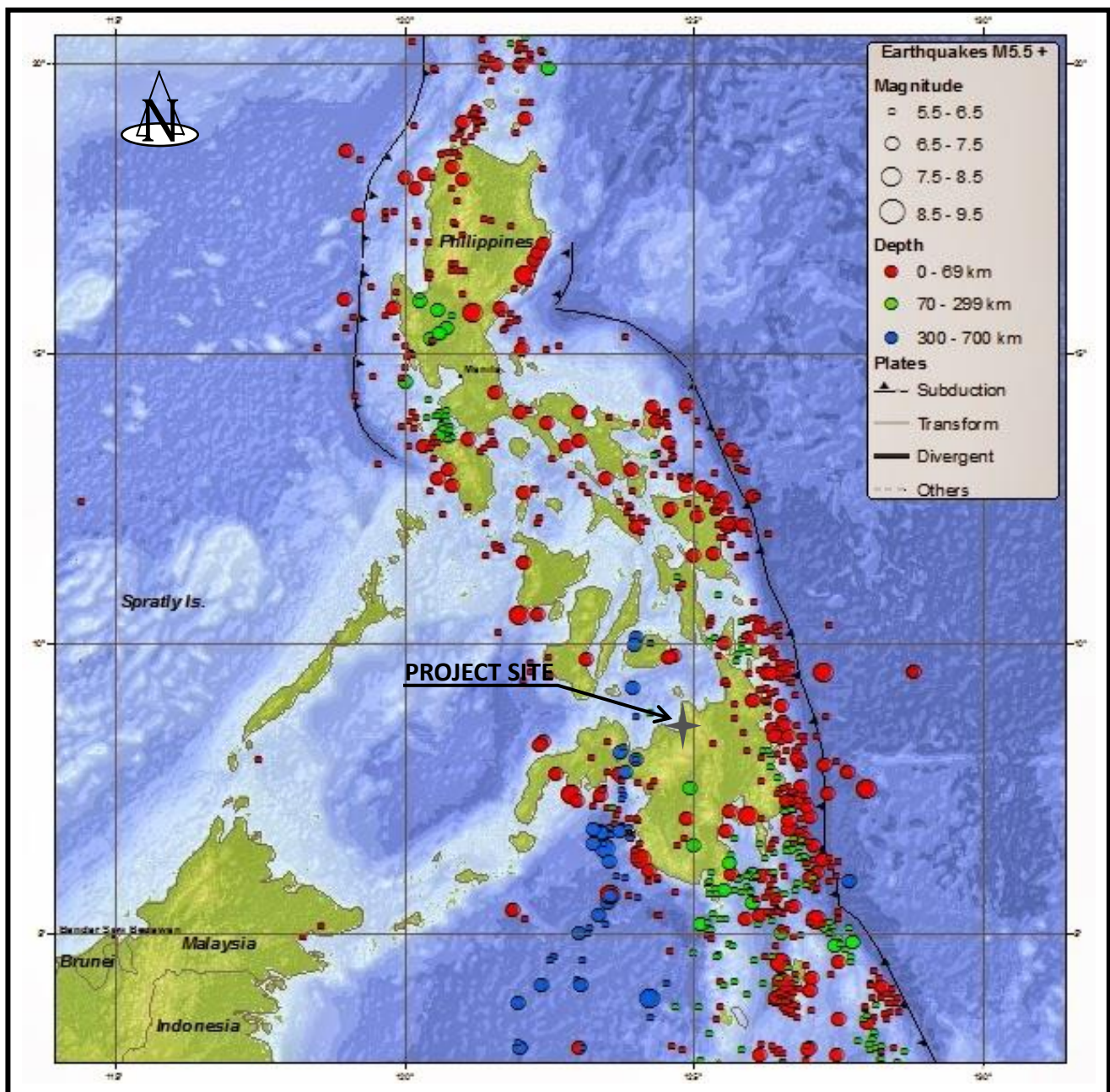


Figure 2.2.1.5.1.2: Map showing earthquakes in the Philippines, its recorded magnitude and corresponding depth (downloaded from phivolcs.dost.gov.ph)

2.1.2.1.5.1.2 Ground Acceleration

Ground acceleration caused by earthquakes may result to great damage and destruction to property and infrastructure accompanied by loss of life. Factors that influence the intensity of ground shaking include the magnitude of the earthquake, distance of the site in relation to the earthquake generator, characteristics of the underlying rocks, and the soundness of the building. The Philippines is a tectonically active place with noted active faults that are usually the source of major earthquakes. This is the reason why the Philippine Institute of Volcanology and Seismology (PHIVOLCS) and the United States Geological Survey (USGS) conduct ground motion hazard mapping useful to engineering design using modern probabilistic methodology. In the study, the peak horizontal ground accelerations that have a 10 % probability of being exceeded in 50 years have been uniformly estimated for rock, hard soil, medium soil, and soft soil site condition. Result of the study shows an estimate on rock ranging from a low of 0.11g in Visayas to a high of 0.30g in the vicinity of Casiguran fault zone in eastern Luzon



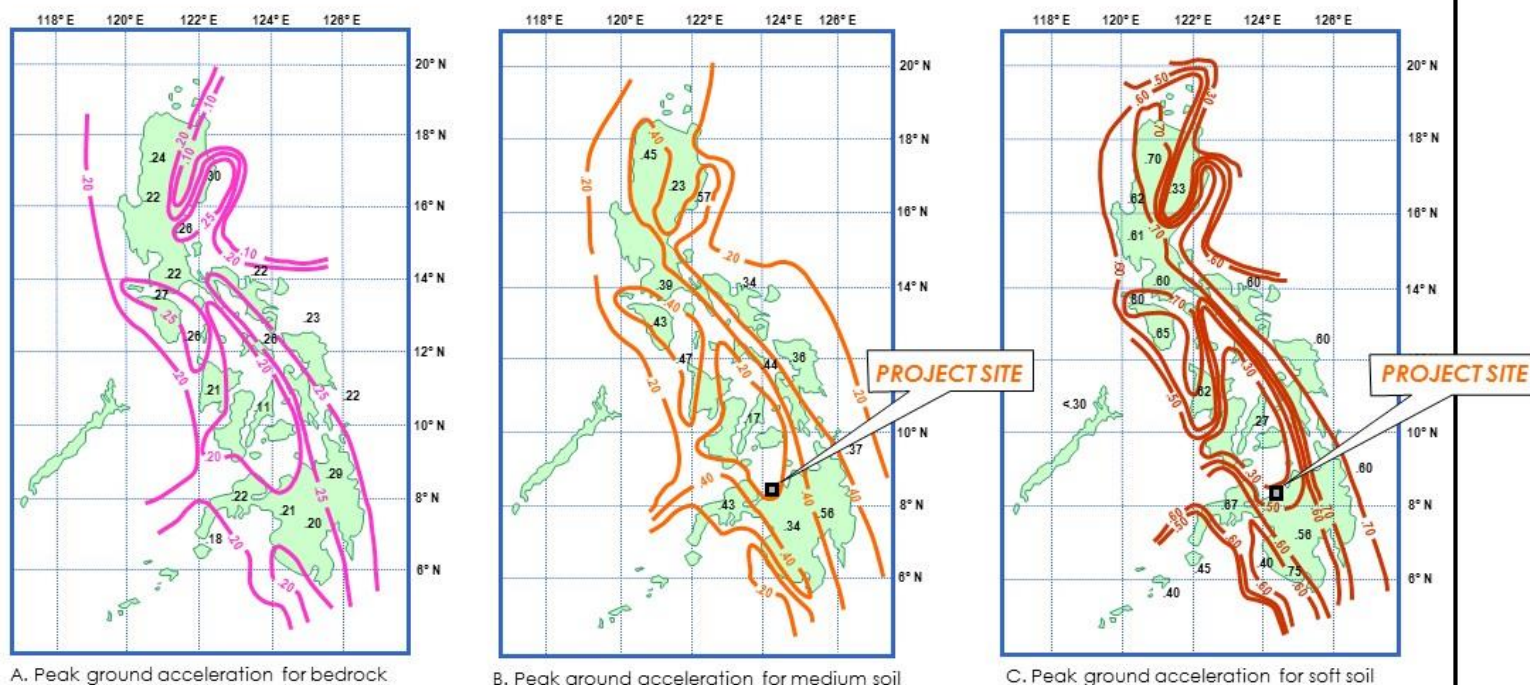
(Thenhaus et al, 1994). Estimates for soft soil conditions are considerably higher and range between 0.27g for Visayas and 0.80g along the Casiguran fault zone.

The project site is underlain mainly by alluvial deposits mostly sandy silt associated with pebble to gravel size material being located near Macajalar Bay and fall under the 0.30g and 0.20g for Soft Soil and Medium Soil condition, respectively (Figure 2.1.2.1.5.1.2.1).

Using the deterministic method of Tanaka and Fukushima with the following attenuation relation:

$$\text{Log}_{10}A=0.41M-\text{log}_{10}(R+0.032 \times 10^{0.41M}) - 0.0034R + 1.30$$

Where :
 A= mean of the peak acceleration from two horizontal components at each site (cm/sec²)
 R= shortest distance between site and fault rupture (km)
 M= surface-wave magnitude



SOURCE: Thenhaus et al, 1994

Figure 2.1.2.1.5.1.2.1: Maps Showing Peak Horizontal Acceleration for Bedrock, Medium Soil and Soft Soil for the Philippine Region (Source: Thenhaus et al, 1994)



Republic of the Philippines
 Department of Science and Technology
PHILIPPINE INSTITUTE OF VOLCANOLOGY AND SEISMOLOGY



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HASS-EQ-04

HAS-Mar-18-439

DATE 21 March 2018
 FOR **SAN MARTIN STEEL, INC.**
 REPRESENTED BY **HERNANI I. BAYANI**
 PURPOSE MGB requirement

EARTHQUAKE HAZARD ASSESSMENT

LOT DESCRIPTION, PROJECT NAME, LOCATION	GROUND RUPTURE			
Lots 1, 296, 280-A, 2713-A, 2712-AI, Pls-923; Lot 1, Swo-10-0000174-B1; Lot 1, Swo-10-000174-AI; Steel Rolling Mill Expansion Project; Brgy. San Martin, Villanueva, Misamis Oriental	Safe; Approximately 2 kilometers west of the Tagoloan River Fault			

EXPLANATION AND RECOMMENDATION

- ✓ All hazard assessments are based on the latest available hazard maps and on the location indicated in the vicinity map provided.
- ✓ Ground rupture hazard assessment is the distance to the nearest known active fault. The recommended buffer zone, or Zone of Avoidance, against ground rupture hazard is at least 5 meters on both sides of the active fault or from its zone of deformation.
- ✓ All sites may be affected by strong ground shaking.
- ✓ Ground shaking hazard can be mitigated by following the provisions of the National Building Code and the Structural Code of the Philippines.
- ✓ This hazard assessment supersedes previous assessment made by this office regarding the site.

Assessed by Kimberley M. Vitto
 Verified by Abigail C. Pidlaon

Officer-of-the-Day
 Science Research Specialist II

Approved by **RENATO U. SOLIDUM, JR.**

**Undersecretary for DRR and CC, DOST
 and
 Officer-in-Charge, PHIVOLCS**

V2-2017-05-19

kmv\jdb\TUFF\Volume_2\01 SERVICES_DATABASE\03 DRAFTS\Hazard Assessment Services\2018\March\HAS-Mar-18-439_San Martin Steel, Inc.-Villanueva, Misamis Oriental

PHIVOLCS Building, C.P. Garcia Avenue, U.P. Campus, Diliman, Quezon City 1101 Philippines.
 Tel. Nos.: (+632) 426-1468 to 79; (+632) 926-2611 | Fax Nos. (+632) 929-8366; (+632) 928-3757
 Website: www.phivolcs.dost.gov.ph

Figure 2.1.2.1.5.1.2.2: Phivolcs Fault Certification



2.1.2.1.5.1.3 Liquefaction

Liquefaction occurs when a water-saturated cohesionless soil loses its strength and liquefies when subjected to intense and prolonged ground shaking. Reyes et al, of UP-Engineering Research and Development Foundation, Inc., in their soil study of areas that liquefy during the 16th July 1990 Luzon earthquake came out with the following soil conditions for the potential liquefiable layers:

- (1) loose soil classification;
- (2) upper layers of the surveyed areas;
- (3) water table near the ground surface;
- (4) N-value of less than 30 using the American Association of State Highway and Transportation Officials (AASHTO) method and less than 35 using the Japan Society of Civil Engineers (JSCE) method; and
- (5) 50% passing (D50) of approximately 0.001-1.8mm.

Based on the field observation, the project site is underlain by alluvial deposits and fall under the delineated liquefaction prone area (Figure 2.2.1.5.1.2.2).

2.1.2.1.5.1.4 Ground Rupture

Ground rupture occurs when a new rupture is created or when renewed movement of old fractures takes place (Punongbayan, 1994). PHIVOLCS is recommending a buffer zone of at least 5 meters on both sides of a fault trace or from the edge of deformation zone. This hazard is seemingly absent in the project area since the nearest active Tagoloan Fault is found about 2.00 kilometers west of the project site.

2.1.2.1.5.2 Hydrologic Hazard

2.1.2.1.5.2.1 Flood Hazard

Floods usually occur during or after heavy rainfall wherein the river channels are saturated with water resulting to river swelling and overflowing of floodplains.

The project area located on a flat terrain has an elevation ranging from 0 to 10 meters above sea level and falls on low to moderate susceptibility to flooding as delineated by Mines and Geosciences Bureau (Figure 2.1.2.1.5.2.1.1). The project site, however, could experience "localized flooding" if the drainage systems are inadequate and not fully maintained.

LANDSLIDE AND FLOOD SUSCEPTIBILITY MAP OF CLAVERIA QUADRANGLE MISAMIS ORIENTAL AND BUKIDNON PROVINCES, PHILIPPINES

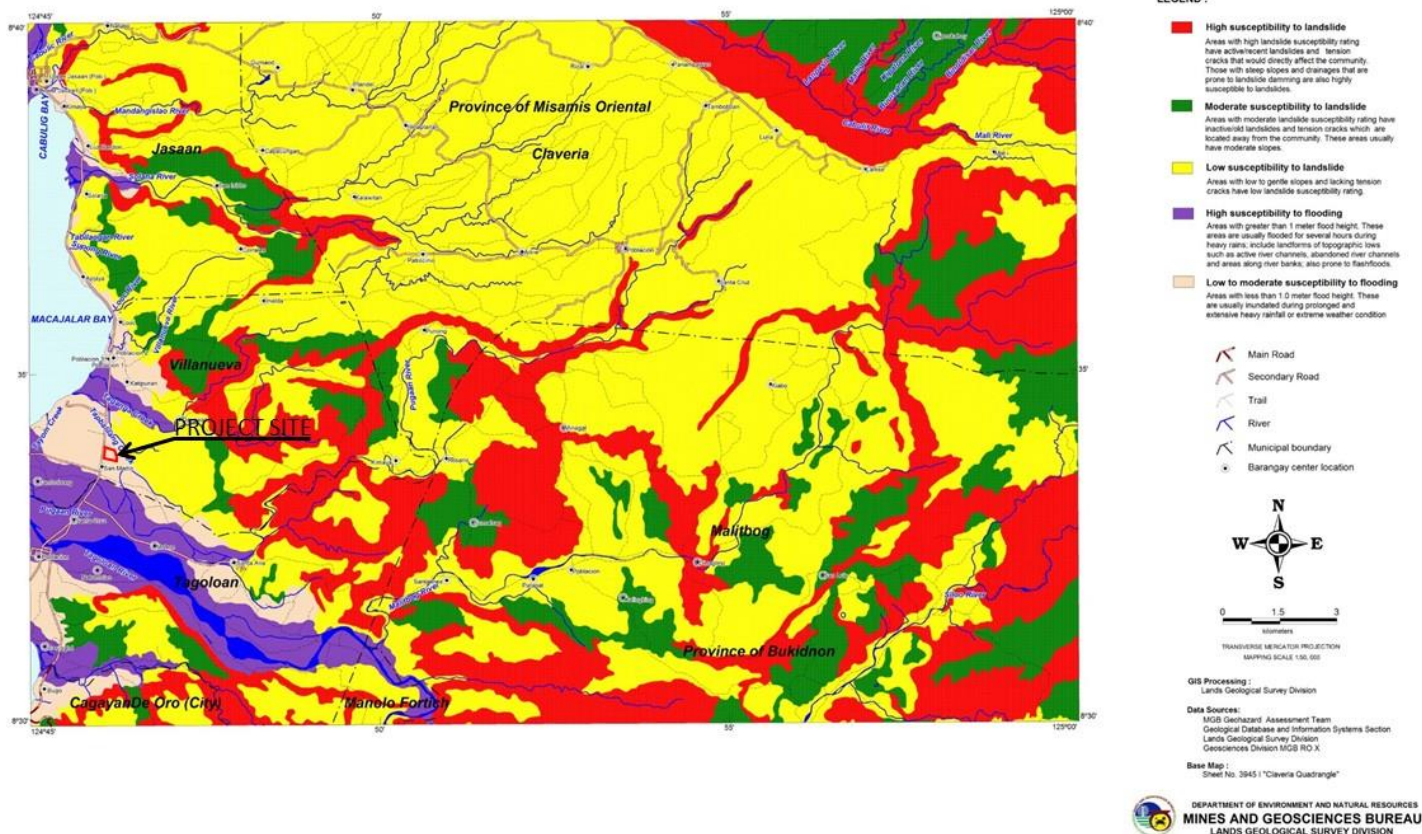


Figure 2.1.2.1.5.2.1.1: Flood Susceptibility Map of Claveria Quadrangle, Misamis Oriental (Source; MGB 2011)

2.1.2.1.5.2.2 Tsunamis

Tsunamis are giant sea waves generated by under the sea earthquakes and volcanic eruptions. All coastal areas in the region are susceptible to tsunamis.

Figure 2.2.1.5.2.2 shows the tsunami prone areas and occurrences in the region. From this map is seen that the project site is essentially vulnerable to potential locally generated tsunami.

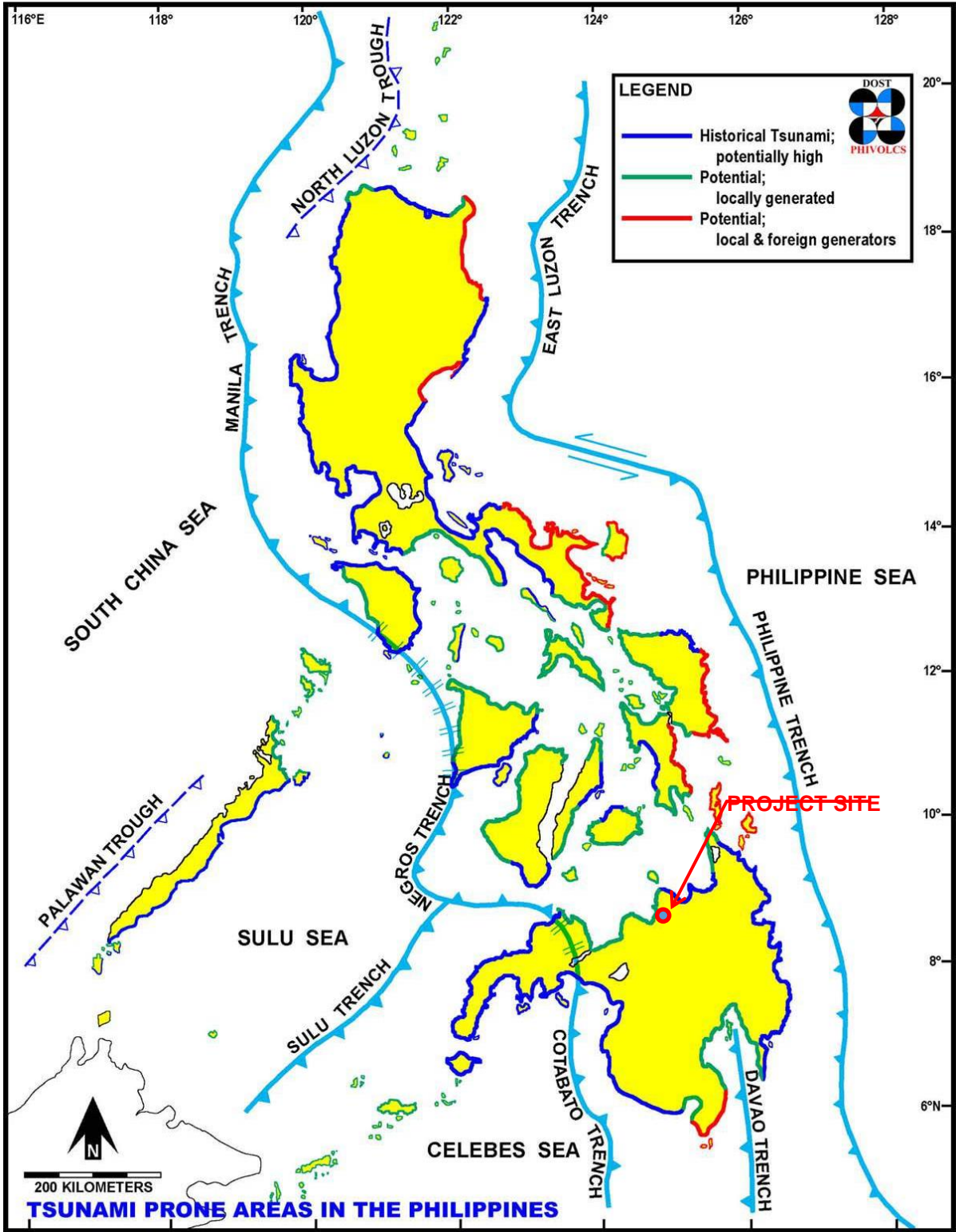


Figure 2.2.1.5.2.2: Tsunami Prone Areas and Occurrences Map



2.1.2.1.5.2.3 Typhoons

The relevance of typhoons to the project/project site is reckoned from the following hazards:

- Rain-induced localized floodings
- Risks to personnel

Figure 2.2.1.5.2.3.1 shows the normal path of typhoons. From this map is seen that the project site is not vulnerable to typhoons.

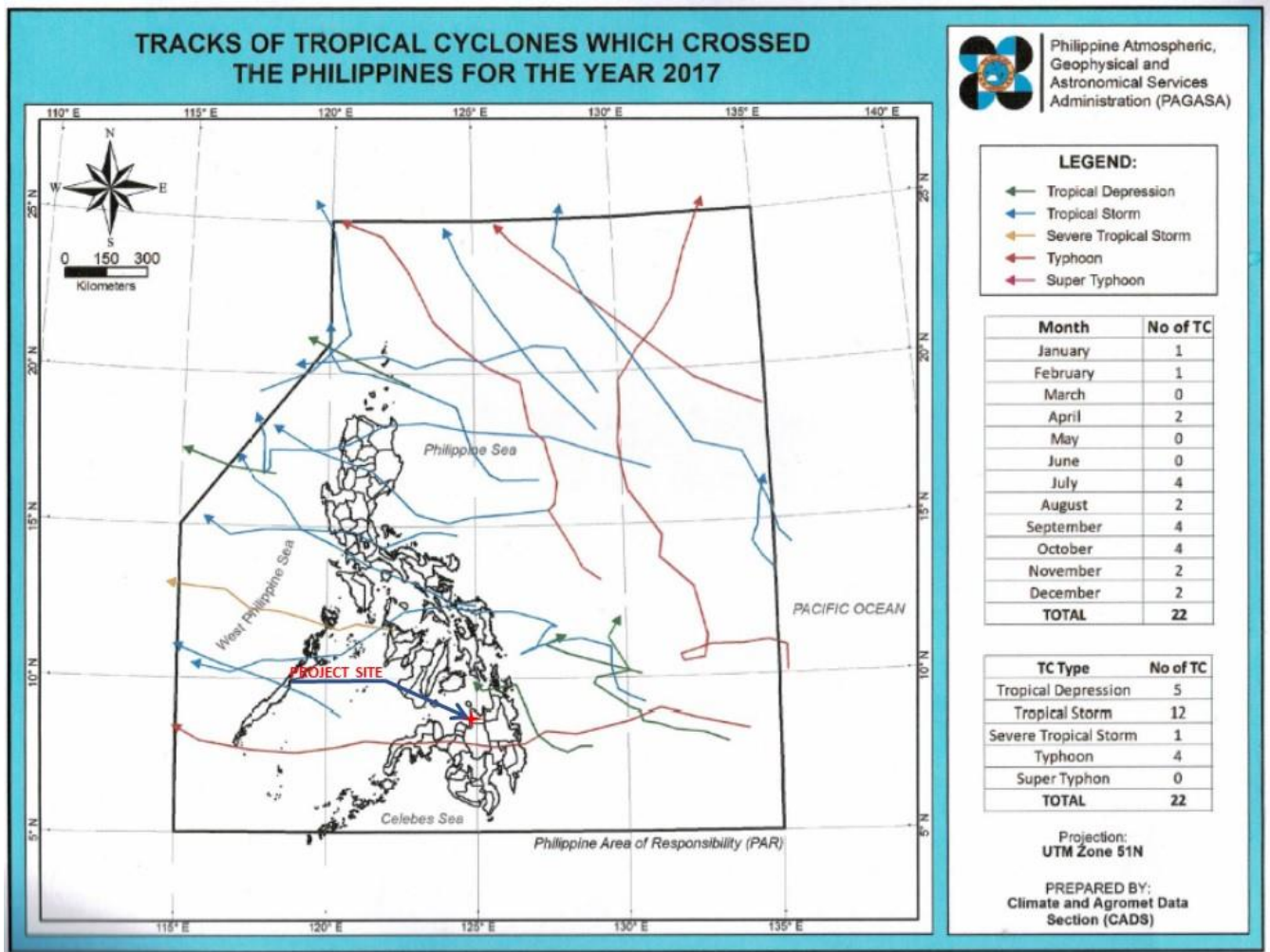
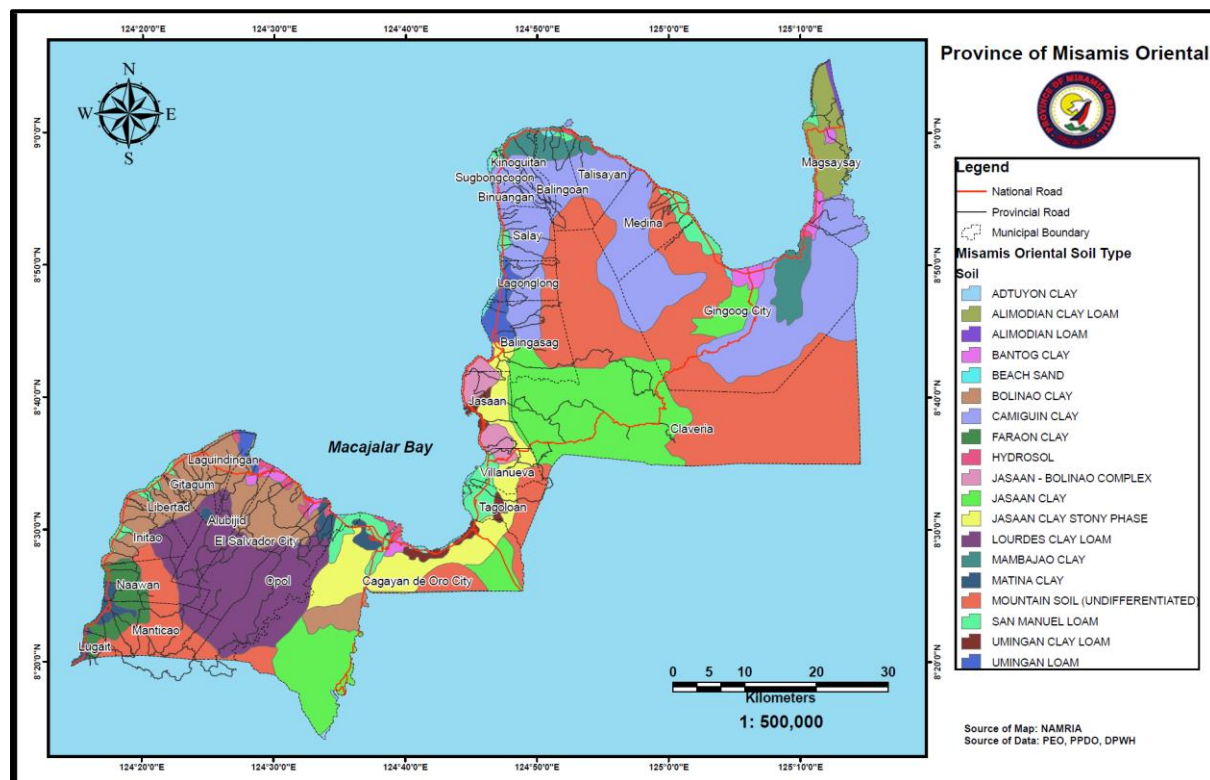


Figure 2.2.1.5.2.3.1 Track of Tropical Cyclones (Source: PAGASA 2017)



2.1.2 Pedology

The Municipality of Villanueva has four (4) types of soil cover. The San Manuel Loam, which favors agricultural activities, is found dominating the area around the Poblacion, Barangay San Martin and Katipunan. The Jasaan Clay is found in Dayawan while Mountain Soils cover Kimaya. The rest being coastal barangays are covered with Beach Sand. Based on the Soil Map presented in **Figure 2.1.3.1**, the soil in the project site belongs to San Manuel Loam.



Source: MPDO of Villanueva

Figure 2.1.3.1: Soil Map of the Municipality of Villanueva

Two (2) test pits were also excavated to check the underlying subsoil of the project. Exposed in the 0.50 meter test pits are mostly pebble to gravel size andesitic to cherty rock associated with silty material. **Plate 2.1.1** shows the subsoil profile of the test pits.



Plate 2.1.1: Subsoil Profile of the Test Pits

The subsoil profile shows that the soil/land can accommodate the proposed amendment with minimal soil erosion and loss of topsoil/overburden because the project only involved construction of Plant structures and its facilities.

Soil Erosion/loss of topsoil/overburden

There will be no soil erosion nor loss of topsoil/overburden involved in this project because the project involves reheating / rolling mill only and associated facilities. No earthworks will be undertaken for the project.

The soil erosion susceptibility map for the project site is shown in Figure 2.1.3 below wherein it may be gleaned that the site is characterized by Susceptibility to Erosion. However, as mentioned, no earthworks will be undertaken for the project. Thus, erodability potential is considered insignificant because of the site's flat terrain and the minimum amount of earthworks. Bank stability is not germane because of the absence of immediately adjacent banks which have to be protected.

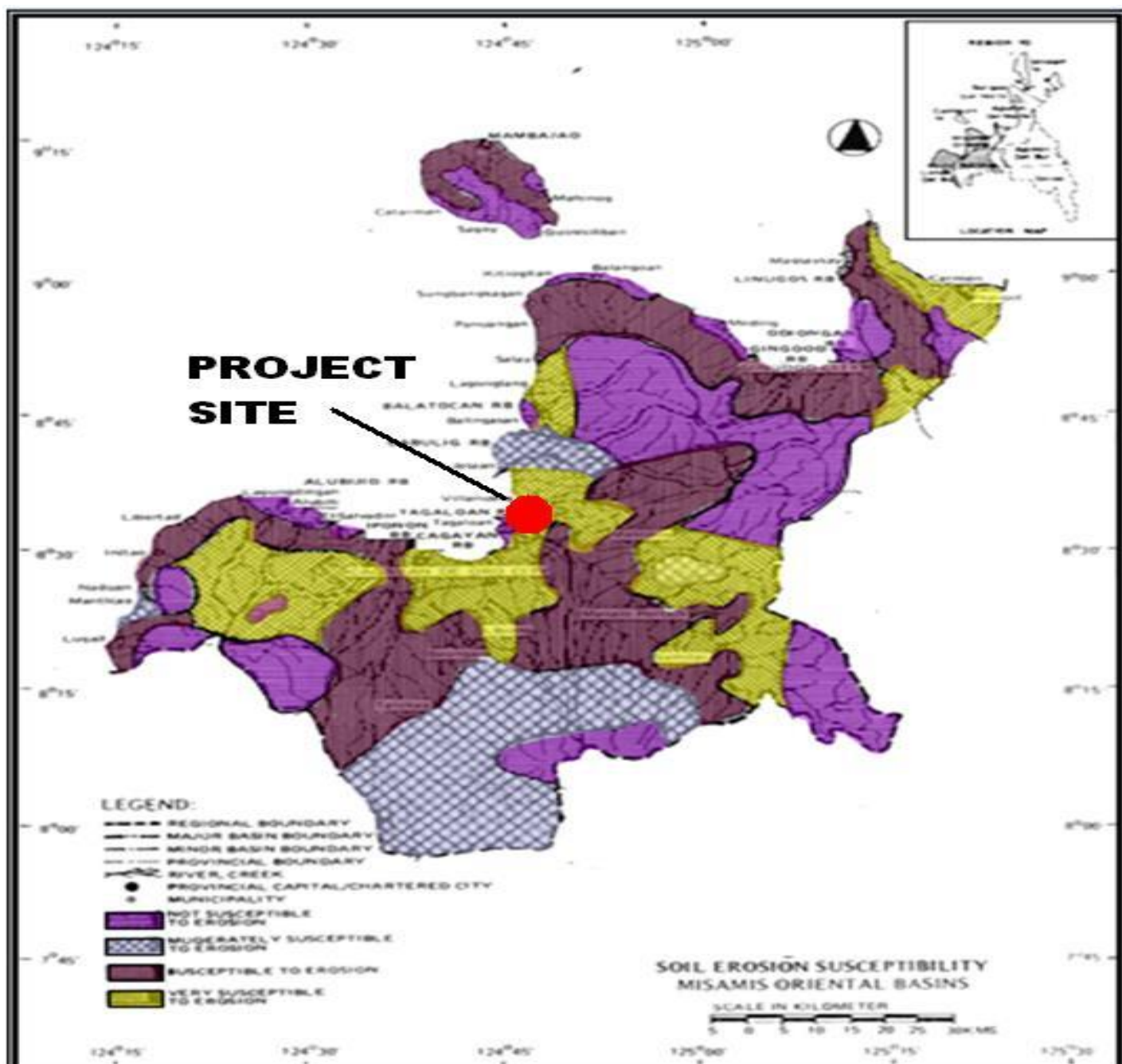


Figure 2.1.3: Map of Soil Erosion Potential (source: MGB)

2.1.3.1 Change in soil quality/fertility

The western part of the municipality has probably the most productive soil parent materials considering its flat landform and other factors concerning productions. However, most of these areas are already used for built up areas especially with the implementation of PD 538 creating the PHIVIDEC Industrial Estate.

The remaining half towards the eastern side have soils development from a parent materials that is generally deep to very deep, a pH thread of acid to strongly acid. Plant growth in this soil is good. Some of these areas are cultivated for agricultural production, some still have forest cover.

Soil sampling was conducted at the project site in 10 April 2018. Soil sampling was conducted to investigate the elements, particularly heavy metals, which are present in the soil matrix within the project site. Heavy metals are a special concern since these substances are hazardous, even in small amounts

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



and have a potential to contaminate the surrounding environment. Also, the aspects of soil erosion/soil quality/fertility were taken into consideration as there are some farming activities ongoing at the project site. Soil quality test was conducted at the project site using Swedish EPA Generic Guideline Value for Soil (2009), as there are no standards under the Philippine law.

Heavy metals such as mercury, zinc, copper, manganese, iron, lead, chromium, boron, chloride and cadmium as well as Phosphorus, Potassium, organic matter and water retention were tested. Results of soil sampling were compared with Swedish EPA Generic Guideline Value for Soil (2009) for hexavalent chromium, potassium, phosphorus, total organic matter, total nitrogen and pH. This sampling and analysis were undertaken to determine whether soil require urgent remediation due to unmitigated contamination. Although all of the parameters were detected in the Project area, they are all below the Dutch target values and Swedish EPA Generic Guideline Value for Soil. This shows that pedology is still unaffected by heavy metal contamination. Although the present DENR-EMB guideline does not have a definitive acceptable standard or limits on the presence of heavy metals on soils, SanMartin Steel conducted the sampling to establish the baseline. Below are the actual test results.

Provided below are several soil test results:

1. Figure 2.1.3.1.1: Soil Test Report for Mercury
2. Figure 2.1.3.1.2: Soil Test Report for Water Retention
3. Figure 2.1.3.1.3: Soil Test Report for Organic Matter, Phosphorus, Potassium and pH
4. Figure 2.1.3.1.4: Soil Test Report for Heavy Metals such as zinc, copper, manganese, iron, lead, cadmium, chromium, boron and chloride

TEST REPORT

CLIENT: **San Martin Steel Inc.**
ADDRESS: **Cagayan de Oro City**

CONTROL NO.: 18-13334
DATE RECEIVED: 10-Apr-18
DATE ANALYZED: 10-30 Apr -18
DATE REPORTED: 30-Apr-18

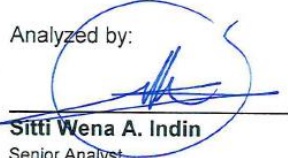
SAMPLE INFORMATION

Sample Name: Soil (01)
Description: Soil
Packaging: Packed in a plastic cellophane

PARAMETER	Laboratory Ref #.	METHOD
	S ₁ -18-024	
	Soil	
Mercury, ppb	ND	Cold Vapor - AAS
Nothing Follows		

REMARKS: 1. Result(s) is/are based on sample(s) submitted to DALINC unless otherwise indicated. The Laboratory does not guarantee that the sample(s) is/are representative of the whole bulk from where it was/were drawn.
2. Methods used is/are in accordance with the Standard Method of Analysis for soil, fertilizer, plant tissue, and water and Official Methods of Analysis of AOAC Int'l, 17th edition.
3. This test report may not be reproduced unless in full.

Analyzed by:


Sitti Wena A. Indin
Senior Analyst
PRC No.: 0001708

Certified by:

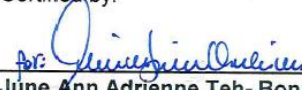

June Ann Adrienne Teh-Bonilla, RCh
Laboratory Manager
PRC No.: 0010782 / PTR No.: 9884000

Figure 2.1.3.1.1: Soil Test Report for Mercury



TestLab Engineering & Geotech Services

You We Tong Building, Gusa Highway

Cagayan de Oro City



DPWH - BRS

Accredited Laboratory

Our Ref : B29193

Date : 04/12/18

Determination of Water Retention for Soil

Client : San Martin Steel Inc./Steel Asia
 Project : For Compliance/Verification
 Supplier : In-situ
 Stated Source : Brgy. San Martin, Villanueva
 Sample Location : Brgy. San Martin, Villanueva
 Proposed Used : Not Stated
 Sample Description : Soil
 Date Sampled : 04/03/18
 Date Received : 04/10/18
 Laboratory Report No : B29193
 Date End of Test : 04/10/18
 Tested by : J. Benolirao

	RESULTS
Water Retention, %	77

Remarks :
 1. The results reported relate only to the samples received for test
 2. The laboratory is responsible for test only

Checked & Verified by:

Joselito A. Benolirao
 Laboratory Manager

Alvin P. Biton
 Technical Manager/ME-1 (Acc.# 2197)

Sampled by:

Submitted by:

NOT VALID WITHOUT SEAL

Figure 2.1.3.1.2: Soil Test Report for Water Retention

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



INTEGRATED LABORATORIES DIVISION
DEPARTMENT OF AGRICULTURE REGIONAL FIELD OFFICE - 10
Antonio Luna Street, 9000, Cagayan de Oro City
Republic of the Philippines

OP-005-F8
Revision 0

REGIONAL SOILS LABORATORY

LABORATORY TEST REPORT

Lab Request No.	SL-2018-04-093	Sample Origin	
Client's Name	San Martin Steel Inc.	Site of Farm	Not Stated
Address	San Martin, Villanueva, Mis. Or.	Topography	Plain
Date Submitted	April 10, 2018 10:35 AM	Area, ha	4.69
Submitted By	Ruel Jacinto B. Taguic	Crops	Jackfruit, Mango, Papaya, Okra, Malunggay, Camote, Avocado, Tamarind, Coconut, Gabi

Laboratory Test Data:						
Sample		Test Method Used	Date Analyzed	Analyzed by	Test Requested	Result
Code	Description					
SL-2018-04-093-490	Soil; dry	Walkley and Black Spectrophotometric Method	April 11-17, 2018	FDGAMBOA	Organic Matter, %	1.81
		Olsen Method		SPKIM	Available Phosphorus, ppm	33.98
		Cold H ₂ SO ₄ Extraction Method		SMEGALVE	Available Potassium, ppm	626
		Potentiometric Method		SMEGALVE	pH	7.66

=====

Reference: Department of Agriculture Bureau of Soils and Water Management Laboratory Services Division. (June 2014). Updated Manual for Soil, Water, Plant Tissue and Fertilizer Analysis.

The result(s) given in this report is/are those obtained at the time of examination and refer only to the particular sample submitted and is/are of no value for advertising or sales promotions. This report shall not be reproduced except in full without the approval of the Integrated Laboratories Division DA RFO - 10.

<p>CERTIFIED BY:</p> <p><i>[Signature]</i> 04/18/18</p> <p>JOHANNA C. CLARO-PICHAY, RCh Chemist III PRC License No. 0011738</p>	<p>APPROVED FOR RELEASE BY AUTHORITY OF THE REGIONAL DIRECTOR:</p> <p><i>[Signature]</i> 04/19/18</p> <p>ENCR. ELENA C. SUSAYA Chemist IV PRC License No. 0016128</p>
<p>CHECKED BY:</p> <p><i>[Signature]</i> 04/19/18</p> <p>SYLVIA P. KIM Agriculturist II PRC License No. 0014003</p>	

Test Report No.: RSL-SL-2018-093
Page 1 of 1

Date Issued: April 18, 2018

Figure 2.1.3.1.3: Soil Test Report for Organic Matter, Phosphorus, Potassium and pH

ENVIRONMENTAL PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP)

Increase in Production Capacity of Steel Rolling Mill Plant

PHIVIDE, Brgy. San Martin

Municipality of Villanueva, Misamis Oriental



DAVAO ANALYTICAL LABORATORIES, INC.

Mc Arthur Hi-way, Corner Union Avenue, Matina, Davao City

Telefax No. (082) 297-3278 E-mail: dalinc_03@yahoo.com

Rev. No. 0 / Issue No. 1

TEST REPORT

CLIENT: San Martin Steel Inc.
ADDRESS: Cagayan de Oro City

CONTROL NO.: 18-13334
DATE RECEIVED: 10-Apr-18
DATE ANALYZED: 10-19 Apr -18
DATE REPORTED: 19-Apr-18

SAMPLE INFORMATION

Sample Name: Soil (01)
Description: Soil
Packaging: Packed in a plastic cellophane

PARAMETERS	Laboratory Ref #.	METHODS
	S ₁ -18-024	
	Soil	
Zinc, %	0.23	Extraction - AAS
Copper, ppm	26.4	
Manganese, ppm	325	
Iron, ppm	103	
Lead, ppm	157	
Cadmium, ppm	2.9	
Chromium, ppm	0.52	
Boron, ppm	0.14	Carmine
Chloride, meq/100g	0.23	Titrimetric
Nothing Follows		

- REMARKS:**
1. Result(s) is/are based on sample(s) submitted to DALINC unless otherwise indicated. The Laboratory does not guarantee that the sample(s) is/are representative of the whole bulk from where it was/were drawn.
 2. Methods used is/are in accordance with the Standard Method of Analysis for soil, fertilizer, plant tissue, and water and Official Methods of Analysis of AOAC Int'l, 17th edition.
 3. This test report may not be reproduced unless in full.

Analyzed by:

Jemaina M. Ombina, RCh
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PRC No.: 0001329 / PTR No.: 9883998

Sitti Wena A. Indin
Senior Analyst
PRC No.: 0001708

Carol Dawn T. Villegas
Senior Analyst

Certified by:

June Ann Adrienne Teh- Bonilla, RCh
Laboratory Manager
PRC No.: 0010782 / PTR No.: 9884000

Figure 2.1.3.1.4: Soil Test Report for Heavy Metals such as zinc, copper, manganese, iron, lead, cadmium, chromium, boron and chloride



Table 2.1.1.3.2: Swedish EPA Generic Guideline Value for Soil (2009)

Type of Metals Analyzed	Sensitive Land Use	Less Sensitive Land Use	Results
Total Mercury	0,25	2,5	ND
Total Arsenic	10	25	4.6
Total Cadmium	0,8	12	1
Total Lead	50	400	12
Hexavalent Chromium	2	10	ND
Potassium	No standards	No standards	2,210
Total Phosphorus	No standards	No standards	591
Total Organic Matter	No standards	No standards	2.45
pH** Lab (@ 25.0 degrees centigrade)	No standards	No standards	8.0
Total Nitrogen	No standards	No standards	1,170

*Reporting Limit/s

**PAB approved parameter/s

MDL = Method Detection Limit/s

IDL = Instrument Detection Limit/s

Teledyne, HYDRALIAA Mercury Analyzer

ND = Not Detected (Below Reporting Limit)

Results for Metals are reported as "dry basis"

Shimadzu Analytical Methods, Atomic Absorption Spectrophotometry (AAS)

Standard Methods for the Examination of Water and Wastewater, APHA, AWWA, WEF, 23rd Edition.

Velp Scientifica Operating Manual (20.24), Referenced from Methods of Solid Analysis - Chemical and Microbiological Properties, 2nd Edition.

Soil and Plant Analysis Laboratory Manual by International Center for Agricultural Research in the Dry Areas (ICARDA), 2001

Test Methods for Evaluating Solid Wastes, Vol 1A. USEPA, Third Edition

Impact Assessment and Mitigation:

Based on the assessment of the impact of the project activities including the possibility of spills / land contamination on soil quality and fertility, following are among the measures that will be implemented:

1. Reusing of materials

Materials such as glass containers, plastic bags, paper, cloth etc. can be reused at domestic levels rather than being disposed, reducing solid waste pollution.

2. Recycling and recovery of materials

This is a reasonable solution for reducing soil pollution. Materials such as paper, some kinds of plastics and glass can and are being recycled. This decreases the volume of refuse and helps in the conservation of natural resources. For example, recovery of one tonne of paper can save 17 trees.

3. Solid waste treatment

Proper methods should be adopted for management of solid waste disposal. Industrial wastes can be treated physically, chemically and biologically until they are less hazardous. Acidic and alkaline wastes will be first neutralized; the insoluble material if biodegradable should be allowed to degrade under controlled conditions before being disposed.

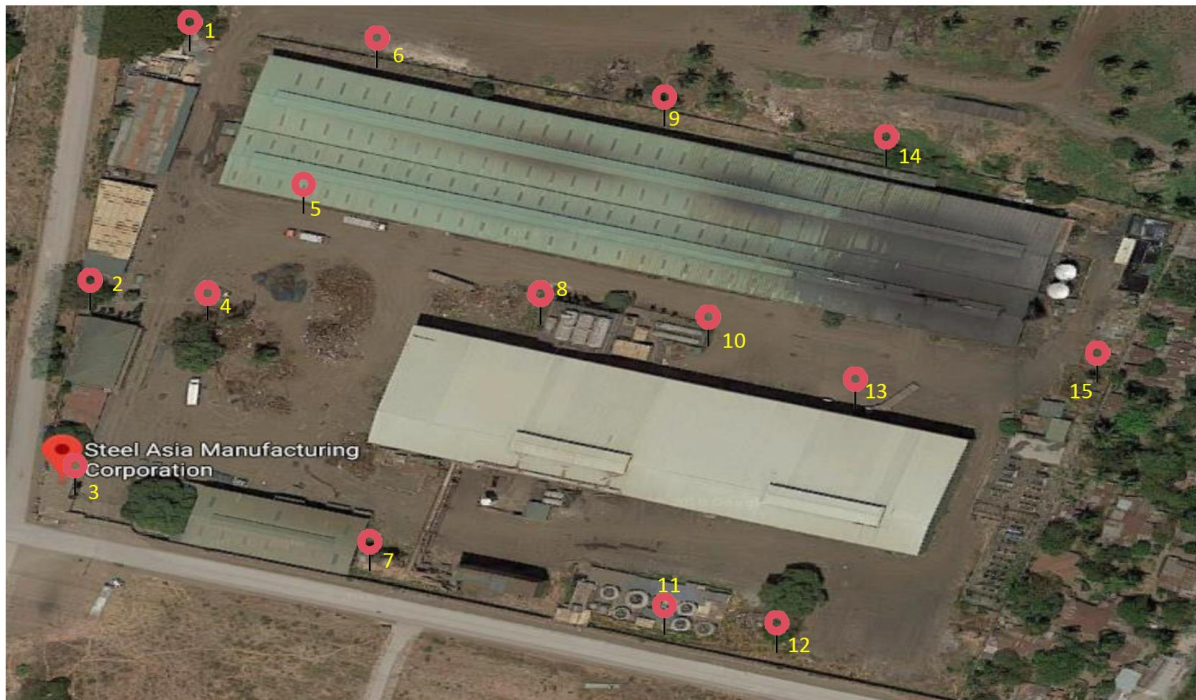


Figure 2.1.3.1: Soil Sampling Map (Source: SMSI 2018)

2.1.3 Terrestrial Biology

This module is not applicable because the project area is already developed and all of the facilities except MRF and THW facilities are already existing and constructed. Also, there are no trees nor vegetation in the area that will be affected.

2.1.4.1 Vegetation removal and loss of habitat

The project site is predominantly a huge, flat developed area with is completely devoid of trees and vegetation. Provided below are photographs of the project area.





Plate 1: Photographs of the Project Site



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

2.1.4.3 Threat to abundance, frequency and distribution of important species

2.1.4.4 Hindrance to wildlife access

Items 2.1.4.2 up to 2.1.4.4 are not applicable.

2.2 WATER

2.2.1 Hydrology/Hydrogeology

Drainage Morphology

The Project site located in Barangay San Martin, Villanueva, Misamis Oriental drained by rivers and creek towards Macajalar Bay. The hydrologic feature which affects the Project is the Tagoloan River. Tagoloan River is the main drainage way of basin with generally north western flow. The Macajalar Bay serves as the discharge point of the whole basin with an annual discharge run-off of 4,106 million cubic meter (RDC, 2005).

Tagoloan River Basin is the 13th largest river basin in the Philippines with a basin estimated area of 1,704 km² (**Figure 2.2.1**). There are two (2) provinces covered by the Tagoloan River Basin: Bukidnon and Misamis Oriental. The municipalities covered by the river basin are the City of Malaybay, the municipalities of Baungon, Manolo Fortich, Sumilao, Impasug-ong, and Malitbog. The lower portion of the drainage area covers the municipalities of Claveria, Tagoloan, and Villanueva where the project is located in the province of Misamis Oriental.

The Tagoloan River is the main drainage-way of the river basin. It originates in the slopes of Mount Kibuwa and flows in a northwesterly direction before draining into Macajalar Bay. The river basin is consisting of eight (8) major tributaries; namely, Pugaan, Malitbog, Siloo, and Amusig on the north; and Ipaon, Atugan, Calamuan, and Manolo Fortich on the south. **Table 2.2.1** shows the river system of the basin including its area and length.

Table 2.2.1: Major Tributaries of Tagoloan River Basin

River Name	Basin Area, (km ²)	River Length (km)
Pugaan	64	25
Malitbog	135	31
Siloo	142	47
Amusig	227	53
Ipaon	89	27
Atugan	518	61
Calamuan	153	61
Manolo Fortich	151	78

Source: *The Preparatory Study for Loan on Disaster Risk Management in the Republic of the Philippines: JICA; CTI Engineering International Co., Ltd.; Nippon Koei Co., Ltd.*

Streamflow

There is no comprehensive measurement of discharges of the rivers in the Tagoloan River Basin except for the annual discharge run-off of 4,106 million cubic meter (RDC, 2005). The freshwater requirement for the operation of the plant will be fully sourced from underground and rainwater harvesting. There are no recorded streamflow measurements in the rivers draining the Project area. Since there will be no extraction of water s or expected impounding of surface water, the Project will have no impact on the stream water depth.



Flooding

Flood is the abnormal rising and overflowing of a body of water. It usually results from high precipitation caused by excessive and continuous downpour brought about by typhoons or monsoon rains wherein the river channels are saturated with water resulting to river swelling and overflowing of floodplains. Factors that affect the vulnerability of an area to flooding are surface geology, topography, amount and duration of rainfall, vegetation and land cover.

The areas in the Municipality of Villanueva that are regularly inundated by floodwaters include Barangays Tambobong, Looc, Dayawan, Balacanas and Poblacion 3. Most of the flooding incidents experienced in these areas were due to rising water of the surrounding fluvial systems including Tagoloan River, Tag-anga Creek and Tubigan Creek. Other flooding incidents include the seasonal rise of floodwaters in Barangay Balacanas which at time reach heights of 3m and destroyed several houses as well as killed a few animals.

The project site is located on a flat terrain has an elevation ranging from 0 to 10 masl and falls on low to moderate susceptibility to flooding as delineated by MGB (**Figure 2.2.2**). Provided in **Figure 2.2.2A** is the drainage map of the project site. The storm drainage is connected to the Water Catchment Ponds to accumulate water to serve as make-up water to the WTP. Advanced water treatment system is used to ensure that no production wastewater discharge to the outside of the plant.

2.2.1.2 Hydrogeology

Based on the Map of Groundwater Distribution in Tagoloan River Basin and Vicinities from the Integrated River Basin Management and Development Master Plan for the Tagoloan River Basin (DENR; CFNR-UPLB; 2014), the project site falls under fairly extensive and productive aquifers (**Figure 2.2.1**). This classification is attributed to a fair-level wells in the area. This was supported by the 1997 Groundwater Availability Map of the Philippines as shown in **Figure 2.2.3**.

A small portion of highly productive aquifer composed of alluvial deposits are found near the mouth of the river in the town of Tagoloan, Misamis Oriental. Both shallow and deep wells within this area can be expected to have high discharges. The aquifer in these segments is tapped by shallow wells which are pumped manually or with the aid of low capacity centrifugal pumps.

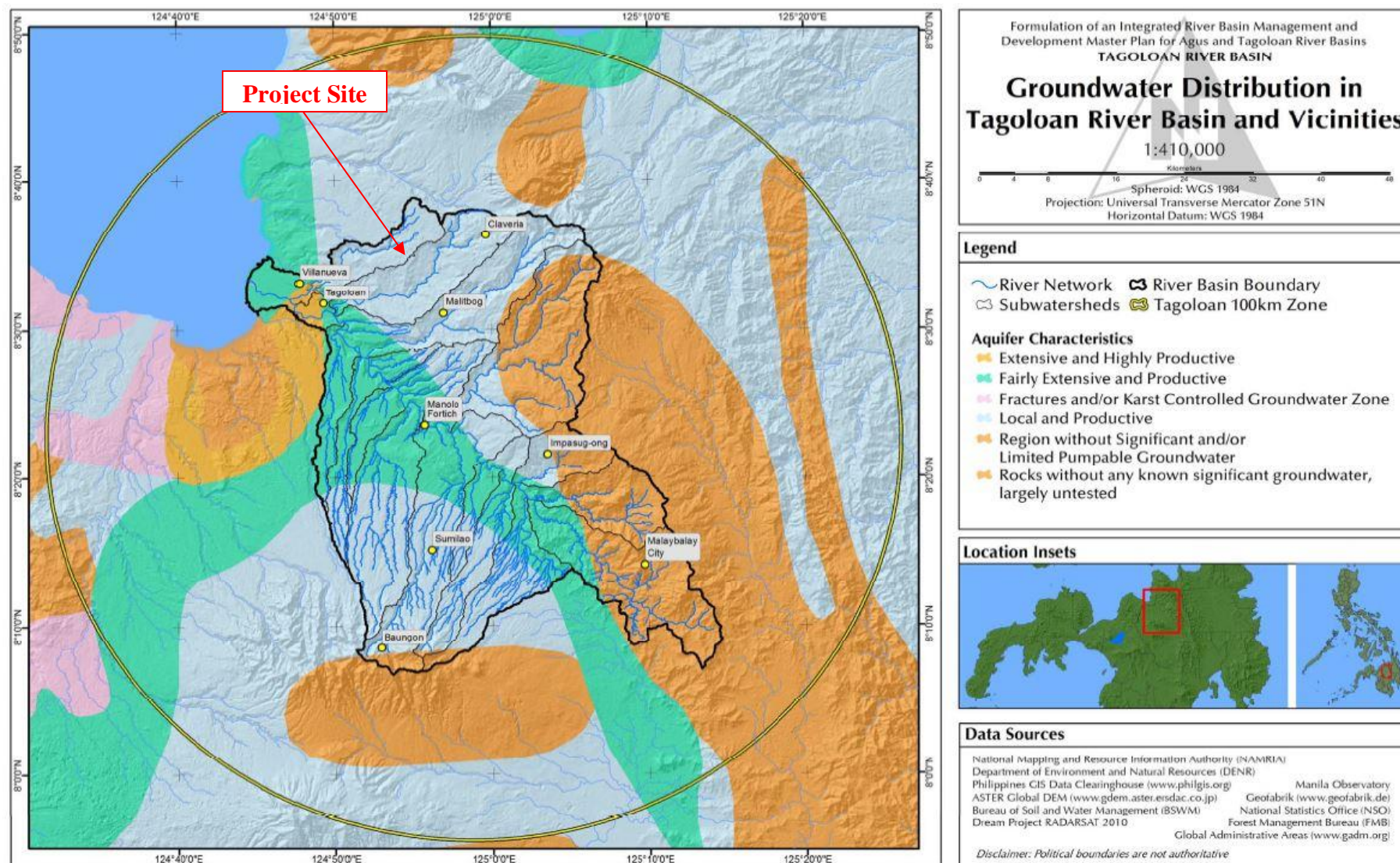
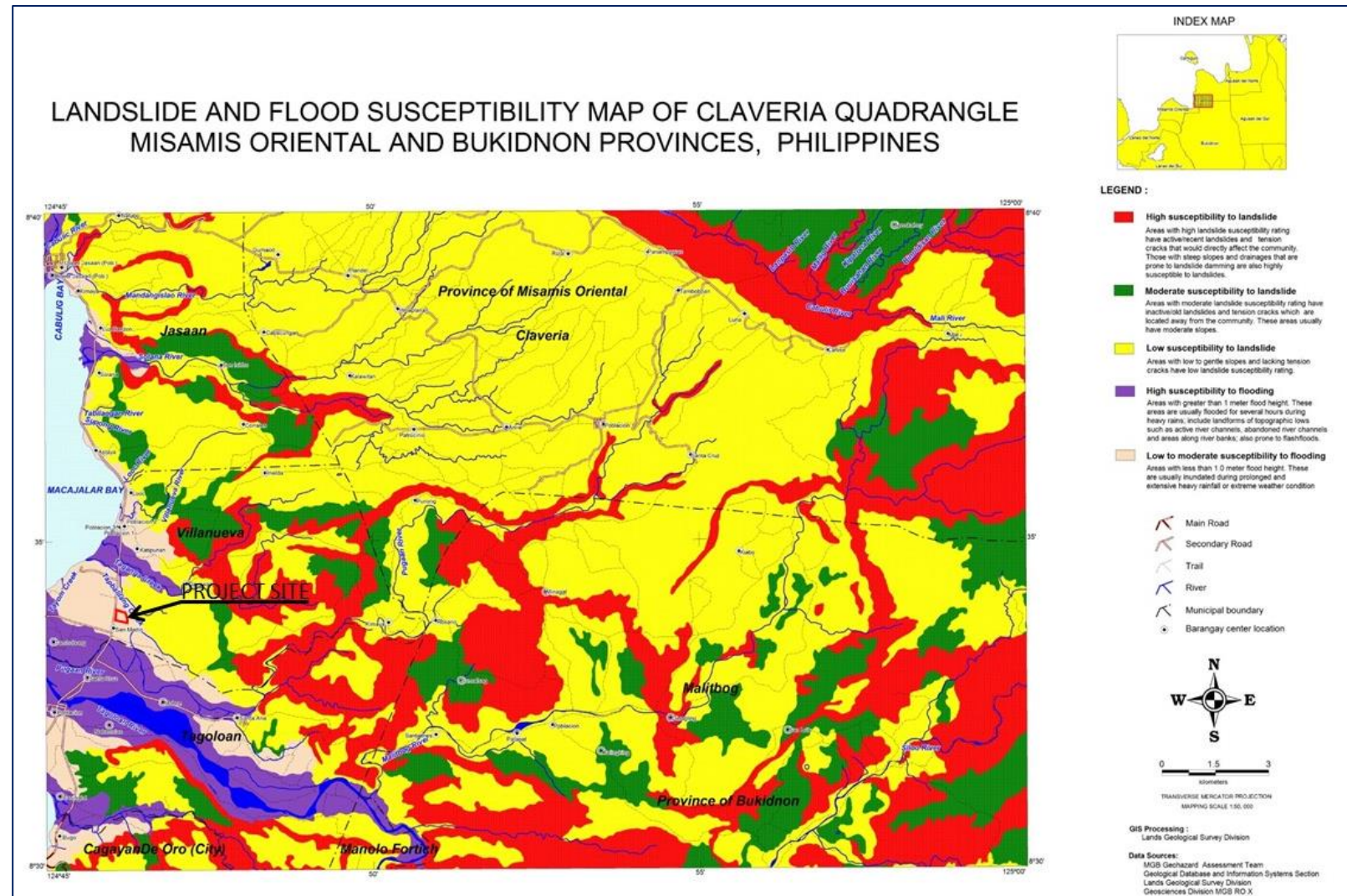


Figure 2.2.1: Groundwater Distribution in Tagoloan River Basin and Vicinities



Source: MGB, 2011

Figure 2.2.2: Flood Susceptibility Map of Claveria Quadrangle, Misamis Oriental

Analysis of water availability the context of climate change projections by PAGASA

The PAG ASA projections shown below suggest that rainfalls can increase at certain months of the year by only 2.9 % compared to maximum decrease at other months of the year of 10.4 %, suggesting that rainfall aberrations in the Region should not cause heavy flooding in/adjacent to the project site.

3.5.13 Climate Projections in 2020 and 2050 in Provinces in Region 10

The projected seasonal temperature increase, seasonal rainfall change and frequency of extreme events in 2020 and 2050 under the medium-range emission scenario in the provinces in Region 10 are presented in Table a, Table b and Table c, respectively.

To use the tables and arrive at values of seasonal mean temperature and seasonal rainfall in 2020 and 2050 in any of the provinces, the projections are added to the observed values (presented in each of the tables).

For example, in Bukidnon province, the projected values in 2020 are:

- DJF mean temperature = $(25.1^{\circ}\text{C} + 1.0^{\circ}\text{C}) = 26.1^{\circ}\text{C}$;
- DJF rainfall = $\{329.7\text{mm} + 329.7(2.9\%)\text{mm}\} = (329.7 + 9.6)\text{mm}$ or 339.3mm;
- number of days with $T_{\text{max}} > 35^{\circ}\text{C}$ in Malaybalay during the 2006-2035 period (centered at 2020) = 477;
- number of dry days in Malaybalay during the 2006-2035 period (centered at 2020) = 3,977; and
- number of days with rainfall $> 300\text{mm}$ in Malaybalay during the 2006-2035 period (centered at 2020) = 1.

Table a: Seasonal temperature increases (in $^{\circ}\text{C}$) in 2020 and 2050 under medium-range emission scenario in provinces in Region 10

	OBSERVED BASELINE (1971-2000)				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Region 10												
BUKIDNON	25.1	26.5	25.8	25.7	1.0	1.2	1.2	1.0	1.9	2.3	2.4	2.1
LANAO DEL NORTE	24.4	25.5	25.4	25.2	1.0	1.1	1.0	1.0	1.9	2.2	2.1	1.9
MISAMIS OCCIDENTAL	25.6	26.7	26.6	26.4	1.0	1.1	1.1	1.0	1.9	2.2	2.2	1.9
MISAMIS ORIENTAL	25.4	26.8	26.9	26.5	1.0	1.2	1.2	1.0	1.9	2.3	2.4	2.0

Table b: Seasonal rainfall change (in %) in 2020 and 2050 under medium-range emission scenario in provinces in Region 10

	OBSERVED BASELINE (1971-2000) mm				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
Region 10												
BUKIDNON	329.7	335.6	653.8	559.5	2.9	-10.3	-4.4	-0.3	-5.1	-13.0	-9.7	-5.8
LANAO DEL NORTE	337.5	350.3	662.5	621.1	9.6	-0.6	-2.2	6.9	2.5	-1.9	1.4	7.1
MISAMIS OCCIDENTAL	392.1	323.4	633.1	728.3	9.1	1.4	-6.1	6.1	5.2	0.3	-5.1	4.6
MISAMIS ORIENTAL	442.5	296.0	615.7	581.1	4.6	-10.4	-3.7	2.9	1.8	-17.8	-5.2	-0.1

Table c: Frequency of extreme events in 2020 and 2050 under medium-range emission scenario in provinces in Region 10

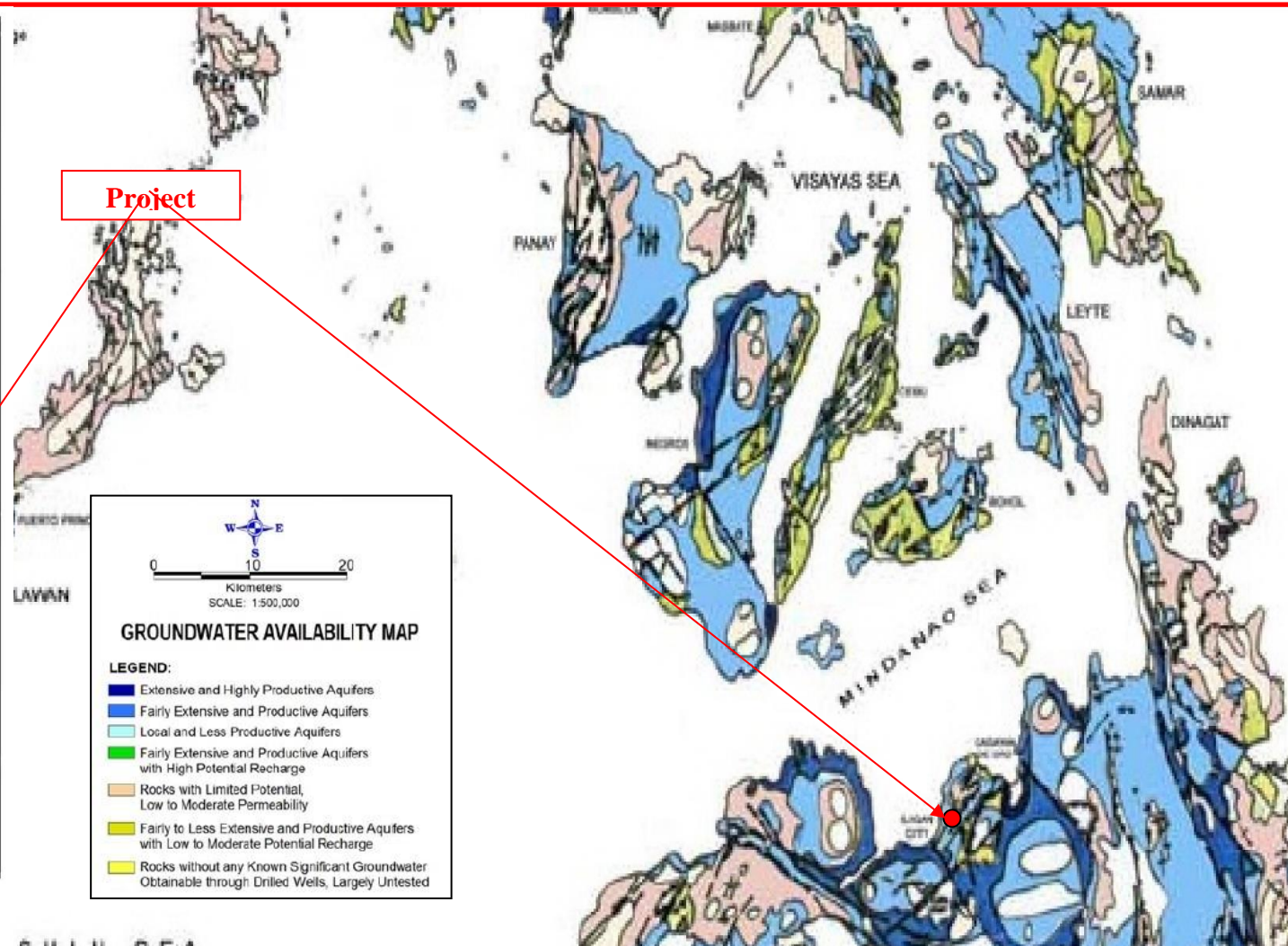
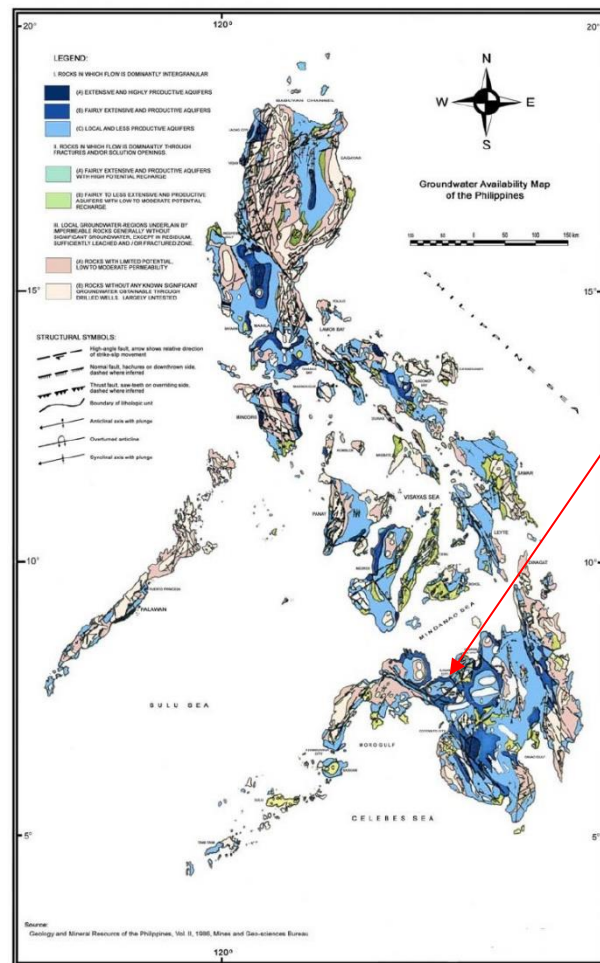
Provinces	Stations	No. of Days w/ $T_{\text{max}} > 35^{\circ}\text{C}$			No. of Dry Days			No. of Days w/ Rainfall $> 150\text{mm}$		
		OBS	2020	2050	OBS	2020	2050	OBS	2020	2050
		(1971-2000)								
BUKIDNON	Malaybalay	26	477	1441	6537	3977	4461	4	9	9
LANAO DEL NORTE	Dipolog	217	2155	4004	7481	5384	5470	3	6	1
MISAMIS ORIENTAL	Cagayan De Oro	383	4539	6180	8251	6413	7060	10	13	9
	Lumbia	106	2012	3759	6495	6290	6580	3	6	1

Note:

- For western portion of Misamis Occidental, use values of Dipolog City.
- OBS-Observed Baseline

Hydrogeology

Based on the 1997 Groundwater Availability Map of the Philippines, the Project Site falls under local to less extensive and productive aquifers with moderate potential recharge as shown in Figure 2.2.15. The classification is attributed to the scarcity of productive wells in the area.



Source: MGB

Figure 2.2.15: Groundwater Availability Map

Depletion of water resources/competition in water use

The project will use the existing deepwells at the project site which can cater the water requirements for the project while implementing waste water recycling. The plant will also utilize rainwater harvesting in the future as its method for collecting rain and later used in the processing of materials. Rainwater collected will then pass to water treatment before its use.

For domestic use, water will be sourced from the local water utilities/local water district.

The specific measures to address the issues on water resource competition are the following:

- Water reuse and recycling to reduce water requirement
- Water harvesting

2.2.2 Oceanography

The Project Site is at least 2.53 km away from Macajalar Bay. This body of water will not be affected by the project because the project will not drain nor use water from this source.

2.2.2.1 Change/disruption in water circulation pattern, littoral current, coastal erosion and deposition

There will be no change/disruption in water circulation pattern, littoral current, coastal erosion and deposition because the project will not drain nor use water from Macajalar Bay.

2.2.2.2 Change in bathymetry

There will be no change in bathymetry because the project will not drain nor use water from Macajalar Bay.

2.2.3 Water Quality

Generally, the project is zero discharge and it will not use water from nearby surface water bodies. Expected discharges from septic tanks and its effluents are being siphoned by 3rd party treaters/disposal companies. Secondary data on water quality from Tagoloan River is hereby presented.

2.2.3.1 Degradation of groundwater quality

There will be no impact on groundwater water quality because the project employs zero wastewater effluent.

However, an existing deepwell is being used by the Plant for drinking water. With this, water quality for Deepwell is also being monitored by SanMartin Steel as this deepwell is used for drinking water. Provided below is the water quality results for December 2019 for bacteriological tests under PNSDW, DOH 2017 and March 2020 for PNSDW, DOH 2017 and AO 2017-10. Analysis showed that results passed the standards.

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

TEST REPORT

Reference No. CD1912-5302

Page 1 of 1

CUSTOMER NAME : SAN MARTIN STEEL INC.
ADDRESS : PHIVIDE Industrial Estate, Brgy. San Martin, Villanueva, Misamis Oriental
SAMPLE/S SUBMITTED : WATER
SAMPLE CODE : CD1912-5302-01
DATE / TIME SAMPLING : 17 Dec 2019 / 09:30 AM (by: CUSTOMER)
DATE / TIME RECEIVED : 17 Dec 2019 / 11:45 AM
DATE / TIME ANALYZED : 17 Dec 2019 / 02:40 PM
DATE REPORTED : 03 Jan 2020

RESULTS OF ANALYSIS

Sample Description	Heterotrophic Plate Count, (CFU) per mL	Total Coliform per 100 mL	<i>E. coli</i> per 100 mL	Conformance to PNSDW**
PRODUCT WATER – FOR DRINKING BRGY. SAN MARTIN VILLANUEVA, MIS. OR.	85	Absent	Absent	PASSED
PNSDW, DOH 2017	< 500	Absent	Absent	-
TEST METHOD	(9215 A-B) Pour Plate	Chromogenic substrate test (Presence-Absence)*		

Note: CFU - Colony Forming Units

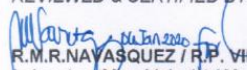
* Validated and approved by Department of Health

Ref. : Colilert 18 (IDEXX) Test Kit Procedure

**Philippine National Standards for Drinking Water, Dept. of Health, 2017

Results are those obtained at time of examination and relate only to the sample/s tested.

REVIEWED & CERTIFIED BY:


R.M.R. NAVASQUEZ / R.P. VILLANUEVA
Laboratory Microbiologist / Medical Technologist
NRL No. WMLA-16-0416 / PRC Reg. No. 0052989

NOTED BY:



M.L.S. MENDOZA
Laboratory Business Manager
Chem. Reg. No. 08239



Figure 2.2.3.1.1: Bacteriological water quality results for December 2019 for PNSDW, DOH 2017

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

TEST REPORT

Reference No. CD2003-1260

Page 1 of 1

CUSTOMER NAME : SAN MARTIN STEEL INC
ADDRESS : Phividec Ind. Estate, Villanueva, Misamis Oriental
SAMPLE/S SUBMITTED : WATER
SAMPLE CODE : CD2003-1260-01
DATE / TIME SAMPLING : 16 Mar 2020 / 01:45 PM (by: CUSTOMER)
DATE / TIME RECEIVED : 16 Mar 2020 / 03:01 PM
DATE / TIME ANALYZED : 16 Mar 2020 / 05:50 PM
DATE REPORTED : 23 Mar 2020

RESULTS OF ANALYSIS

SAMPLE DESCRIPTION	Heterotrophic Plate Count, (CFU) per mL	No. of Positive Tube (out of 5 Tubes)	Most Probable Number (MPN) per 100mL	E.coli per 100mL	Conformance to PNSDW **
		Total Coliform	Total Coliform Count		
PRODUCT WATER FOR DRINKING	56	0	Less than 1.1	Absent	PASSED
PNSDW, DOH 2017 AO 2017-10	< 500	0	Less than 1.1	Absent	-
TEST METHOD	(9215 A-B) Pour Plate	(9221 B-C) Multiple Tube Fermentation Technique		(9221 G) Indole	

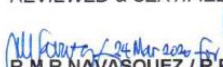
Note: CFU - Colony Forming Units

Ref.: APHA – AWWA and WEF 2017. Standard Methods for the Examination of Water and Wastewater, 23rd ed.

** Philippine National Standards for Drinking Water, Dept. of Health, 2017.

Results are those obtained at time of examination and relate only to the sample/s tested.

REVIEWED & CERTIFIED BY:


R.M.R. NAVASQUEZ / R.P. VILLANUEVA, RMT
Laboratory Microbiologist / Medical Technologist
NRL No. WMLA-16-0416 / PRC Reg. No. 0052989

NOTED BY:


M.L.S. MENDOZA, RCh
Laboratory Business Manager
Chem. Reg. No. 08239



Figure 2.2.3.1.2: Bacteriological water quality results for March 2020 for PNSDW, DOH 2017 and AO 2017-10

Provided below is the water quality results for December 2019 for physico-chemical analysis under PNSDW, DOH 2017 and March 2020 for PNSDW, DOH 2017 and AO 2017-10. Analysis showed that results passed the standards.

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

Reference No. **CD1912-5303**

Page 1 of 1

TEST REPORT

CUSTOMER : SAN MARTIN STEEL INC.
ADDRESS : Phivide Industrial Estate Brgy. San Martin, Villanueva, Misamis Oriental
SAMPLE(S) SUBMITTED : WATER
SAMPLE CODE : CD1912-5303-01
DATE / TIME OF SAMPLING : 17 December 2019 / 9:30 AM (By Customer)
DATE / TIME RECEIVED : 17 December 2019 / 11:32 AM
DATE ANALYZED : 17 December 2019 – 11 January 2020
ANALYZED BY : A.T. BACLAO, L.G. DALAGUIT, K.B. QUISIL, J.C. ANTINERO
C.O. PONFERRADA
DATE-REPORTED : 13 January 2020


Parameters	Results	PNSDW DOH, 2017 (maximum)	Test Method
	Product Water		
pH	8.22 @ 21.1 °C	6.5 – 8.5	4500 H+ B. Electrometric Method
Apparent Color, CU	5 @ pH 8.22	10	2120 B. Visual Comparison
Total Suspended Solids, mg/L	Less than 2*	-	2540 D. Gravimetric, Dried @ 103-105°C
Total Dissolved Solids, mg/L	10	600	2540 C. Gravimetry
Turbidity, NTU	0.47	5	2130 B. Nephelometry
Nitrate, mg/L	0.41	50.00	US EPA 352.1 Colorimetric, Brucine
Chlorine Residual as Free Chlorine, mg/L	Less than 0.010**	0.3 min and 1.5 max	Chlorine Test Kit

Note: * – Method Detection Limit ** - Reporting Limit

Reference: APHA-AWWA and WEF 2017. Standard Methods for the Examination of Water and Wastewater, 23rd ed. United States Environmental Protection Agency (USEPA).

Results are those obtained at time of examination and relate only to the sample(s) tested.

CERTIFIED BY:


J.I.M. CEZAR, RCh
Laboratory Supervisor
Chem. Reg. No. 13360

APPROVED BY:

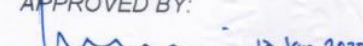

M.L.S. MENDOZA, RCh
Laboratory Business Manager
Chem. Reg. No. 08239



Figure 2.2.3.1.3: Physico-chemical water quality results for December 2019 for PNSDW, DOH 2017

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

Reference No. **CD2003-1225**

Page 1 of 1

TEST REPORT

CUSTOMER : SAN MARTIN STEEL INC.
ADDRESS : Phividec Industrial Estate Brgy. San Martin, Villanueva,
Misamis Oriental
SAMPLE(S) SUBMITTED : WATER
SAMPLE CODE : CD2003-1225-01
DATE / TIME OF SAMPLING : 12 March 2020 / 1:45 PM (By Customer)
DATE / TIME RECEIVED : 12 March 2020 / 3:23 PM
DATE ANALYZED : 12 – 27 March 2020
ANALYZED BY : A.T. BACLAO, J.C. ANTINERO, H.M. PAPELLERAS,
C.O. PONFERRADA, L.G. DALAGUIT
DATE REPORTED : 30 March 2020


Parameters	Results	PNSDW DOH, 2017 (maximum)	Test Method
	Product Water For Drinking		
pH	9.90 @ 21.5 °C	6.5 – 8.5	4500 H ⁺ B. Electrometric Method
Apparent Color, CU	5 @ pH 9.90	10	2120 B. Visual Comparison
Total Suspended Solids, mg/L	Less than 2*	-	2540 D. Gravimetric, Dried @ 103-105°C
Total Dissolved Solids, mg/L	105	600	2540 C. Gravimetry
Turbidity, NTU	0.42	5	2130 B. Nephelometry
Nitrate, mg/L	Less than 0.2*	50.00	US EPA 352.1 Colorimetric, Brucine
Chlorine Residual as Free Chlorine, mg/L	0.010	0.3 min and 1.5 max	Chlorine Test Kit

Note: * – Method Detection Limit

Reference: APHA-AWWA and WEF 2017. Standard Methods for the Examination of Water and Wastewater, 23rd ed.
United States Environmental Protection Agency (USEPA).

Results are those obtained at time of examination and relate only to the sample(s) tested.

CERTIFIED BY:


J.S. ANASCO, RCh
Laboratory Chemist
Chem. Reg. No. 13329

APPROVED BY:


M.L.S. MENDOZA, RCh
Laboratory Business Manager
Chem. Reg. No. 08239



Figure 2.2.3.1.4: Physico-chemical water quality results for March 2020 for PNSDW, DOH 2017 and AO

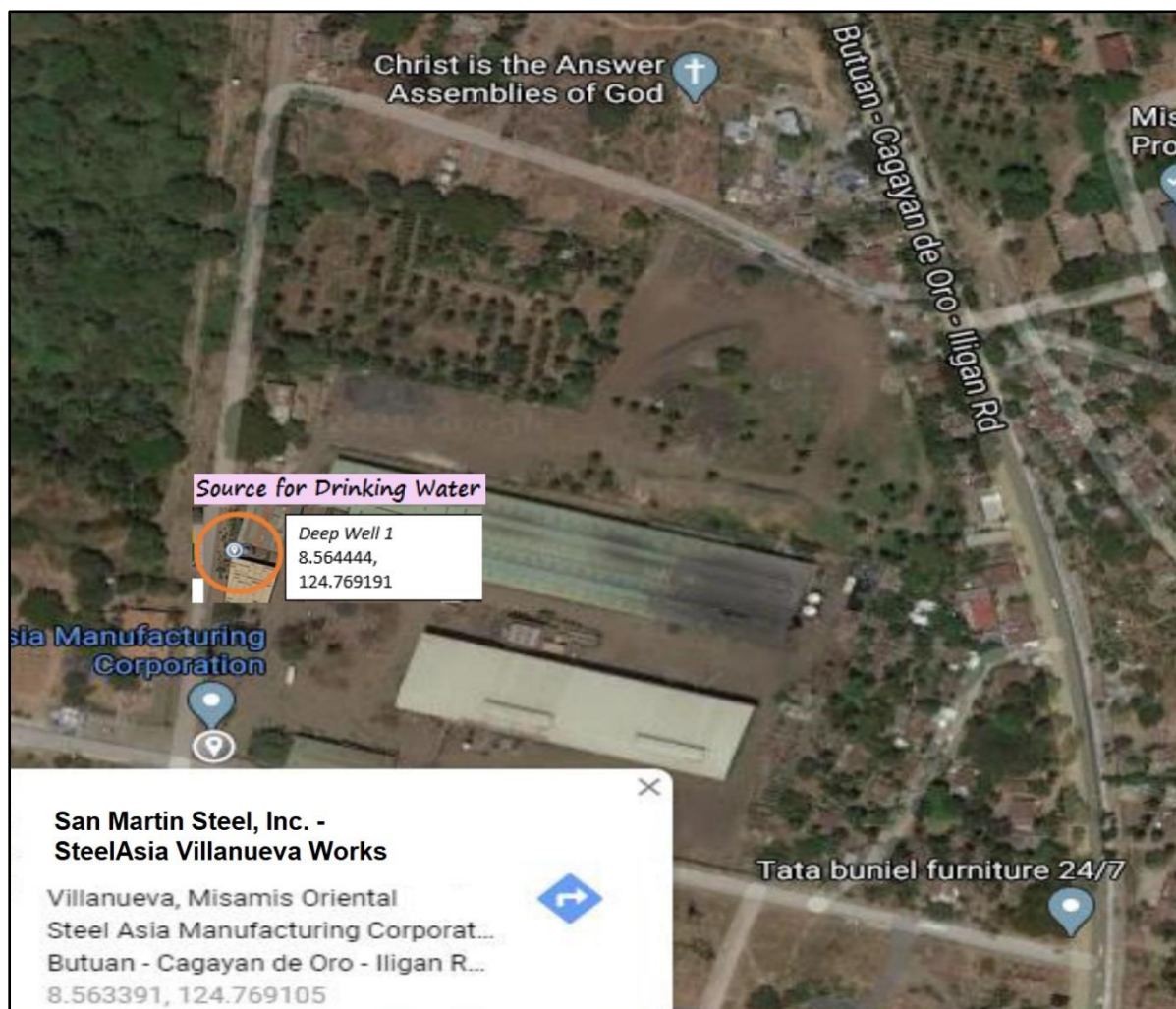
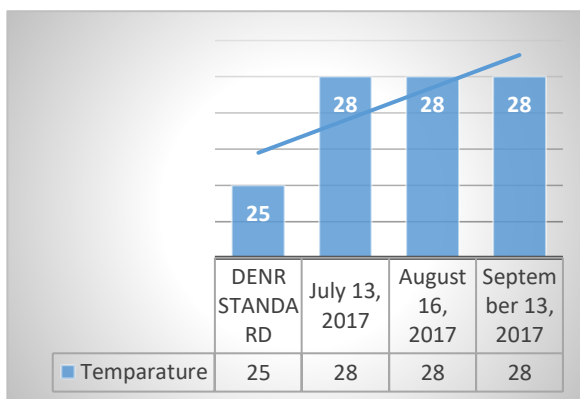
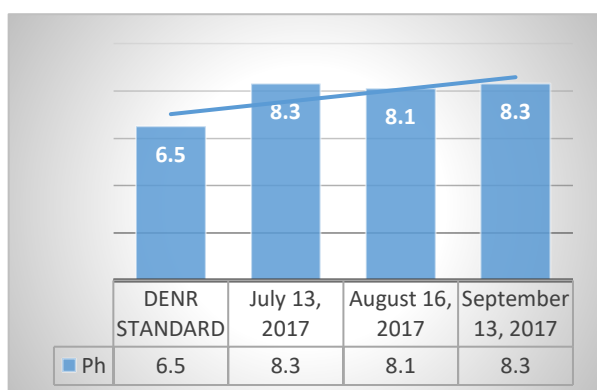


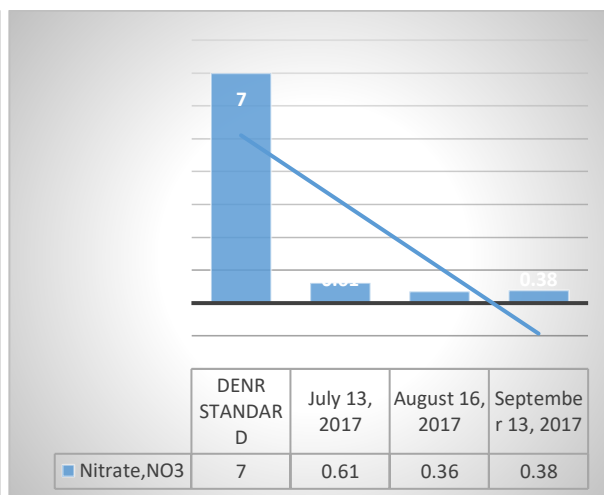
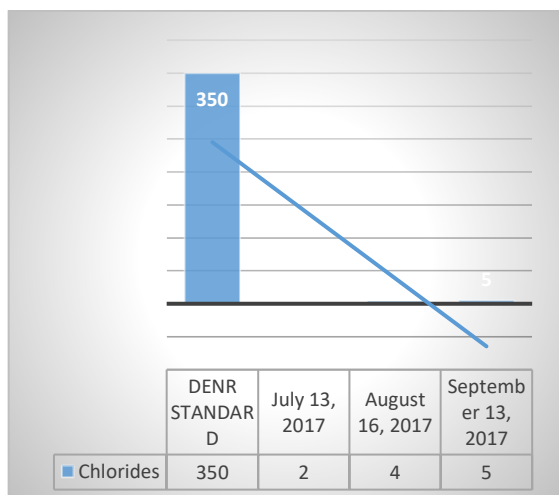
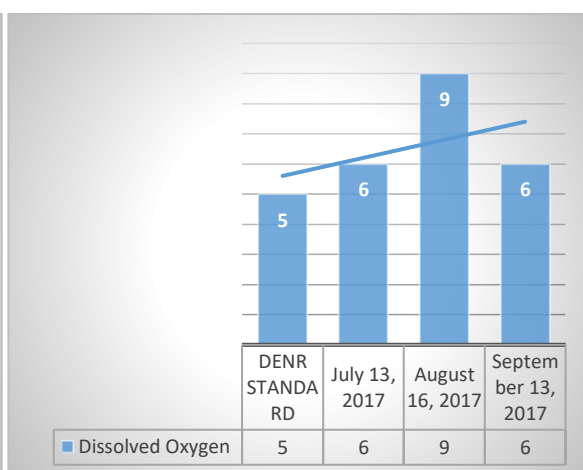
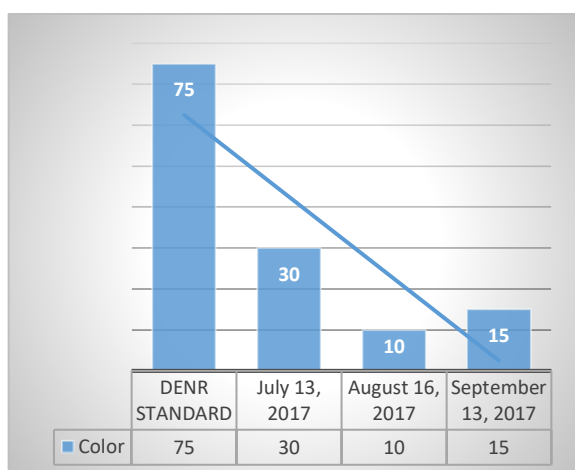
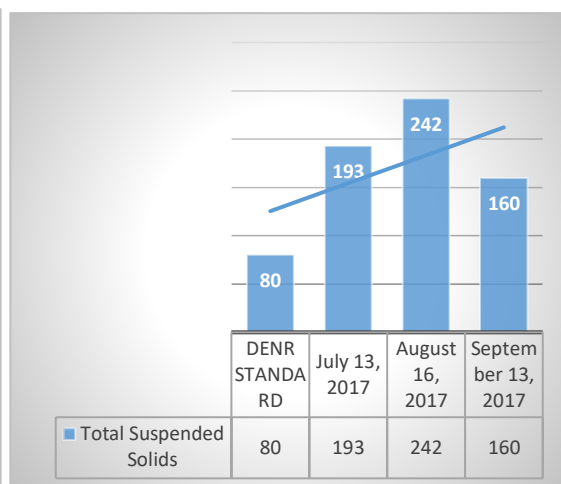
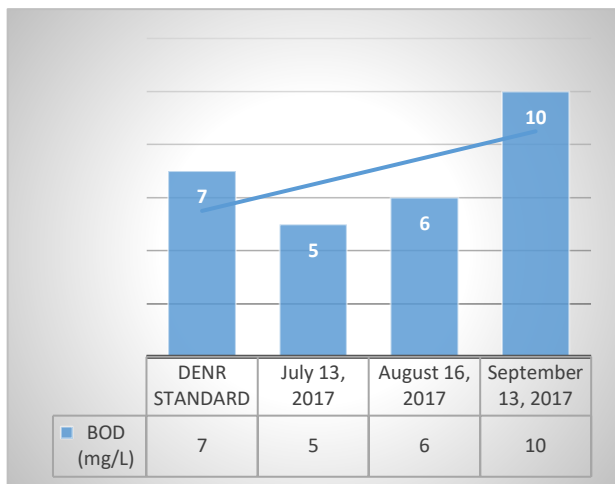
Figure 2.2.3.1.5: Sampling station for groundwater quality

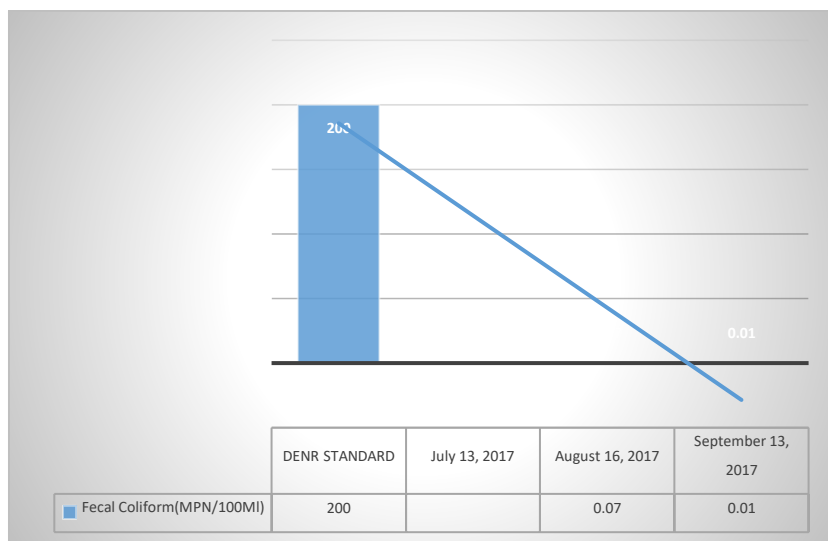
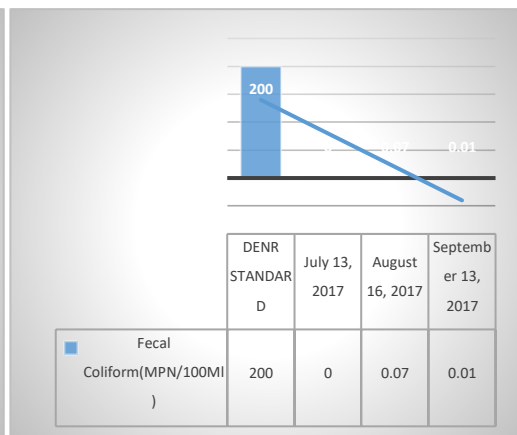
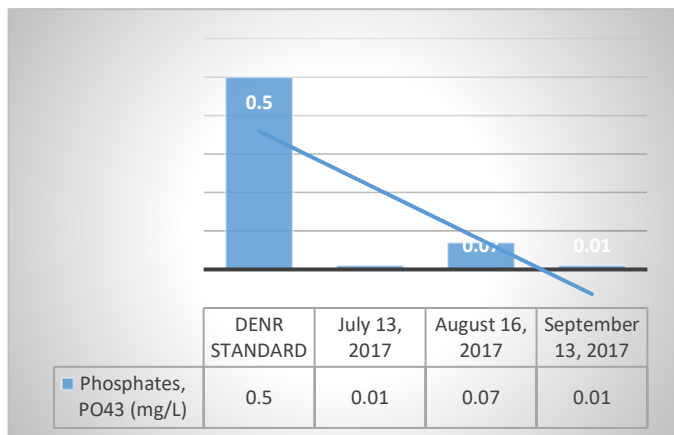
2.2.3.2 Degradation of surface water quality

There will be no impact on the surface water quality because the project will not drain nor use water from Tagoloan River.

Though such is the case, secondary data for Tagoloan River (upstream and downstream) were secured and provided as follows:



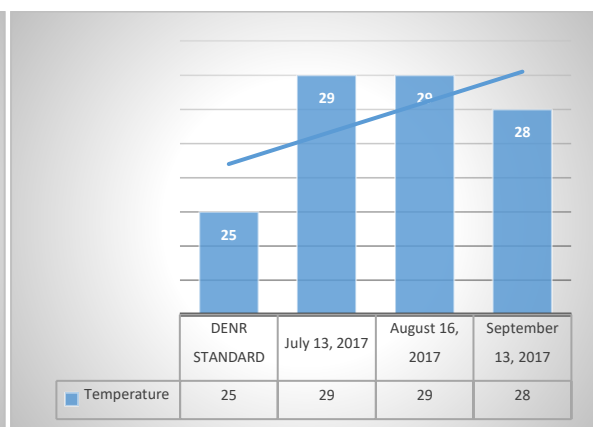
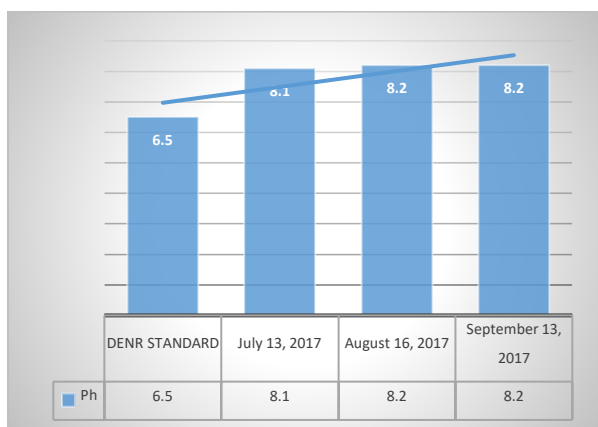




2.2.3.3 Degradation of coastal/marine water quality

There will be no impact on the coastal/marine water quality because the project will not drain nor use water from Macajalar Bay.

Though such is the case, secondary data for Macajalar Bay (upstream and downstream) were secured and provided in Figure 2.2.3.3.1 while sampling site map is provided in Figure 2.2.3.3.2. Figure 2.2.3.3.3 shows the sampling station for groundwater quality.



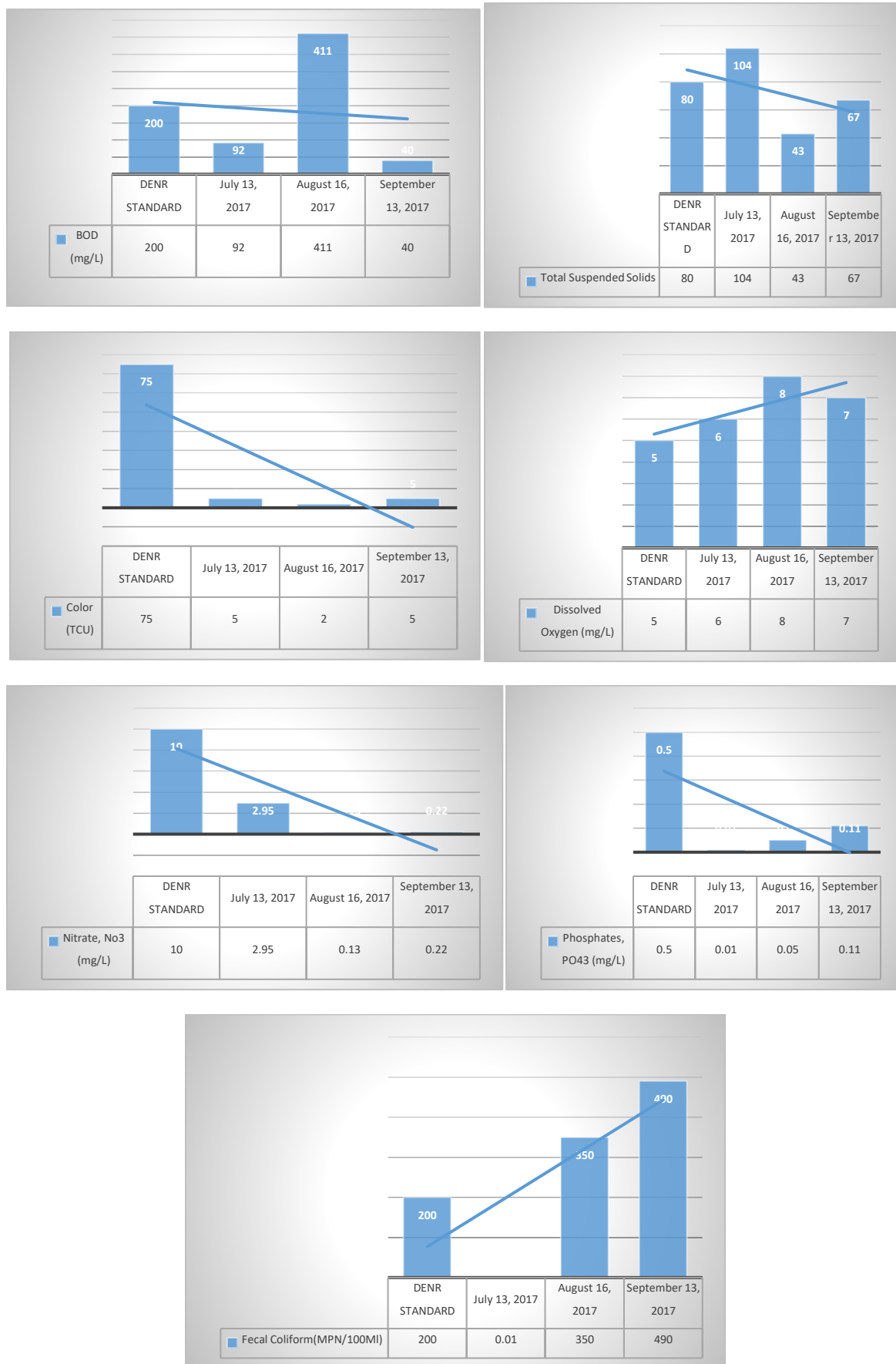


Figure 2.2.3.3.1: Secondary data of water quality test results for Macajalar Bay (upstream and downstream)

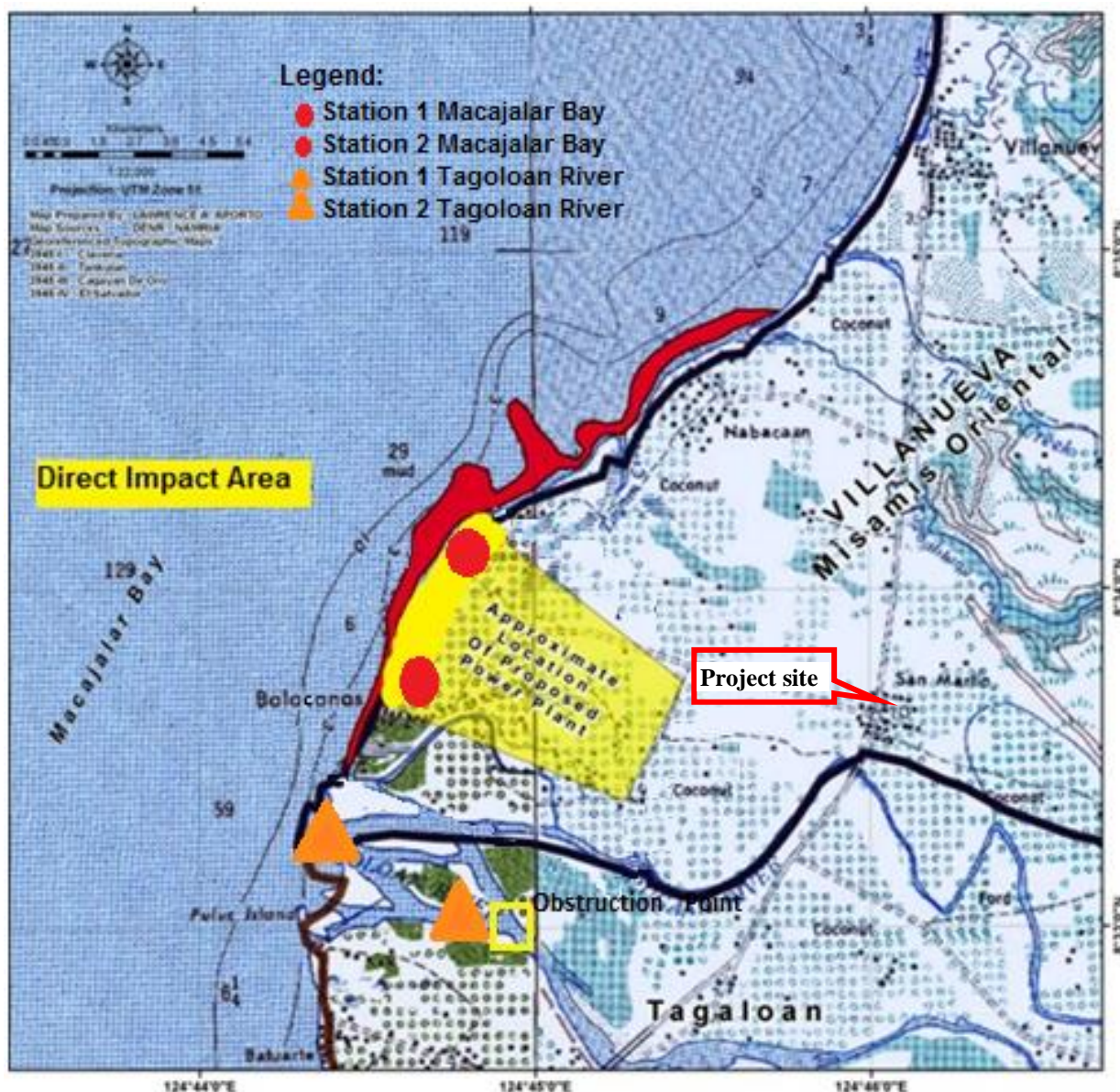


Figure 2.2.3.3.2: Sampling station for water quality

2.2.3.3 Impact Assessment and Mitigation

Degradation of Water Quality

Wastewater generated from domestic use are collected in septic tanks. The Project will provide wastewater management plan through the use of domestic wastewater that will pass through the wastewater treatment facility before process use.

Storm runoff will be directed through the water reservoir. Contaminated rainwater in the maintenance area will be directed to the wastewater treatment and will be recirculated for process use.

2.2.4 Freshwater Ecology

A survey of the Tagoloan River, the most adjacent and impact area of the project is provided hereunder.

As a brief summary the Tagoloan River is partly degraded in view of siltation already experienced. Thus there are insignificant ecologically and economically important species. Sporadic fishing activities are being undertaken for household and not for commercial purposes.

Fisheries Profile

Results of rapid appraisal of municipal capture fisheries

Municipal Capture Fisheries

Actual fishing was undertaken by the survey team in two stations close to the project site on 11 February 2013 (please see Figure 16 for location of stations). A set gill net of monofilament nylon measuring 30 meters in length was used. Results from actual fishing operations were supplemented by rapid fisheries appraisal through key informant interviews (12 fishers) and observations of actual fishing operations in front of the project site. The information gathered was directed at defining the state of municipal fisheries in the general area of the project site in terms of (i) fishing gears used, (ii) catch composition, (iii) catch rates and issues that may be heightened with the establishment and operation of the project.

In recent years, however, the *Integrated Coastal Management Plan of Villanueva (undated; but according to the MAO, the plan was formulated in 2011)* indicates that there are only 93 fishers in the coastal barangays of Looc and Poblacion 3, majority of which undertake fishing as a part-time livelihood. Slightly over 50% of these fishers operate fishing boats while the rest practice shore-based fishing using cast nets, fish pots and traps. Apart from this, some 41 fishing boats from other municipalities allegedly intrude into the municipal waters of Villanueva to capture small pelagic species. While no figures on fisheries yield estimates were presented in the plan, anecdotal accounts reveal that over the last two decades, destructive fishing practices, largely through the use of dynamite and fine mesh nets, exacerbated by siltation in coastal waters have led to loss of important habitats that nurture demersal fish recruitment. At the present time, key informants alleged that major fishing grounds are situated farther out into Macajalar Bay, with more than one hour of navigation by motorized boat. In deeper waters, the use of fish aggregating devices (FADs-Payao) is being practiced. In principle, FADs attract small fishes into the shelter provided by the FAD and thereafter large pelagic species, such as tuna and jacks, become attracted to the schooling fish. The FAD-aided fishing areas are then fished through hook and line and surrounding nets to almost capture everything within the FAD area. The primary yield consists of Hairtails (Espada) and an assortment of large pelagic species of tuna and tuna-like species (e.g., *Thunnus tonggol*, *Euthynnus affinis*, and *Katsuwonus pelamis*) dolphinfish (*Coryphaenahippurus*), spanish mackerel (*Scomberomorus commerson*), roundsad (*Decapterus macrurus*) and frigate mackerel (*Auxisthazard*). For hairtails and its associated by-catch, an average of 20 kg per day is captured.

In nearshore waters, the primary fishing gears employed by small fishers are (i) set gill nets (pukot), hook and line (kawil), beach seine (baling) and cast nets. The primary observation is that fisheries is no longer productive in the near-shore areas around the project site compared to ten years ago and few fishers have continued to fish as their principal livelihood. Lucrative demersal species have diminished from the reefs, replaced by juveniles and the capture of small pelagics has become the dominant practice. There are about six (6) fisher households that have settled on the beach along the Tagoloan River estuary and all practice full time fishing with use of cast nets, gill nets and fish pots. Fishers interviewed on the beach fronting the project site claim there are about 36 fishers, many of which are part time fishers residing far from the shoreline, fishing in the coastal waters around the project site but only about four boats were encountered by the survey team in 3 days of observations. Fishers report that an average of 7 kilograms of assorted fish is harvested from gillnetting with only 4 to 6 hours of gear operation (Plate 11). Even as the catch rates have declined considerably as compared to the yield projections indicated in previous EIA surveys, the present rates declared by the fishers are quite substantial if compared to other heavily-fished areas in say central Visayas. The catch composition of municipal capture fisheries, according to order of yield proportion are as follows:

Catch composition of municipal capture fisheries in Villanueva, Misamis Oriental in order of production importance (top 10; data from key informants and actual fishing operation, February 2013)

Table 2.2.8: Catch composition of small-scale capture fisheries in Villanueva, Misamis Oriental, in particular, near the Tagoloan River estuary (February 2013).

English name of fish	Local (common) name	Scientific Name
Indian sardines	Tamban	<i>Sardinella longiceps</i>
Hairtail	Espada	<i>Trichiurus lepturus</i>
Mackerels	Alumahan/Matangbaka	<i>Scomber australasicus</i> Selarboops
Frigate mackerel	Tulingan	<i>Auxisthazard</i>
Spanish mackerel	Tanguige	<i>Scomberomorus commerson</i>

Lizardfish	Kambabalo	<i>Sauridamicroptoralis</i>
Eastern little tuna	Tuna/bariles	<i>Euthynnusaffinis</i>
Moontailbullseye		<i>Pricanthushamrur</i>
Rabbitfish	Dangit	<i>Siganus spp.</i>
Gray mullet	Banak	<i>Mugilcephalus</i>

Note in the photograph below the presence of the freshwater species *Tilapia sp* caught by the fishing net.

Plate 2.2.1: Photograph showing the presence of tilapia



Survey Results

The actual fishing stations are shown in the figure below.

In the river estuary, an average of 5 to 7 small fishing crafts were observed to operate daily in using cast nets to catch principally 'pasayan' (*Nematopalaemonetes*), and gill nets to catch mullet (*Mugil sp*), rabbitfish (*Siganidae*; above), Snappers (*Lutjanidae*) and Tilapia. The catch rate is exceedingly low, at only 1 to 2 kg per fisher per day, consisting mostly of mullets, shrimps and juvenile rabbitfish. Results of actual fishing operations using gill net in two stations inside the Tagaloan River yielded only 2 fishes per gear setting of 3 hours each. In both cases the species caught was *Mugilcephalus*, or the common mullet.

**Map Showing The Actual Fishing Stations
LOCATED IN MUNICIPALITY OF VILLANUEVA
Province Of Misamis Oriental**

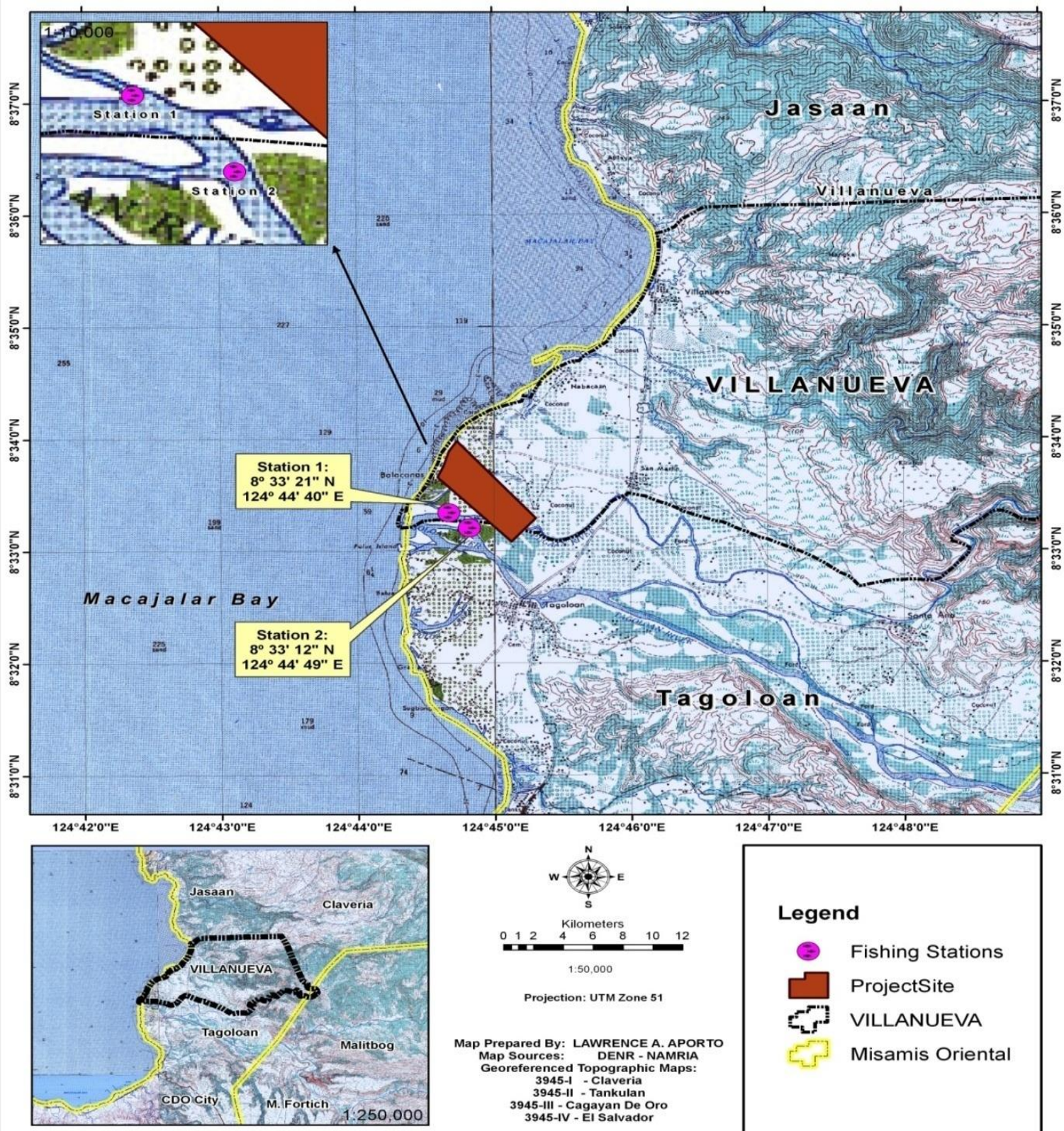


Figure 2.2.16: Map of the Fishing Survey Stations

The survey confirms the claim of fishers in the area that river fisheries productivity has declined considerably due to the extremely intense sedimentation. Previous studies indicate that the most common animals encountered in the river include the penaeid shrimps (pasayan), the molluscs *Thiara* sp., *Melanoides* and *Vivipara*. A lucrative species of freshwater fish known as *Pigok*, (first alleged to be *Therapon* sp. in previous studies) was allegedly captured in many of previous sampling stations for the Mindanao Power Plant EIA in 2001. In the present survey, there has been no sightings of the *Pigok* even as it is a highly sought after fish due to its lucrative price (P 800/kilogram) and rare status. None of the fisher key informants interviewed has caught the fish in the last 3 to 5 months. Research undertaken by the present survey team revealed that the *Pigok* is the same as the tapiridtherapon species known as *Pigok* - *Mesopriostes cancellatus* – which was previously thought to be endemic in the Abra River and the Rio Grande de Mindanao. The fish is allegedly captured rarely at the present time and residents suspect that the practice of capturing spawning females as they migrate downstream to lay eggs is the main reason for the disappearance of the fishes. Fishers also alleged that the *Pigok* does not inhabit the heavily turbid waters near the Tagoloan river estuary.

At present, the only major fishery resource that is found extensively in the Tagoloan river is the freshwater fish *Tilapia* sp. The species is caught by cast nets thrown by fishers in shallow calm waters in the downstream section of the river. Upstream, few fishers operate as fisheries productivity in this part of the river is lesser than the fisheries in the estuary area where fish species that migrate into brackish water can still be captured, albeit in progressively decreasing yield. In the river estuary, an average of 5 to 7 small fishing crafts were observed to operate daily in using cast nets to catch principally 'pasayan' (*Nematopalaemon tenuispis*), and gill nets to catch mullet (*Mugil* sp), rabbitfish (*Siganidae*), Snappers (*Lutjanidae*) and *Tilapia*. Their area of operation is not within the river itself but in coastal waters where brackish water dominates. The catch rate is exceedingly low, at only 1 to 2 kg per fisher per day, consisting mostly of mullets, shrimps and juvenile rabbitfish. Results of actual fishing operations using gill net in two stations inside the Tagoloan River yielded only 2 fishes per gear setting of 3 hours each. In both cases the species caught was *Mugil cephalus*, or the common mullet (Plate 12). The catch composition consists of mostly juvenile sizes. In the mangrove areas, the capture of Mud Crabs (*Scylla serrata*) is being practiced together with gleaning for bivalves. In three days of actual observations and lookouts for fishing operation, the survey team encountered about 5 fishing crafts in the estuary during various times of the day. No mud crab harvesting activities were observed and neither was there any crab traps encountered.

Presence of pollution indicator species

Freshwater fish species have not been utilized as pollution indicator species but their presence in significant numbers and species diversity will indicate a relatively robust and healthy river ecology. Such numbers do not occur in the portion of the Tagoloan river close to the project site. As a summary, Tagoloan River is partly degraded in view of siltation that has rendered the downstream portions, especially in the river mouth where the project is located, highly unfavorable for long-term fish recruitment and habitation. Thus in this area, there are no ecologically and economically important species apart from the hardy *Tilapia* and mullet species of fish. Mullet spend part of their life stages in brackish water environments. Sporadic fishing activities are being undertaken for household and not for commercial purposes. In previous surveys undertaken for the Mindanao Power Plant, many of the freshwater species encountered were found in the upstream portions of the river.

2.2.4.1 Impacts

The overall impacts are deemed not highly significant because the project is located 2.53 hectares away from the Tagoloan River and will not use nor drain to Tagoloan River.

2.2.5 Marine Ecology

This is not applicable because this environment will not be used nor impacted because no water will be used nor will be discharged.

2.3 AIR

2.3.1 Meteorology/Climatology

The scope of this section is to describe the existing meteorological conditions at the project site. It includes assessment of climate change with respect to the PAGASA projections in 2020 and 2050.

Data and related studies from PAGASA were used to describe the climatological normal, extremes, and climate change which are described below:

- a) Climate normal and extreme data from the Lumbia Station. Climatological normal are the monthly and annual summaries of rainfall, (amount and number of rainy days), temperature (maximum, minimum, mean, dry bulb, wet bulb, and dew point), vapor pressure, relative humidity, mean sea level pressure, wind direction and speed, cloud amount or cover, number of days with thunderstorm, and number of days with lightning;
- b) Climate Map of the Philippines from PAGASA;
- c) Windrose diagram (2015);
- d) Greenhouse gas assessment of the project; and
- e) The PAGASA climate change projections of 2020 and 2050.

Impacts to the local climate at the site were done by analyzing trends of relevant parameters like temperature, rainfall, and relative humidity.

2.3.1.1 Change in the local micro-climate

Climatology

The climate of the site belongs to Type IV as referred to the climate map of the Philippines (Figure 2.3-1) based on the Modified Coronas system of classification. For Type IV climate, rain is more or less evenly distributed throughout the year.

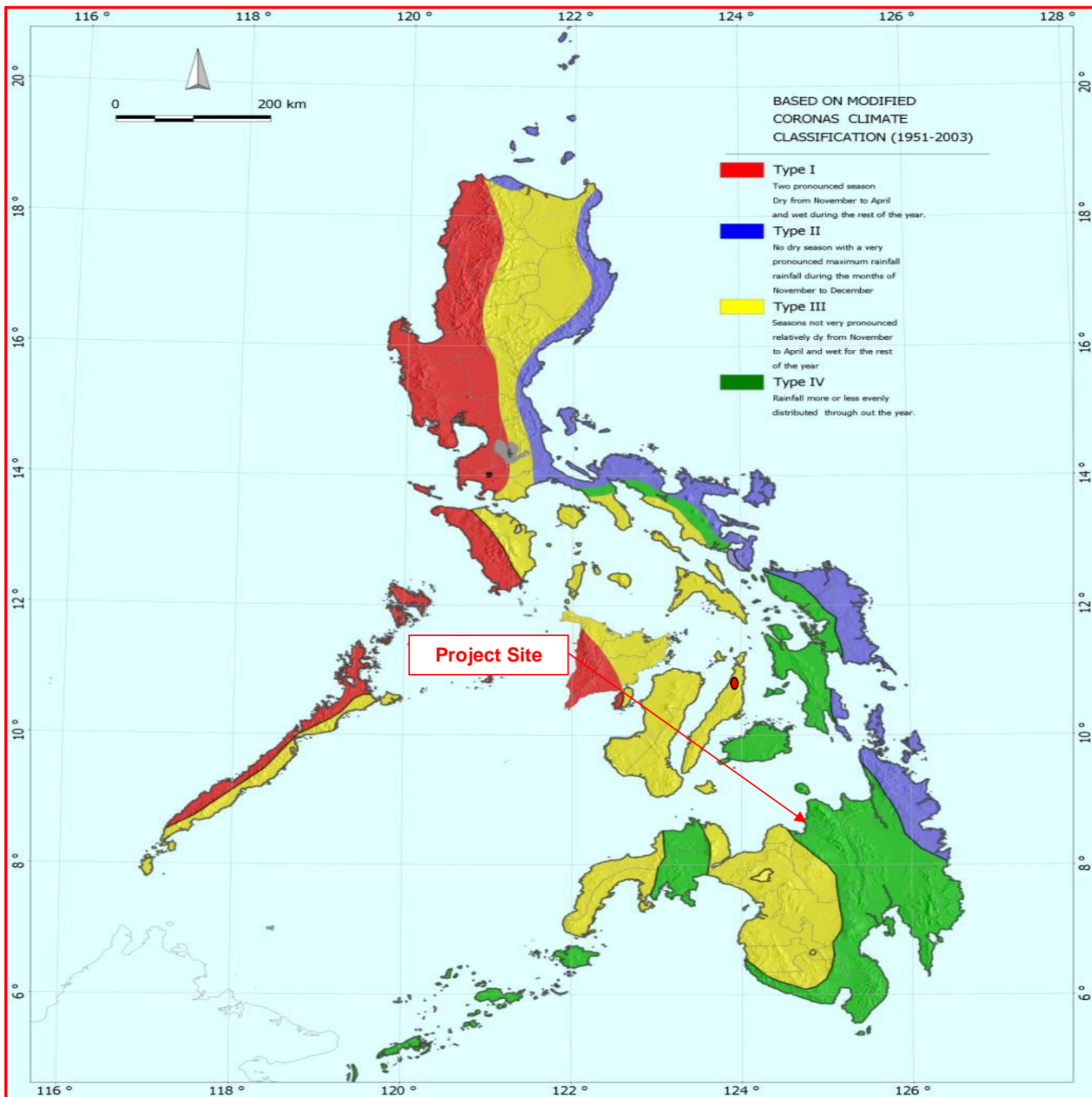


Figure 2.3-1: Philippine Climate Map (Source: PAGASA)

In assessing any project with significant air emissions, it is necessary to compare the impacts of the project with relevant air quality goals. Air quality standards or goals are used to assess the potential for ambient air quality to give rise to adverse health or nuisance effects.

The Philippine National Ambient Air Quality Guideline Values

Activities in environmental and natural resource management in the Philippines are guided by the following overarching policy frameworks:

- 1977 Philippine Environmental Policy (Presidential Decree [PD] 1151);
- 1977 Environment Code (PD 1152);

- 1989 Philippine National Strategy for Sustainable Development; and
- 1996 National Action Plan for Sustainable Development.

The major legal instrument guiding air quality management is the Philippine Clean Air Act of 1999 and its Implementing Rules and Regulations DAO 2000-81 which lays down policies to mitigate air pollution, sets standards for vehicle owners and manufacturing industry, imposes/sets fines and penalties for violators of the law, and outlines the different programs to be implemented by the government and other sectors to manage air quality.

The Department of Environment and Natural Resources (DENR) is mandated to be the primary government agency responsible for air quality and functions as the policy-making and standard-setting body. The National Ambient Air Quality Guideline Values (NAAQGV) set the ambient air quality guidelines for the criteria pollutants in the Philippines (Tables 2.3.1 and 2.3.2). The DENR also issued a Departmental Administrative Order (DAO) setting a provisional NAAQGV for PM_{2.5} to 50µg/m³ and 25µg/m³ for daily and annual PM_{2.5}. This standard is provisional and are not yet mandated to industries such as the Project.

Table 2.3.1: National Ambient Air Quality Guideline for Criteria Pollutants

Pollutants	Short Term			Long Term		
	µg/Ncm	ppm	Averaging Time	µg/Ncm	ppm	Averaging Time
Suspended Particulate Matter						
TSP	230		24-hour	90		1-year
PM ₁₀	150		24-hour	60		1-year
Sulfur Dioxide	180	0.07	24-hour	80	0.03	1-year
Nitrogen Dioxide	150		24-hour			
Photochemical Oxidants as Ozone	140	0.07	1-hour			
	60	0.03	8-hour			
Carbon Monoxide	35 mg/Ncm	30	1-hour			
	10 mg/Ncm	9	8-hour			
Lead	1.5		3-months	1.0	1-year	

Source: Section 12 of RA 8749, Philippine Clean Air Act

Table 2.3.2: National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations

Pollutants	Concentration		Averaging Time(min)	Methods of Analysis/ Measurements
	ug/Ncm	ppm		
Ammonia	200	0.28	30	Nesslerization/ Indo Phenol
Carbon Disulfide	30	0.01	30	Tischer Method
Chlorine and Chlorine Compounds expressed as Cl ₂	100	0.03	5	Methyl Orange
Formaldehyde	50	0.04	30	Chromotropic Acid Method or MBTH Colorimetric Method
Hydrogen Chloride	200	0.13	30	Volhard Titration with Iodine Solution
Hydrogen Sulfide	100	0.07	30	Methylene Blue
Lead	20		30	AAS
Nitrogen Dioxide	375	0.20	30	Greiss-Saltzman
	260	0.14	60	
Phenol	100	0.03	30	4-Aminoantiphrine
Sulfur Dioxide	470	0.18	30	Colorimetric – Pararosaniline
	340	0.13	60	
Suspended Particulate Matter				
TSP	300		60	Gravimetric
PM ₁₀	200		60	

Source: Section 12 of RA 8749, Philippine Clean Air Act

Meteorology

The Philippines has a tropical maritime climate. The country is exposed to the southwest monsoon, northeast monsoon, North Pacific Trades, Intertropical Convergence Zone, tail end of the cold front, easterly waves, the passage of tropical cyclones and the El Nino Southern Oscillation (ENSO) phenomenon.

Meteorology in the area surrounding the Project is affected by several factors such as terrain and land use. Wind speed and direction are largely affected by the coastal winds at the small scale. While factors such as synoptic scale winds which are modified by the dominant monsoon winds and valley drainage flows that develop during night hours, affect wind speed and direction on the larger scale.

The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) is the government agency that operates and maintains a network of meteorological stations throughout the Philippines. The closest PAGASA site to the Project that records meteorological data is at Lumbia, approximately 22km to the southwest of the Project. The meteorological data collected from the PAGASA site includes 3-hourly records of temperature, humidity, barometric pressure, wind speed and wind direction. While the data cannot be used for modelling purposes because it is 3-hourly rather than hourly and the wind directions are measured to a 12.5 degree accuracy rather than 1 degree, it can be used for discussion of general regional meteorology. A range of data collected from this station in 2012 is provided in **Table 2.3.3**.

The data from **Table 2.3.3** show that the climate is characterized by warm temperatures and wet humid days. This is typical of the tropical maritime climate of the Philippines.

Table 2.3.3. Summary Statistics for Meteorological Data for the Lumbia Station, 2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min Temp (°C)	20.0	23.0	21.0	22.0	22.0	22.0	22.0	22.0	21.0	21.0	22.0	22.0	20.0
Mean Temp (°C)	25.8	26.2	26.6	27.0	26.7	26.9	26.1	27.0	26.3	26.3	26.3	26.1	26.37
Max Temp (°C)	33.0	32.0	35.0	34.0	34.0	36.0	33.0	36.0	34.0	33.0	33.0	33.0	36.0
Min RH (%)	49	50	37.0	48.0	50.0	37.0	10.0	37.0	10.0	10.0	50.0	10.0	10.0
Mean RH (%)	81	83	76.4	76.8	79.3	76.7	82.0	75.9	79.5	79.9	80.8	82.0	79.28
Max RH (%)	100	100	97.0	99.0	99.0	98.0	99.0	98.0	98.0	98.0	99.0	99.0	100
Min WS (m/s)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean WS (m/s)	1.6	1.8	2.2	2.0	2.2	2.2	1.6	1.6	1.5	1.7	1.5	1.6	1.77
Max WS (m/s)	5.0	10	65.52	56.28	60.5	60.5	6.05	8.06	8.06	60.5	4.0	6.1	65.52
No. of Rainy Days	13	17	9	10	15	15	24	15	18	14	12	14	180

The wind rose for the Lumbia site is provided in **Figure 2.3.2**. Overall, the wind roses indicate that there is a prevailing wind direction from the north (i.e. the sea) and lighter winds from the south (or inland).

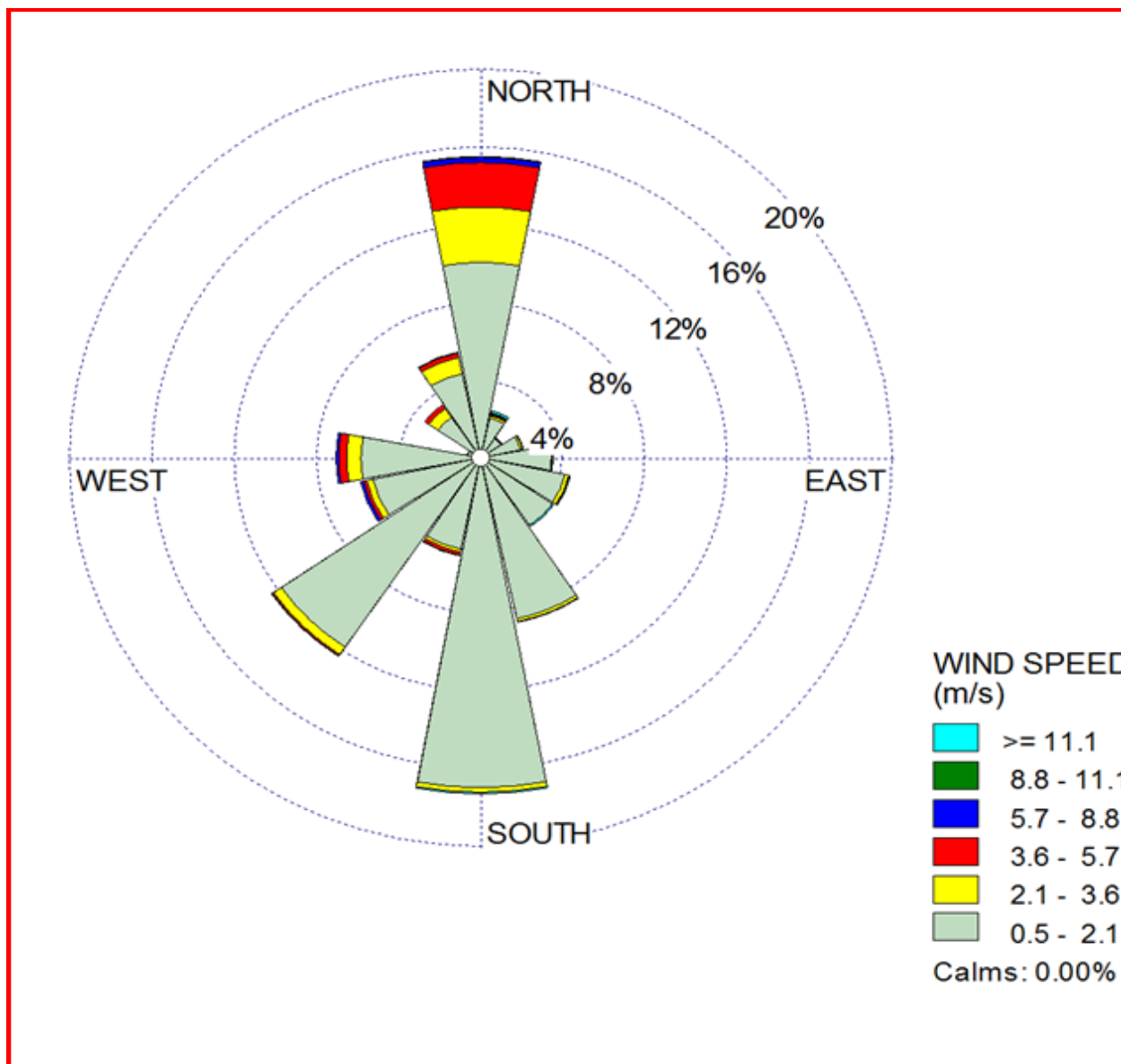


Figure 2.3.2: Windrose at Lumbia Station

2.3.1.3 Impact Assessment and Mitigation

Climate Change Projections 2020 & 2050

The climate change scenario for the Philippines published by PAGASA in February 2011 indicated that the Province of Misamis Oriental will have an increase in temperature and fluctuating amount of rainfall. The projected seasonal temperature increases and seasonal rainfall change under the medium-range emission scenario in 2020 and 2050 are presented in **Tables 2.3.1.3.1&2.3.1.3.2** respectively.

To use the tables and arrive at values of seasonal mean temperature and seasonal rainfall in 2020 and 2050 in any of the provinces, the projections are added to the observed values (presented in each of the tables).

In Misamis Oriental province, the projected values in 2020 are:

- DJF mean temperature = $(25.4\text{ }^{\circ}\text{C} + 1.0\text{ }^{\circ}\text{C}) = 26.4\text{ }^{\circ}\text{C}$;
- DJF rainfall = $\{442.5\text{mm} + 442.5(4.6\%)\text{mm}\} = (442.5 + 20.36)\text{mm}$ or 462.86mm;
- number of days with $T_{\text{max}} > 35\text{ }^{\circ}\text{C}$ in CDO during the 2020-2050 period (centered at 2020) = 4539;
- number of dry days in CDO during the 2020-2050 period (centered at 2020) = 6413; and
- number of days with rainfall $> 150\text{mm}$ in CDO during the 2020-2050 period (centered at 2020) = 1.

Temperature Change

The historic average annual ambient air temperature as provided in the table below indicate that there is little monthly or seasonal variation in average temperatures.

Table 2.3.1.3.1: Seasonal temperature increases (in °C) in 2020 and 2050 under medium-range emission scenario in provinces in Region 10

Region 10	OBSERVED BASELINE (1971-2000)				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
PROVINCES	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
BUKIDNON	25.1	26.5	25.8	25.7	1.0	1.2	1.2	1.0	1.9	2.3	2.4	2.1
LANAO DEL NORTE	24.4	25.5	25.4	25.2	1.0	1.1	1.0	1.0	1.9	2.2	2.1	1.9
MISAMIS OCCIDENTAL	25.6	26.7	26.6	26.4	1.0	1.1	1.1	1.0	1.9	2.2	2.2	1.9
MISAMIS ORIENTAL	25.4	26.8	26.9	26.5	1.0	1.2	1.2	1.0	1.9	2.3	2.4	2.0

Table 2.3.1.3.2: Frequency of extreme events in 2020 and 2050 under medium-range emission scenario in provinces in Region 10

Provinces	Stations	No. of Days w/ Tmax >35 °C			No. of Dry Days			No. of Days w/ Rainfall >150mm		
		OBS (1971-2000)	2020	2050	OBS	2020	2050	OBS	2020	2050
BUKIDNON	Malaybalay	26	477	1441	6537	3977	4461	4	9	9
LANAO DEL NORTE	Dipolog	217	2155	4004	7481	5384	5470	3	6	1
MISAMIS ORIENTAL	Cagayan De Oro	383	4539	6180	8251	6413	7060	10	13	9
	Lumbia	106	2012	3759	6495	6290	6580	3	6	1

Rainfall Change

Table 2.3.1.3.3 shows the monthly average rainfall without climate change, calculated monthly average rainfall with climate change 2006-2035 and 2036-2065.

Table 2.3.1.3.3: Seasonal rainfall change (in %) in 2020 and 2050 under medium-range emission scenario in provinces in Region 10

Region 10	OBSERVED BASELINE (1971-2000) mm				CHANGE in 2020 (2006-2035)				CHANGE in 2050 (2036-2065)			
PROVINCE	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON	DJF	MAM	JJA	SON
BUKIDNON	329.7	335.6	653.8	559.5	2.9	-10.3	-4.4	-0.3	-5.1	-13.0	-9.7	-5.8
LANAO DEL NORTE	337.5	350.3	662.5	621.1	9.6	-0.6	-2.2	6.9	2.5	-1.9	1.4	7.1
MISAMIS OCCIDENTAL	392.1	323.4	633.1	728.3	9.1	1.4	-6.1	6.1	5.2	0.3	-5.1	4.6
MISAMIS ORIENTAL	442.5	296.0	615.7	581.1	4.6	-10.4	-3.7	2.9	1.8	-17.8	-5.2	-0.1

2.3.1.4 Contribution in Terms of Greenhouse Gas Emissions

One of the most important environmental changes now in progress is a buildup of atmospheric carbon dioxide (CO₂). Undoubtedly, the added CO₂ in the atmosphere is coming from the burning of fossil fuels, the cutting of forests and the wastage of soil humus (the colloidal organic complex in the soil). The main outcome of the buildup is likely to be a change climate, notably toward greater warmth. The atmospheric CO₂ content is usually measured in terms of its concentration relative to all other gases in parts per million by volume (ppmv).

The procedure was used in estimating CO₂ are from the Tier 1 estimation method prescribed by the Intergovernmental Panel on Climate Change (IPCC) are discussed below. This method calculates the

GHG emissions from all sources of combustion and indirect off-site sources on the basis of the quantities of fuel consumed and average emission factors. Below is equation used:

Equation 1:

$$\text{CO}_2 \text{ emissions} = \text{FC} \times \text{NCV} \times \text{CEF} \times \text{FC} \times \text{K}$$

Where:

FC = Fuel Consumption, MT
 NCV = Net Calorific Value, Tj/MT
 CEF = Carbon Emission Factor, MT C/Tj
 FC = Fraction Carbon Oxidized
 K = Molecular Weight Ratio of CO₂ to C, (44/12)
 A = Fuel Type

Equation 2:

$$\text{CH}_4 \text{ emissions} = (\text{FC} \times \text{NCV} \times \text{EF} \times 1/1000 \times 21)A$$

Where:

FC = Fuel consumption, MT
 NCV = Net calorific value, Tj/MT
 EF = Emission factor, kg/Tj
 21 = GWP of methane
 1/1000 = Conversion factor
 A = Fuel type

Equation 3:

$$\text{N}_2\text{O emissions} = (\text{FC} \times \text{NCV} \times \text{EF} \times 1/1000 \times 310)A$$

Where:

FC = Fuel consumption, MT
 NCV = Net calorific value, Tj/MT
 EF = Emission factor, kg/Tj
 310 = GWP of methane
 1/1000 = Conversion factor
 A = Fuel type

Table 2.3.1.3.4 shows the summary of the GHG emissions from the Project. The default CO₂ emission factor of residual oil no. 6 from Table 2.2 of the IPCC 2006 Guidelines is 77,400 kg of CO₂/Tj; 10 kg of CH₄/Tj for methane; and 0.6 kg of N₂O/Tj for nitrous oxides.

Table 2.3-13: Summary of GHG Emissions of the Project

Emission Sources	Fuel Consumption (L/year)	Fuel Heating Value (kcal/kg)	CO ₂ Emission (MT/year)	CH ₄ Emission (MT/year)	N ₂ O Emission (MT/year)
Furnace Stack	34,800,000	10,082	136,157	17.59	1.06

The total overall estimated CO₂ emission based on IPCC 2006 and USEPA is 136,175.33 metric tons per year. The Philippines Initial National Communication (INC) on Climate Change has projected 122,344 Gg of CO₂ for 2008 for energy sector. Using these projections of INC, the Project operation is expected to contribute an approximately 0.034084% of the total CO₂ emission. In the global levels projection of CO₂ emission for 2020 under the USEPA Sectoral Trend in Global Energy Use and Greenhouse Gas Emissions, Climate Protection Division, Office of Air and Radiation, the estimated contribution of the Project globally is 0.000461%. When such a comparison is made, this total emerges as a small contribution to the total global anthropogenic CO₂ load. If this total is a measure of

responsibility for global warming, on an absolute magnitude, the Project can still be considered to be on the low-end greenhouse gas emitters in the world.

Table 2.3.1.3.4: INC/SNC Data

	Gg CO ₂ /yr	GHG %
Global Level^a		
2000	6,118,000	0.000682
2010	7,936,000	0.000525
2020	9,042,000	0.000461
Energy Sector		
SNC		
2000	69,667	0.059856
2020	100,402	0.041533
INC		
INC Projected 2008	122,344	0.034084

Note: ^a – Sectoral Trend in Global Energy Use and Greenhouse Gas Emissions, Climate Protection Division, Office of Air and Radiation, US EPA, 2006

INC – Initial National Communication on Climate Change

SNC – Second National Communication on Climate Change

2.3.2 Air Quality and Noise

2.3.2.1 Degradation of Air Quality

Baseline Environmental Condition

An ambient air quality monitoring programme was conducted in four (4) sampling locations within the project site and vicinity. The collected ambient air and noise data from the established stations will be used to represent the baseline data of the project. Station identification and geographical location are presented.

The ambient TSP, PM₁₀, PM_{2.5}, SO₂, NO₂, and heavy metals (As, Cd, Cr⁺⁶, Pb, & Hg) concentrations were measured at the identified sampling points. The selection of the sampling stations was based on the locations of receptors, source, and prevalent wind direction. Methods for sampling and analysis conformed to methods prescribed in Sec. 1(b) Rule VII Part II of the Clean Air Act IRR. The resulting ambient air concentrations were compared with the National Ambient Air Quality Guidelines Values (NAAQGV), Rule VII, Part II and the National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations Section 1 Rule XXVI Part VII of the Clean Air Act IRR.

Table 2.3.2.1: Station Identification for Ambient Air Quality & Noise Measurement Monitoring for 1-hour sampling

Station	Station Description
STN-1	1 - Vacant lot near bunkhouse; 8° 33' 56.9484" N 124° 46' 14.9700" E
STN-2	2 - Billet yard near furnace; 8° 33' 54.8712" N 124° 46' 17.4468" E
STN-3	3 - WTP area; 8° 33' 47.1348" N 124° 28' 37.5157" E
STN-4	4 - Near main gate; 8° 33' 49.0248" N 124° 46' 10.0200" E

Source: Mediatrix, 2016

Ambient Air Sampling Result

The summary of the ambient air quality monitoring results is presented below. The monitoring results show that the concentrations of TSP, PM₁₀, NO₂, and SO₂ for 1-hour averaging period in all stations are below the CAA limits of 300 µg/Ncm for TSP, 200 µg/Ncm for PM₁₀, 260 µg/Ncm for NO₂, and 340 µg/Ncm for SO₂, respectively. Heavy metals concentrations (As, Cd, Cr⁺⁶, Pb, & Hg) in all stations are below the method's detection limit.

Table 2.3.2.2: Ambient Air Results

Sample ID Number	Station Number	CONCENTRATION, $\mu\text{g}/\text{Ncm}$		
		Total Suspended Particulates (TSP)	Sulfur Dioxide (SO_2)	Nitrogen Dioxide (NO_2)
16-08A101	1	17	30	20
16-08A102	2	21	37	21
16-08A103	3	18	23	13
16-08A104	4	98	24	20
DENR STANDARDS		300 $\mu\text{g}/\text{Ncm}$ / 1 hour	340 $\mu\text{g}/\text{Ncm}$ / 1 hour	260 $\mu\text{g}/\text{Ncm}$ / 1 hour

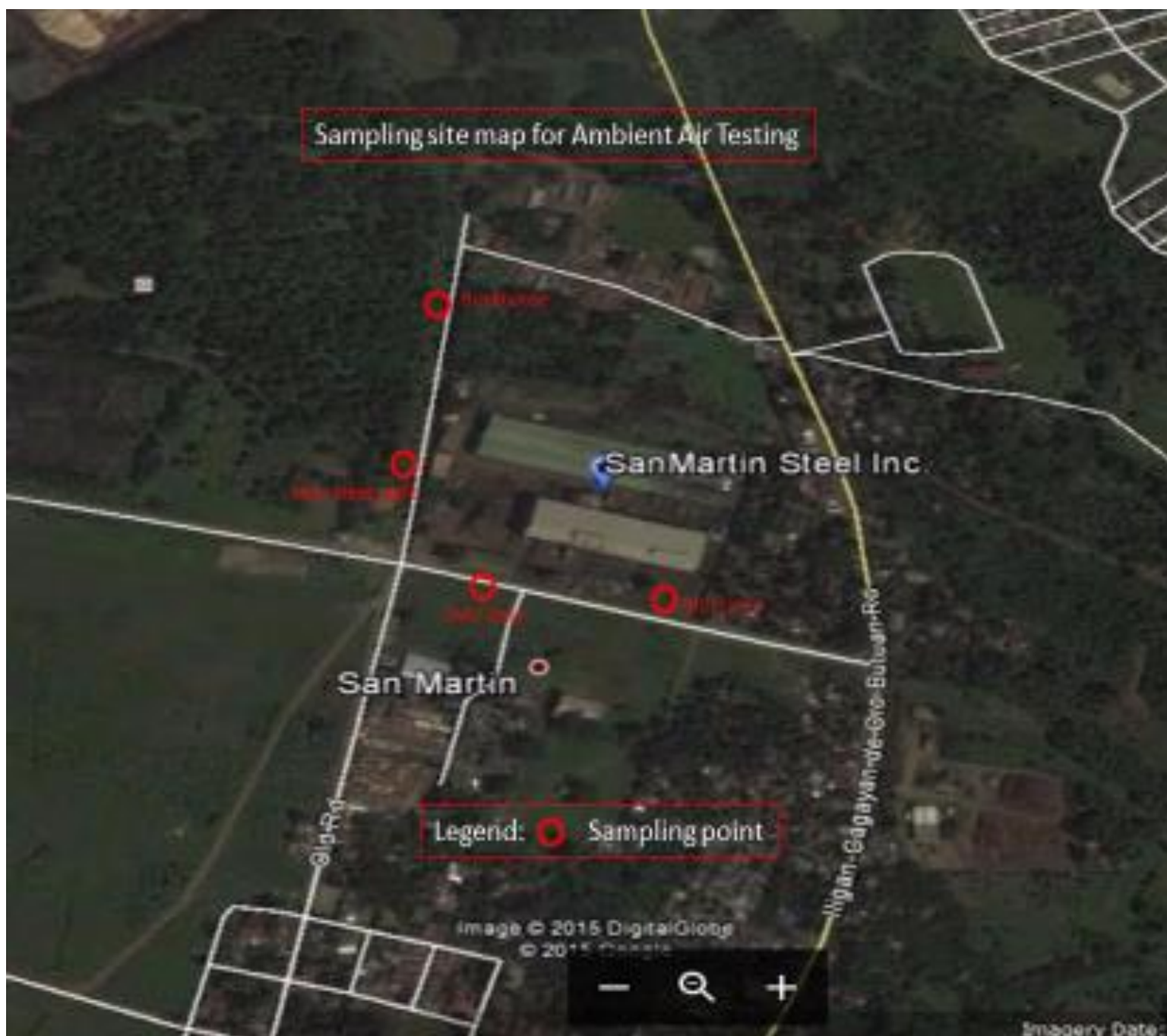


Figure 2.3.3: Sampling Map for Air

2.3.2.1.1 Impact Assessment and Mitigation

2.3.2.1.1.1 Construction Phase

Construction operations are significant source of dust emissions that may have a substantial temporary impact on local air quality. However, this emission source category is not applicable in this case because activities in this stage will be limited to upgrading and rehabilitation as the Plant is already constructed and existing.

2.3.2.1.1.2 Operation Phase

The Project will utilize oil as its primary fuel. This will be burned in the furnace unit in turn releases air pollutants which will cause significant impact on the environment. The following air pollutants and causes of emission are described below.

Most of the Oxides of Nitrogen (NO_x) formed during the combustion is the result of two oxidation mechanism: a) reaction of nitrogen in the combustion of air with excess oxygen at elevated temperatures, referred to as thermal NO_x , and b) oxidation of nitrogen that is chemically bound nitrogen in the fuel, referred to as fuel NO_x . The term NO_x refers to the composite of Nitric oxide (NO) and Nitrogen Dioxide (NO_2). Most of external fossil fuel combustion systems, emits about 95% of NO_x is in the form of nitric oxide (NO).

The formation of thermal NO_x is affected by four factors: (1) peak temperature; (2) fuel nitrogen concentration; (3) oxygen concentration and (4) time of exposure at peak temperature. The emission trends due to changes in these factors are generally consistent for all types of boilers: an increase in flame temperature, oxygen availability, and/or residence time at high temperatures leads to an increase in NO_x production.

Particulate emissions may be categorized as either filterable or condensable. Condensable particulate matter is material that is emitted in the vapor state which later condenses to form homogeneous and/or heterogeneous aerosol particles. The condensable particulate emitted from boilers is primarily inorganic in nature. Filterable particulate matter emissions depend predominantly on the grade of fuel fired. Combustion of lighter distillate oils result in significantly lower particulate matter formation than the combustion of heavier residual oils.

Sulphur oxides (SO_x) emissions are generated during oil combustion from the oxidation of sulphur contained in the fuel. The emission of SO_x from conventional combustion system is predominantly in the form of SO_2 . Uncontrolled SO_x emissions are almost entirely dependent on the sulphur content of the fuel and are not affected by furnace size, burner design, or grade of fuel being fired. On average, more than 95% of the fuel sulphur is converted to SO_2 , about 1 to 5% is further oxidized to sulphur trioxide (SO_3), and 1 to 3% is emitted as sulphate particulate.

The rate of carbon monoxide (CO) emissions from combustion sources depends on the oxidation efficiency of the fuel. By controlling the combustion process carefully, CO emissions can be minimized. Thus, if a unit is operated improperly or not well maintained, the resulting concentrations of CO (as well as organic compounds) may increase by several orders of magnitude. Smaller boilers, heaters, and furnaces tend to emit more of these pollutants than larger combustors. This is because smaller units usually have a higher ratio of heat transfer surface area to flame volume than larger combustors have; this leads to reduced flame temperature and combustion intensity and, therefore, lower combustion efficiency.

The presence of CO in the exhaust gas of combustion system results principally from incomplete fuel combustion. Several conditions can lead to incomplete combustion, including insufficient oxygen (O_2) availability; poor fuel/air mixing; cold-wall flame quenching; reduced combustion temperature; decreased combustion gas residence time; and load reduction (i.e., reduced combustion intensity). Since various combustion modifications for NO_x reduction can produce one or more of the above conditions, the possibility of increased CO emissions is a concern for environmental, energy efficiency and operational reasons.

Greenhouse gas specifically carbon dioxide (CO_2) is produced during fuel oil combustion. Nearly all of the fuel carbon (99%) in fuel is converted to CO_2 . This conversion is relatively independent of firing configuration. The majority of the fuel carbon not converted to CO_2 is due to incomplete combustion in the fuel stream.

Other pollutant that has significant impact to air quality is the emission of volatile organic compounds (VOC). The VOC emission will be generated from fuel handling and transfer of oil to storage day tanks.

Emission Assessment through Air Dispersion Modeling

1.0 INTRODUCTION

Project Background

San Martin Steel, Inc. bought from Elegant Chemical Alloy Corporation the existing Bar Rolling Mill Facilities and Deform Bar Manufacturing Plant. This project together with its facilities and auxiliaries has the following ECCs:

1. ECC 10(43)05- 04-18 3979-37121
2. ECC 10 (43)03 06-26 3294-37121

The proposed amendment will just increase its production capacity from 20,000 MTPY to 250,000 MTPY.

2.0 LOCAL SETTING

The Project is located inside the Phividec Industrial Estate, Brgy. San Martin, municipality of Villanueva, province of Misamis Oriental. The closest major population centre is Cagayan de Oro City, approximately 14 km to the southwest. The municipal hall of Villanueva municipality is also located approximately 3km northeast from the Project. The local terrain is dominated by flat cultivated coastal land which rises at 2% to 7% slope from 6 km to the east and southeast to steep mountains of approximately 17km to 45km to the east.

3.0 RELEVANT LEGISLATION AND ASSESSMENT CRITERIA

In assessing any project with significant air emissions, it is necessary to compare the impacts of the project with relevant air quality goals. Air quality standards or goals are used to assess the potential for ambient air quality to give rise to adverse health or nuisance effects.

3.1 The Philippine National Ambient Air Quality Guideline Values

Activities in environmental and natural resource management in the Philippines are guided by the following overarching policy frameworks:

- (i) 1977 Philippine Environmental Policy (Presidential Decree [PD] 1151);
- (ii) 1977 Environment Code (PD 1152);
- (iii) 1989 Philippine National Strategy for Sustainable Development; and
- (iv) 1996 National Action Plan for Sustainable Development.

The major legal instrument guiding air quality management is the Philippine Clean Air Act of 1999 and its Implementing Rules and Regulations DAO 2000-81 which lays down policies to mitigate air pollution, sets standards for vehicle owners and manufacturing industry, imposes/sets fines and penalties for violators of the law, and outlines the different programs to be implemented by the government and other sectors to manage air quality.

The Department of Environment and Natural Resources (DENR) is mandated to be the primary government agency responsible for air quality and functions as the policy-making and standard-setting body. The National Ambient Air Quality Guideline Values (NAAQGV) set the ambient air quality guidelines for the criteria pollutants in the Philippines (**Tables 1 and 2**). The DENR also issued a Departmental Administrative Order (DAO) setting a provisional NAAQGV for PM_{2.5} in 2013 which will be further tightened in 2016 to 50µg/m³ and 25µg/m³ for daily and annual PM_{2.5}. This standard is therefore provisional and not applicable to industries such as the Project.

Table 1. National Ambient Air Quality Guideline for Criteria Pollutants

Pollutants	Short Term			Long Term		
	µg/Ncm	ppm	Averaging Time	µg/Ncm	ppm	Averaging Time
Suspended Particulate Matter • TSP	230		24-hour	90		1-year

Pollutants	Short Term			Long Term		
	µg/Ncm	ppm	Averaging Time	µg/Ncm	ppm	Averaging Time
PM ₁₀	150		24-hour	60		1-year
Sulfur Dioxide	180	0.07	24-hour	80	0.03	1-year
Nitrogen Dioxide	150		24-hour			
Photochemical Oxidants as Ozone	140	0.07	1-hour			
	60	0.03	8-hour			
Carbon Monoxide	35 mg/Ncm	30	1-hour			
	10 mg/Ncm	9	8-hour			
Lead	1.5		3-months	1.0	1-year	

Source: Section 12 of RA 8749, Philippine Clean Air Act

Table 2. National Ambient Air Quality Standards for Source Specific Air Pollutants from Industrial Sources/Operations

Pollutants	Concentration		Averaging Time (min)	Methods of Analysis/Measurements
	ug/Ncm	ppm		
Ammonia	200	0.28	30	Nesslerization/ Indo Phenol
Carbon Disulfide	30	0.01	30	Tischer Method
Chlorine and Chlorine Compounds expressed as Cl ₂	100	0.03	5	Methyl Orange
Formaldehyde	50	0.04	30	Chromotropic Acid Method or MBTH Colorimetric Method
Hydrogen Chloride	200	0.13	30	Volhard Titration with Iodine Solution
Hydrogen Sulfide	100	0.07	30	Methylene Blue
Lead	20		30	AAS
Nitrogen Dioxide	375	0.20	30	Greiss-Saltzman
	260	0.14	60	
Phenol	100	0.03	30	4-Aminoantipyrine
Sulfur Dioxide	470	0.18	30	Colorimetric – Pararosaniline
	340	0.13	60	
Suspended Particulate Matter	300		60	Gravimetric
TSP	200		60	
PM ₁₀				

Source: Section 12 of RA 8749, Philippine Clean Air Act

4.0 EXISTING ENVIRONMENT

4.1 Regional Meteorology and Terrain

The Philippines has a tropical maritime climate. The country is exposed to the southwest monsoon, northeast monsoon, North Pacific Trades, Intertropical Convergence Zone, tail end of the cold front, easterly waves, the passage of tropical cyclones and the El Nino Southern Oscillation (ENSO) phenomenon.

Meteorology in the area surrounding the Project is affected by several factors such as terrain and land use. Wind speed and direction are largely affected by the coastal winds at the small scale. While factors such as synoptic scale winds which are modified by the dominant monsoon winds and valley drainage flows that develop during night hours, affect wind speed and direction on the larger scale.

The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) is the government agency that operates and maintains a network of meteorological stations throughout the Philippines. The closest PAGASA site to the Project that records meteorological data is at Lumbia, approximately 22km to the southwest of the Project. The meteorological data collected from the

PAGASA site includes 3-hourly records of temperature, humidity, barometric pressure, wind speed and wind direction. While the data cannot be used for modelling purposes because it is 3-hourly rather than hourly and the wind directions are measured to a 12.5 degree accuracy rather than 1 degree, it can be used for discussion of general regional meteorology. A range of data collected from this station in 2012 is provided in **Table 3**.

The data from **Table 3** show that the climate is characterized by warm temperatures and wet humid days. This is typical of the tropical maritime climate of the Philippines.

Table 3: Summary Statistics for Meteorological Data from the Lumbia Station, 2012

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Min Temp (°C)	20.0	23.0	21.0	22.0	22.0	22.0	22.0	22.0	21.0	21.0	22.0	22.0	20.0
Mean Temp (°C)	25.8	26.2	26.6	27.0	26.7	26.9	26.1	27.0	26.3	26.3	26.3	26.1	26.37
Max Temp (°C)	33.0	32.0	35.0	34.0	34.0	36.0	33.0	36.0	34.0	33.0	33.0	33.0	36.0
Min RH (%)	49	50	37.0	48.0	50.0	37.0	10.0	37.0	10.0	10.0	50.0	10.0	10.0
Mean RH (%)	81	83	76.4	76.8	79.3	76.7	82.0	75.9	79.5	79.9	80.8	82.0	79.28
Max RH (%)	100	100	97.0	99.0	99.0	98.0	99.0	98.0	98.0	98.0	99.0	99.0	100
Min WS (m/s)	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean WS (m/s)	1.6	1.8	2.2	2.0	2.2	2.2	1.6	1.6	1.5	1.7	1.5	1.6	1.77
Max WS (m/s)	5.0	10	65.52	56.28	60.5	60.5	6.05	8.06	8.06	60.5	4.0	6.1	65.52
No. of Rainy Days	13	17	9	10	15	15	24	15	18	14	12	14	180

METEOROLOGICAL DATA

WIND ROSE DIAGRAMS

The meteorological data used is from PAGASA meteorological station located at Lumbia, approximately 24 kilometers South East of the plant as shown in Figure 1.

WRplot ver. 5.9 windrose plotter gives prevailing wind direction at 97.55 % occurs frequently between 0.5 to 2.1 m/s tends both North and South directions. The frequency distribution of wind direction occurs predominantly at 50.8 % from the southwest (348.75 to 11.25 degrees*) while 32.6 % from the (168.75 to 191.25*).

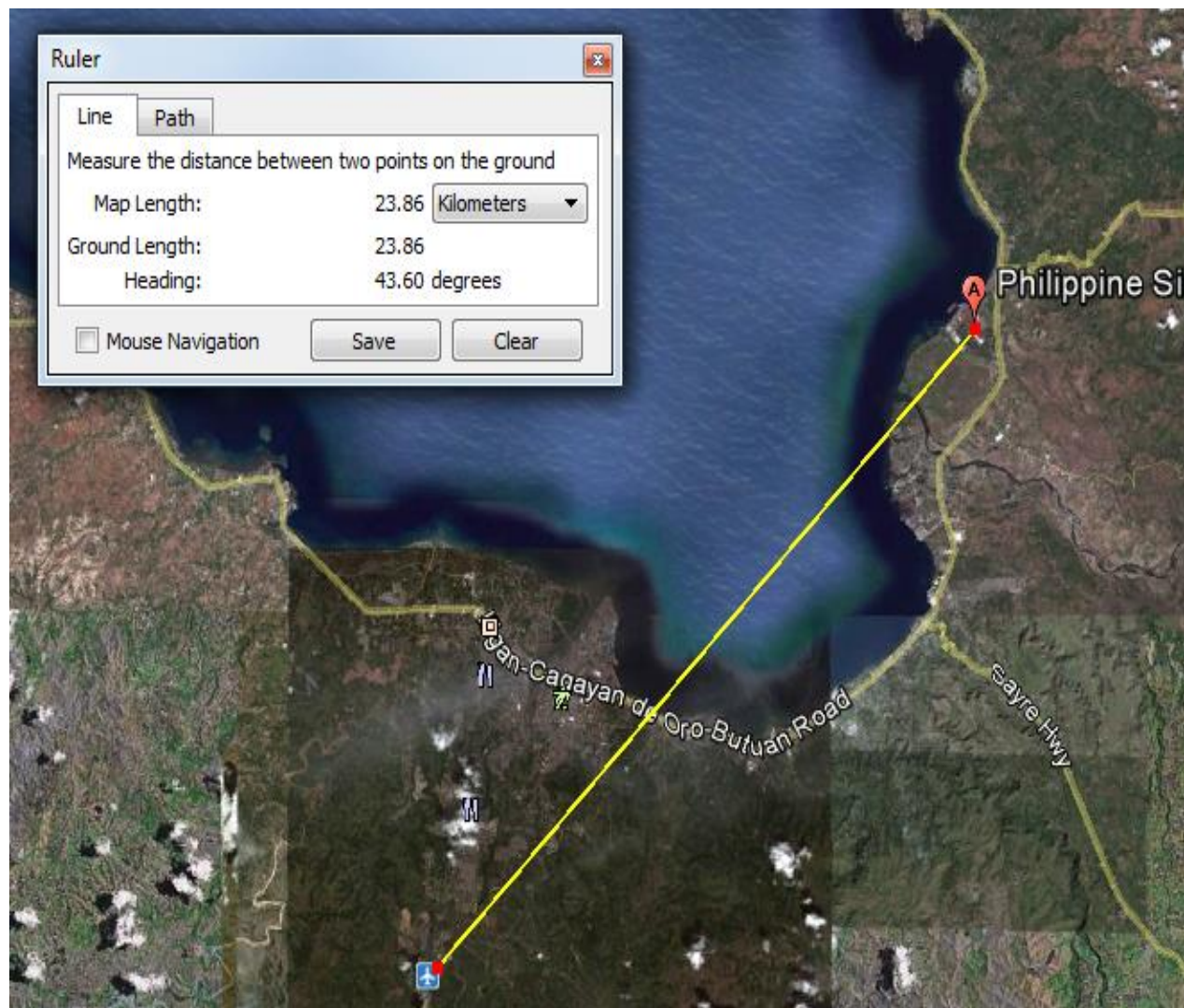


Figure 1: Aerial view of PHILVIDEC and Lumbia Airport (Meteorological Data Source) with a ruler distance

The wind rose for the Lumbia site is provided in Figure 2. Overall, the wind roses indicate that there is a prevailing wind direction from the north (i.e. the sea) and lighter winds from the south (or inland).

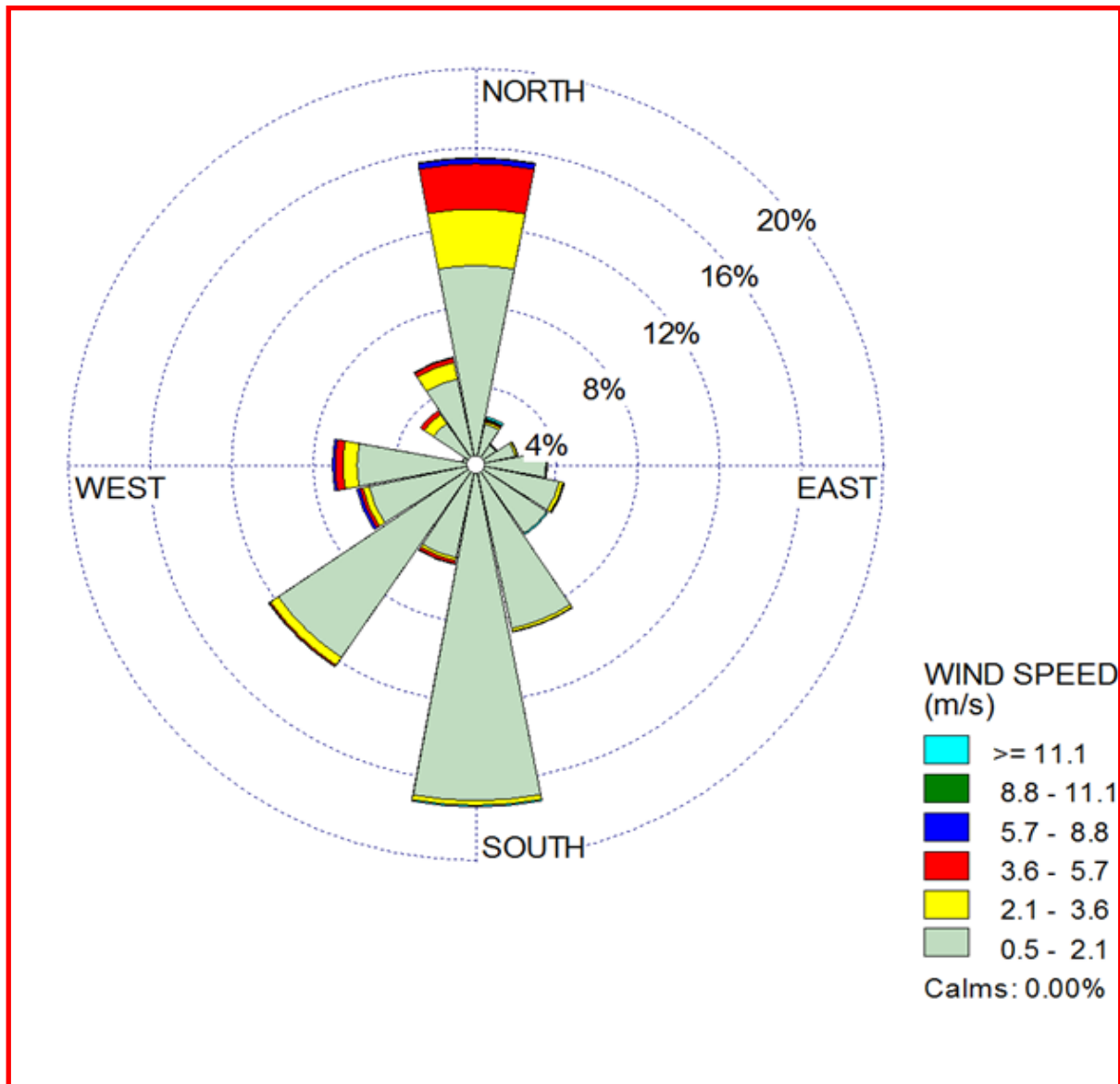


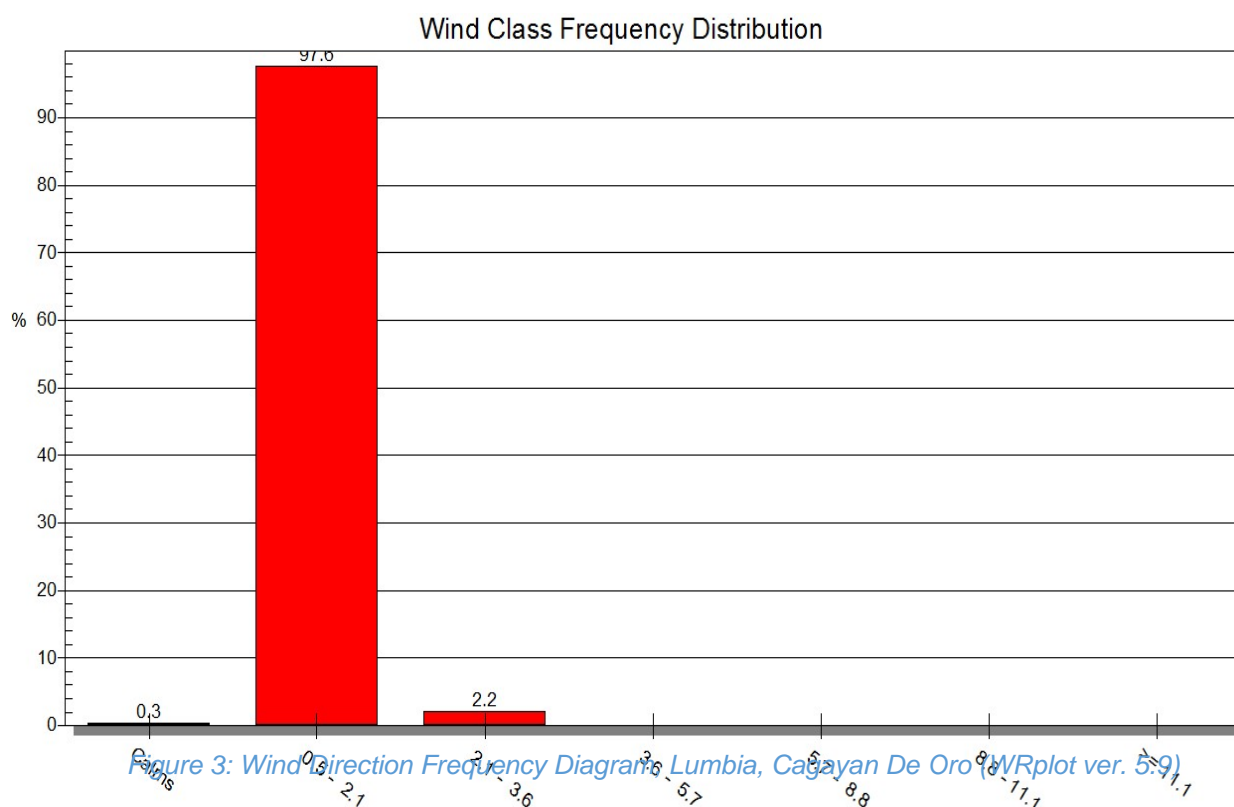
Figure 2: Windrose at Lumbia Station

Table 4 and Figure 3 below show the Wind Direction Frequency Diagram from Lumbia in Cagayan De Oro (WRplot ver. 5.9).

Table 4: Wind Direction Frequency Diagram, Lumbia, Cagayan De Oro (WRplot ver. 5.9)

	Directions / Wind Classes (m/s)	0.5 - 2.1	2.1 - 3.6	3.6 - 5.7	5.7 - 8.8	8.8 - 11.1	>= 11.1	Total
1	348.75 - 11.25	0.49185	0.01630	0.00000	0.00000	0.00000	0.00000	0.50815
2	11.25 - 33.75	0.04076	0.00000	0.00000	0.00000	0.00000	0.00000	0.04076
3	33.75 - 56.25	0.05978	0.00000	0.00000	0.00000	0.00000	0.00000	0.05978
4	56.25 - 78.75	0.00272	0.00000	0.00000	0.00000	0.00000	0.00000	0.00272
5	78.75 - 101.25	0.01630	0.00000	0.00000	0.00000	0.00000	0.00000	0.01630
6	101.25 - 123.75	0.00815	0.00000	0.00000	0.00000	0.00000	0.00000	0.00815
7	123.75 - 146.25	0.01359	0.00000	0.00000	0.00000	0.00000	0.00000	0.01359
8	146.25 - 168.75	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
9	168.75 - 191.25	0.32065	0.00543	0.00000	0.00000	0.00000	0.00000	0.32609
10	191.25 - 213.75	0.00272	0.00000	0.00000	0.00000	0.00000	0.00000	0.00272
11	213.75 - 236.25	0.00543	0.00000	0.00000	0.00000	0.00000	0.00000	0.00543
12	236.25 - 258.75	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
13	258.75 - 281.25	0.00272	0.00000	0.00000	0.00000	0.00000	0.00000	0.00272
14	281.25 - 303.75	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
15	303.75 - 326.25	0.00272	0.00000	0.00000	0.00000	0.00000	0.00000	0.00272
16	326.25 - 348.75	0.00815	0.00000	0.00000	0.00000	0.00000	0.00000	0.00815
	Sub-Total	0.97554	0.02174	0.00000	0.00000	0.00000	0.00000	0.99458
	Calms							0.00
	Missing/Incomplete							0.00
	Total							1.00

* Reference bearing CW 90°



Wind direction was oriented in "Blowing from" configuration. In Figure 4 below, wind rose diagram shows frequency distribution of wind direction and wind speed blowing predominantly towards the Northern and Southern directions.

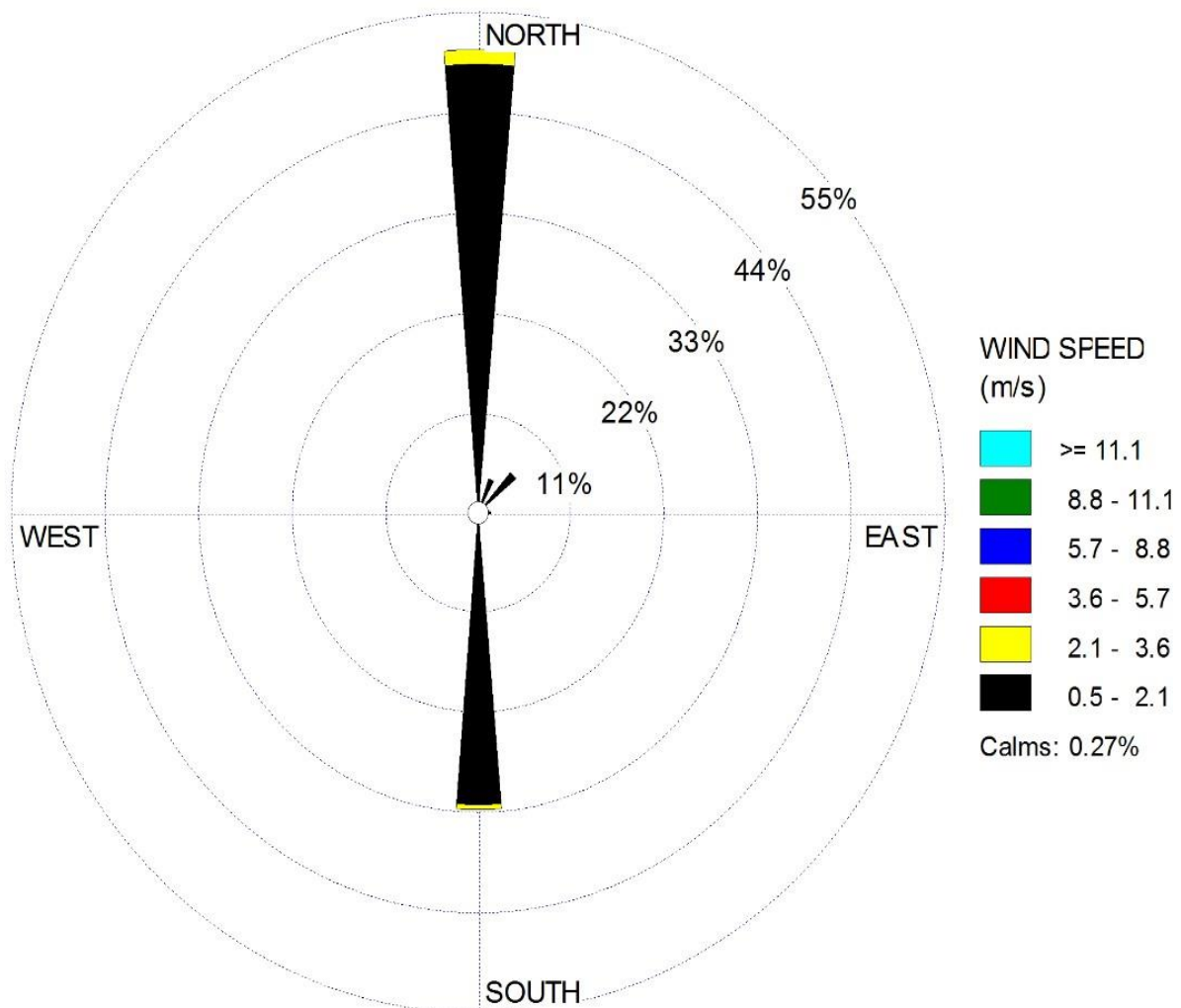


Figure 4: Annual Wind Rose Diagram, Lumbia, CDO PAGASA (Station 747)

5.0 AIR MODELING

5.1 MODELING METHODOLOGY

Air dispersion models use mathematical and numerical techniques to simulate physical and chemical processes that affect air pollutants as they disperse and reach the atmosphere. Several factors impact the fate and transport of pollutants in the atmosphere including meteorological conditions, site configuration, emission release characteristics, surrounding terrain, among others.

Modeling Approach

The Environmental Management Bureau, Memorandum Circular 2008-03 "Guidelines for Air Dispersion Modeling" uses a tiered approach in assessing air contaminants concentrations against the Clean Air Act (CAA of 1999) air quality guidelines and standard. The tiered approach follows the US Environmental Protection Agency that includes:

- Screening-level dispersion modeling techniques conducted using worst-case input data rather than site-specific data, and
- Refined level dispersion modeling techniques conducted using site specific meteorological data or derived regional meteorological data.

A fundamental assumption of the tiered approach to model selection is that the simpler modeling techniques always yielded more conservative results. It is assumed that screening level models would always predict higher ground-level concentrations than refined modelling

techniques, and that the refined models would predict higher impacts than the 'best-estimate' models¹.

Plot Plan

The source subject for this modeling is the furnace flue stacks (FFS). Figure 5 is the general plant lay-out of the facility showing the location of the emission source. This was just used for purposes of modeling.



Figure 5: Plant Layout and Location of stack of Steel Asia

Figure 6 shows the Figure 5: 10km X 10 Km Domain of SanMartin Steel. The center is the stack located in UTM 694950.00 m E, 947095.00 m N.

¹MC 2008-003 "Guidelines on Air Dispersion Modeling", December 2008

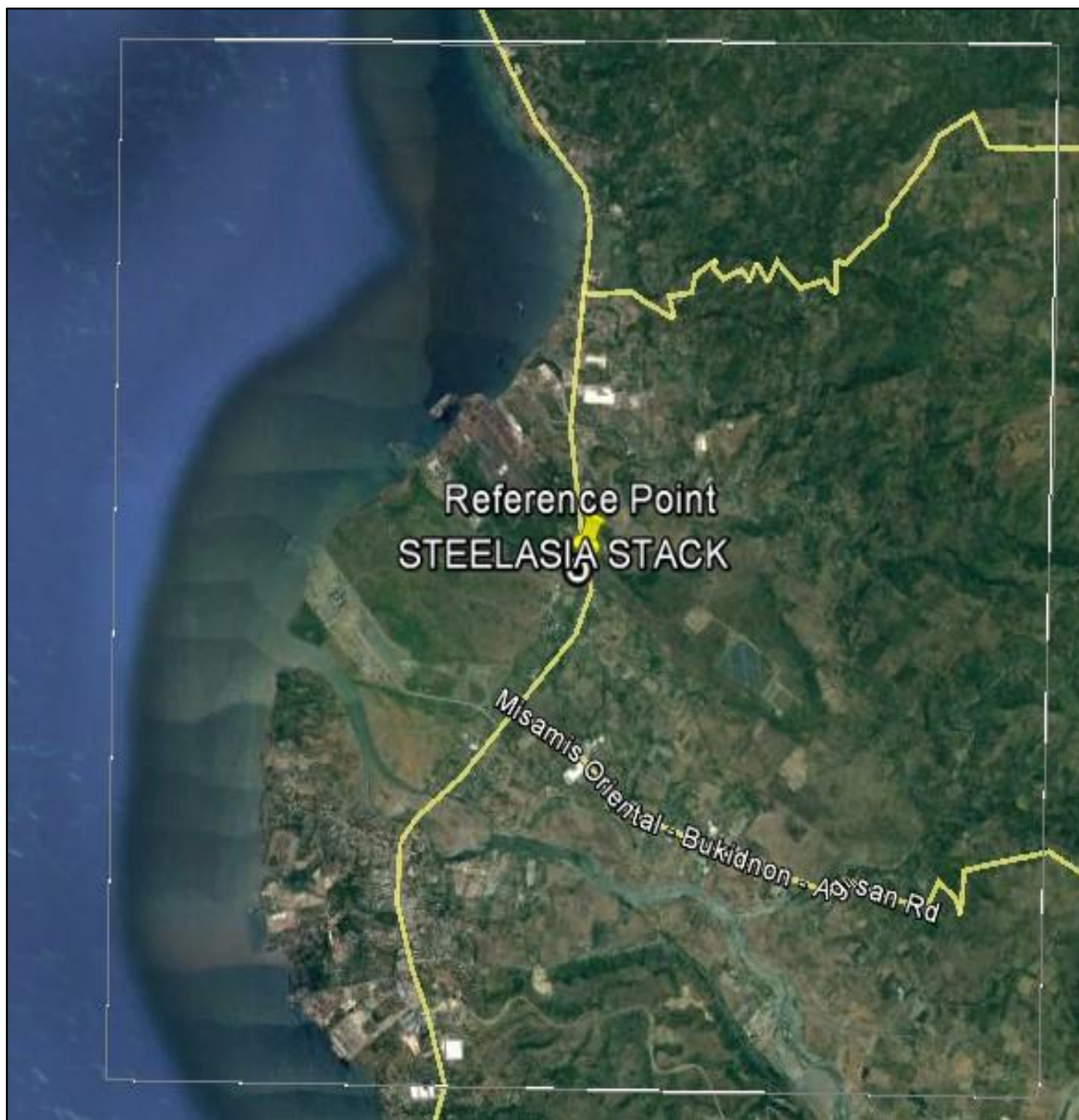


Figure 6: 10km X 10 Km Domain of SMSI (Center Stack location: UTM 694950.00 m E, 947095.00 m

Area Sensitive Receptors (ASRs)

There are 15 area sensitive receptors identified within the domain. The description, distance from the source, and geographical coordinates of these receptors are listed in the table below.

Coordinates of Air Sensitive Receptors (ASRs)

RECEPTOR	LOCATION		BARANGAY
ASR 1	695080.00 m E 8°35'5.48"N	949406.00 m N 124°46'21.34"E	Brgy. Poblacion 2 Villanueva, Misamis Oriental
ASR 2	695609.00 m E	948210.00 m N	Brgy. Katipunan Villanueva, Misamis Oriental

	8°34'26.47"N	124°46'38.46"E	
ASR 3	695479.00 m E 8°34'0.91"N	947424.00 m N 124°46'34.09"E	Brgy. Tambobong Villanueva, Misamis Oriental
ASR 4	696693.00 m E 8°34'12.22"N	947777.00 m N 124°47'13.84"E	Brgy. Dayawan Villanueva, Misamis Oriental
ASR 5	694979.00 m E 8°33'33.09"N	946567.00 m N 124°46'17.61"E	Brgy. San Martin Villanueva, Misamis Oriental
ASR 6	693896.00 m E 8°32'41.11"N	944965.00 m N 124°45'41.96"E	Brgy. Sta. Cruz Tagoloan, Misamis Oriental
ASR 7	692501.00 m E 8°32'25.66"N	944484.00 m N 124°44'56.28"E	Brgy. Poblacion Tagoloan, Misamis Oriental
ASR 8	693489.00 m E 8°31'50.63"N	943412.00 m N 124°45'28.42"E	Brgy. Natumolan Tagoloan, Misamis Oriental
ASR 9	698393.00 m E 8°32'9.19"N	944005.00 m N 124°48'8.85"E	Brgy. Sta Ana Tagoloan, Misamis Oriental
ASR 10	694911.00 m E 8°35'55.66"N	950947.00 m N 124°46'16.05"E	Villa Mila Subd. Aplaya, Jasaan, Misamis Oriental

Modeling Input

Emission Sources and Rates

The source subject for this modeling is the furnace flue stack. There is no associated air pollution control equipment to be installed in the reheating furnace. The scenario considered is the operation of the furnace under normal condition.

The emission rates used in the modeling for each parameter are from the Project design emission guarantee.

Table 5: Summary of Source Parameters

Parameter	Unit	Flue Stack
Coordinates		
Easting (x)	m	610138
Northing (y)	m	1155515
Elevation (z)	m	9
Fuel consumption rate	L/yr	34,800,000
Operating hours	h/yr	6,600
Fuel Sulfur content	%	3.0
Flue gas volumetric flow rate	Nm ³ /s	80,000
Flue gas velocity	m/s	3.6
Flue gas exit temperature	°C	350
Stack height	m	35
Stack exit diameter	m	2.8
Pollutant Emission Rate		
TSP	g/s	1.7554
PM ₁₀	g/s	1.0532
SO ₂	g/s	82.6772
NO ₂	g/s	9.6545
CO	g/s	0.8777

Source: San Martin Steel, 2017

The modeling emission rates are calculated and adjusted to the stack conditions using USEPA Methods of Sampling. Method 5 for the Determination of Particulate Matter from Stationary Sources; Method 6

for the Determination of Sulfur Dioxide Emissions from Stationary Sources; Method 7 for the Determination of Nitrogen Oxides from Stationary Sources; and Method 10 for the Determination of Carbon Monoxide Emission from Stationary Sources.

Equations used to adjust the emission at stack conditions are provided below.

Equation 1:

$$Q_a = 60 \times V_s \times A_s$$

Where:

Q_a = volumetric flow rate of wet flue gas, (m³/min)

V_s = flue gas velocity, (m/s)

A_s = area of stack, (m)

Equation 2:

$$Q_s = 60 \times M_{fd} \times V_s \times A_s \times (T_{std}/T_s) \times (P_s/P_{std})$$

Where:

Q_s = volumetric flow rate of dry flue gas at standard condition, (scm/min)

M_{fd} = moisture content of flue gas, (%)

V_s = flue gas velocity, (m/sec)

A_s = area of stack, (m)

T_{std} = standard temperature, (°C)

T_s = stack temperature, (°C)

P_s = stack gas pressure, (mm-Hg)

P_{std} = standard pressure, (mm-Hg)

Equation 3:

$$P_{mr} = 0.00006 \times Q_s \times P_{conc}$$

Where:

P_{mr} = pollutant mass rate, (kg/hr)

Q_s = volumetric flow rate of flue gas, (m³/min)

P_{conc} = pollutant concentration, (mg/Ncm)

Conversion of Nitrogen Oxides to Nitrogen Dioxides

Nitrogen oxides are produced in most combustion processes and are formed during the oxidation of nitrogen in the fuel and nitrogen in the air. During high-temperature processes a variety of nitrogen oxides are formed including nitric oxide (NO) and NO₂. Generally, at the point of emission NO will comprise the greatest proportion of the emission with 95% by volume of the NO_x. The remaining 5% will be mostly NO₂.

The oxidation of NO to NO₂ can be assessed by various methods. In this modelling study, a conservative assumption that 100% of NO_x emitted is converted to NO₂ is used.

RESULTS

Assumptions used in the above equations are moisture content of flue gas at 8%; standard temperature of 298 K; and standard pressure of 760 mmHg.

Modeling Result

The predicted peak 1-hour and 24-hour emissions of TSP, PM₁₀, SO₂, NO₂, and CO in all scenarios are within the CAA limit. The highest GLC of all modeled parameters falls at 4200 meters from the point source of emission. The highest GLCs predicted were for sulfur dioxide followed by nitrogen dioxide of the sources. Considering that the model was configured to calculate conservative GLCs, adverse effects at the discrete receptors during normal operations is highly unlikely.

Provided in Table 6 is the Table of Results for all parameters while Table 7 shows the Maximum Ground Level Concentrations (GLCs).

Table 6: Table of Modeling Results for all parameters

CO - Concentration - Source Group: ALL								
Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)
1-HR	1ST	15.22818	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
1-HR	2ND	15.22818	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
24-HR	1ST	2.75064	ug/m ³	695150.00	951895.00	130.00	0.00	482.00
24-HR	2ND	2.74881	ug/m ³	695150.00	951895.00	130.00	0.00	482.00

NO2 - Concentration - Source Group: ALL								
Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)
1-HR	1ST	167.56203	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
1-HR	2ND	167.56203	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
24-HR	1ST	30.26641	ug/m ³	695150.00	951895.00	130.00	0.00	482.00
24-HR	2ND	30.24636	ug/m ³	695150.00	951895.00	130.00	0.00	482.00

PM - Concentration - Source Group: ALL								
Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)
1-HR	1ST	30.38690	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
1-HR	2ND	30.38690	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
24-HR	1ST	5.48673	ug/m ³	695150.00	951895.00	130.00	0.00	482.00
24-HR	2ND	5.48509	ug/m ³	695150.00	951895.00	130.00	0.00	482.00

PM10 - Concentration - Source Group: ALL								
Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)
1-HR	1ST	18.23214	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
1-HR	2ND	18.23214	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
24-HR	1ST	3.29324	ug/m ³	695150.00	951895.00	130.00	0.00	482.00
24-HR	2ND	3.29105	ug/m ³	695150.00	951895.00	130.00	0.00	482.00

SO2 - Concentration - Source Group: ALL								
Averaging Period	Rank	Peak	Units	X (m)	Y (m)	ZELEV (m)	ZFLAG (m)	ZHILL (m)
1-HR	1ST	1435.12976	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
1-HR	2ND	1435.12976	ug/m ³	697150.00	946895.00	128.40	0.00	627.00
24-HR	1ST	259.22476	ug/m ³	695150.00	951895.00	130.00	0.00	482.00
24-HR	2ND	259.05307	ug/m ³	695150.00	951895.00	130.00	0.00	482.00

Table 7: Table of Maximum Ground Level Concentrations (GLCs)

PARAMETER	AVERAGING TIME	Distance	Direction	CONC	Standard/GV
	Hours	meters		ug/NCm	ug/NCm
TSP	1	2209.072	W	30.3	300

	24	5385.165	N	5.48	230
PM10	1	2209.072	W	18.23	200
	24	5385.165	N	259.2	150
CO	1	2209.072	W	15.22	35 mg/Ncm
	8	5385.165	N		10 mg/Ncm
NO2	1	2209.072	W	167.56	260
	24	5385.165	N	30.2	150
SO2	1	2209.072	W	143.5	180
	24	5385.165	N	25.9	340

TOTAL SUSPENDED PARTICULATES (TSP)

Predicted short term (1 hour) for controlled Total Suspended Particulates (TSP) maximum ground level concentrations is 30.3ug/Ncm located at 2,209 meters west (W) from stack of the furnace of steel plant. All of TSP concentrations are within the 1 hour averaging standard of 300 ug/Ncm. Other significant concentrations range from 5 to 28.0 ug/Ncm are all within the standards. Simulated concentrations for maximum ground level concentration for 1 hour TSP is generally below (100 % in compliance) the National Ambient Air Quality Standards for Source Specific Air Pollutants of 300 ug/Ncm.

On the other hand, for 24 hour averaging time, result of the Model run shows that Maximum TSP concentration of 5.48ug/Ncm located at 5,385 meters North (N) from stack of the furnace of steel plant. All simulated concentrations were in compliance under the 24 hour standards under the National Guideline Values of 230 ug/Ncm

PARTICULATE MATTER (PM 10)

Predicted short term (1 hour) for controlled Total Suspended Particulates (TSP) maximum ground level concentrations is 18.23v/Ncm located at 2,209 meters west (W) from stack of the furnace of steel plant. Simulated concentrations for maximum ground level concentration for 1 hour TSP is generally below (100 % in compliance) the National Ambient Air Quality Standards for Source Specific Air Pollutants of 200 ug/Ncm.

On the other hand, for 24 hour averaging time, result of the Model run shows that Maximum TSP concentration of 259 ug/Ncm located at 5,385 meters North (N) from stack of the furnace of steel plant. All simulated concentrations were in compliance under the 24 hour standards under the National Guideline Values of 230 ug/Ncm

CARBON MONOXIDE (CO)

Predicted short term (1 hour) for Carbon Monoxide (CO) maximum ground level concentrations is 15.22 ug/Ncm located at 2,209 meters west (W) from stack of the furnace of steel plant. All of TSP concentrations are within the 1 hour averaging standard of 300 ug/Ncm. All simulated concentrations were in compliance under the 1 hour standards under the National Guideline Values of 35 mg/Ncm.

NITROGEN OXIDES

Predicted short term (1 hour) for Nitrogen Oxides (NOx) maximum ground level concentrations is 143 ug/Ncm located at 2,209 meters west (W) from stack of the furnace of steel plant. All simulated concentrations were in compliance under the 1 hour standards under the National Guideline Values of 260mg/Ncm.

On the other hand, for 24 hour averaging time, result of the Model run shows that maximum ground level concentrations is 30.2 ug/Ncm located at 5,385 meters North (N) from stack of the furnace of steel plant.. All simulated concentrations were in compliance under the 24 hour standards under the Guideline Values of 150 mg/Ncm.

SULFUR OXIDES

Predicted short term (1 hour) for Sulfur Oxides (SOx) maximum ground level concentrations located at 143.5 meters west (W) from stack of the furnace of steel plant. All simulated concentrations were in compliance under the 1 hour standards under the National Guideline Values of 340 mg/Ncm.

On the other hand, for 24 hour averaging time, result of the Model run shows that maximum ground level concentrations is 25.9 ug/Ncm located at 5,385 meters North (N) from stack of the furnace of steel plant. All simulated concentrations were in compliance under the 24 hour standards under the Guideline Values of 180 mg/Ncm.

TERRAIN FILE

Provided below is the terrain file generated in the modeling.

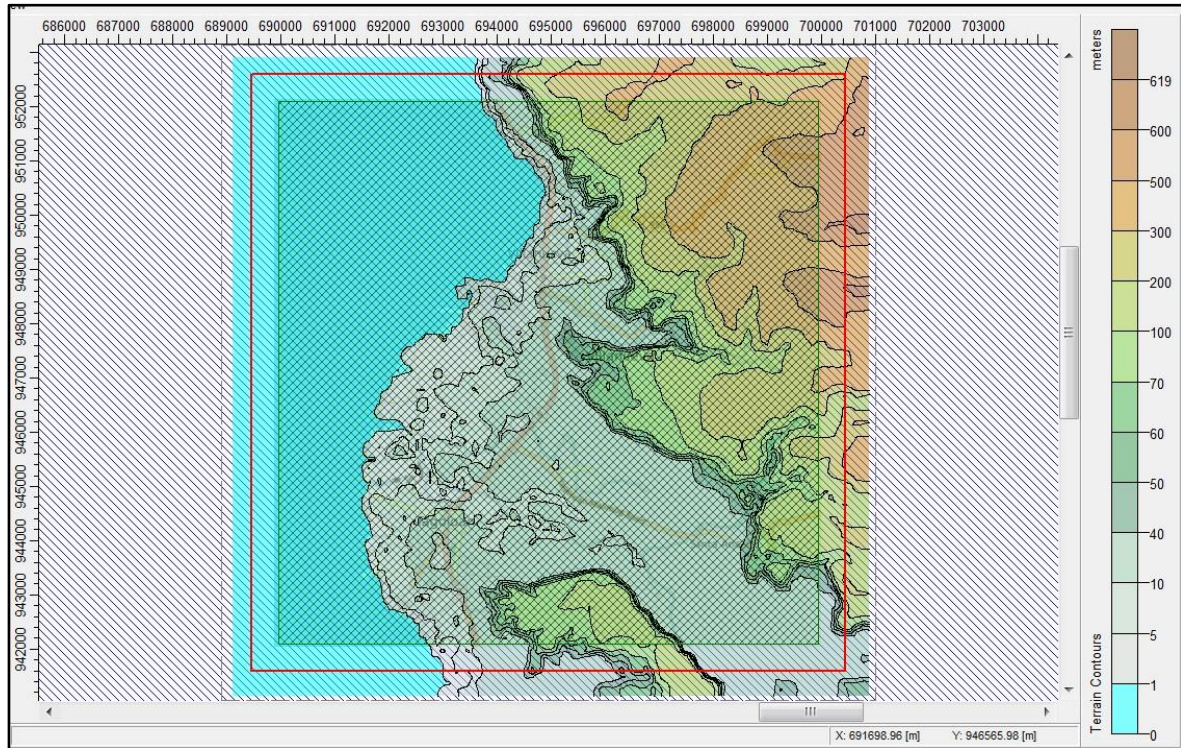


Figure 7: Terrain File generated



Figure 8: Terrain File Overlay (SRTM)



Figure 9: TSP 1 HR ISOPHLET



Figure 10: TSP 24 HR ISOPHLET



Figure 11: PM10 1 HR ISOPHLET



Figure 11: PM10 24 HR ISOPHLET



Figure 12: CO 1 HR ISOPHLET

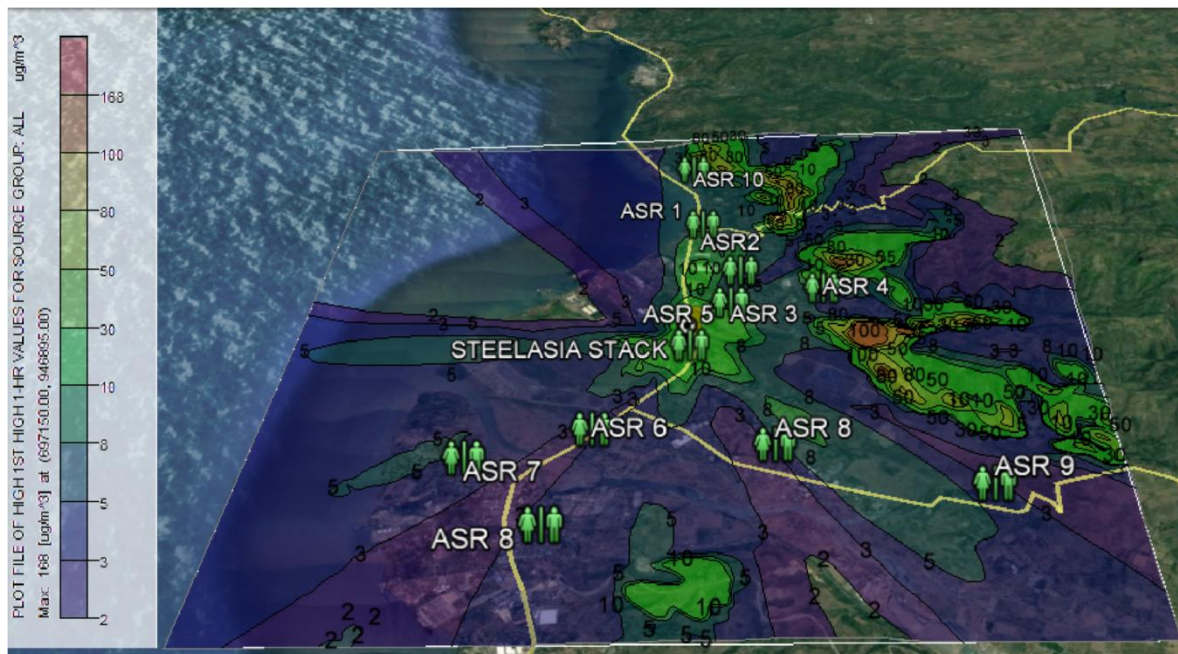


Figure 13: NO2 1 HR ISOPHLET



Figure 14: NO2 24 HR ISOPHLET



Figure 15: SO2 1 HR ISOPHLET

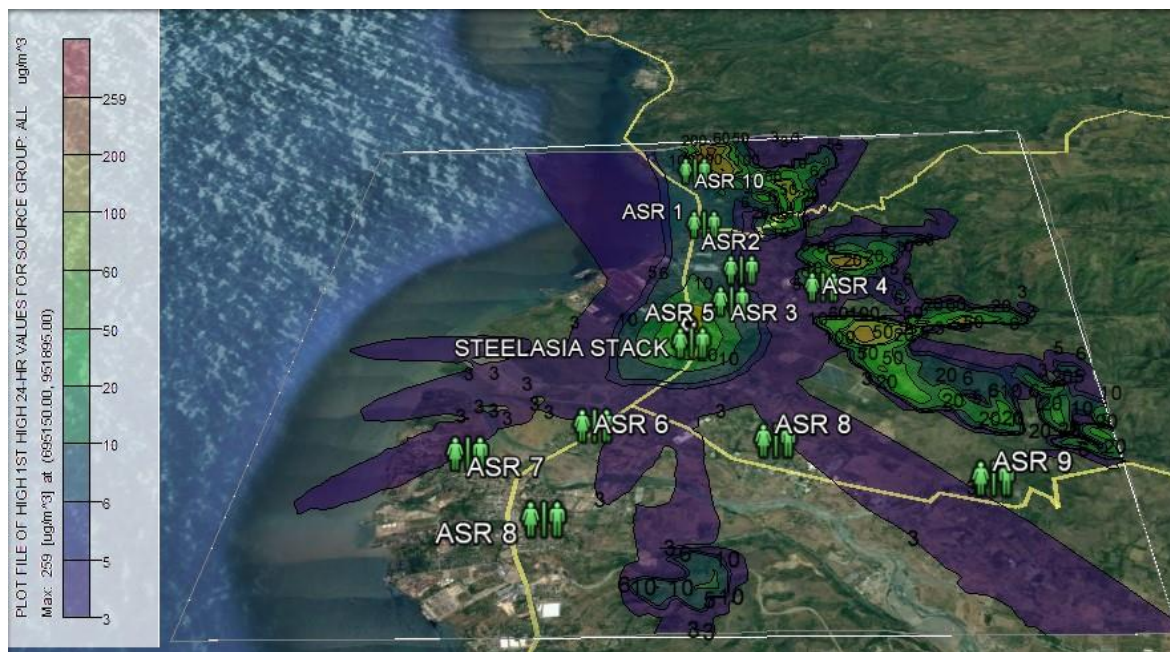


Figure 16: SO₂ 24 HR ISOPHLET

The Air Dispersion Modeling Inputs are provided in Annex F.

Management and Mitigation Measures

Environmental Control Equipment

The following mitigation and control measures are presented in detail to establish the capabilities of each equipment to lessen, control and prevent emission of criteria pollutants into the receiving environment.

Low NO_x Burner

Low NO_x Burners (LNB) limit NO_x formation by controlling the stoichiometric and temperature profiles of the combustion process in each burner zone. The unique design of features of an LNB may create: (i) reduced oxygen level in the combustion zone to limit fuel NO_x formation; (ii) a reduced flame temperature that limits thermal NO_x formation; and/or (iii) a reduced residence time at peak temperature which also limits thermal NO_x formation.

LNBs are applicable to tangential and wall-fired boilers of various sizes but are not applicable to other boiler types such as cyclone furnaces or stokers. They have been used as a retrofit NO_x control for existing boilers and can achieve approximately 35 to 55 percent reduction from uncontrolled levels. LNBs can be combined with OFA to achieve even greater NO_x reduction (40 to 60% reduction from uncontrolled levels).

Recuperator System

A recuperator is a special purpose counter flow energy recovery heat exchanger positioned within the supply and exhaust air streams of an air handling system in order to recover the waste heat.

SMSI will utilize recuperator in order to save energy, fuel and time from their operation. It will also reduce emissions such as CO₂, SO₂ and other gases emissions formed during the combustion of fossil fuel.

Emission Monitoring System

The furnace flue stack will be provided with a complete set of emission monitoring system. The basis for the installation of monitoring system will be the DAO 2007-22 "Guidelines on the requirements for continuous emission monitoring systems and other acceptable protocols, thereby modifying and clarifying certain provisions of Section 5, Rule X of DAO 2000-81 and other related provisions".

Section 3 of DAO 2007-22 states that a) new and modified sources with potential to emit at least 750 tons per year for each applicable pollutant listed in Section 4, Rule IX of DAO 2000-81 must install

CEMS for that parameter; b) all sources with potential to emit more than 100 tons per year but less than 750 tons after the air pollution control installation may utilize a PEMS.

In this regard, the plant's utilization of emission monitoring system either CEMS or PEMS will depend on the results of actual source emission test to be conducted once the plant is in operation. The result of the actual source testing will determine if the plant's emission rate will have exceeded the 750 tons/year of any regulated pollutants for the installation of CEMS or below the 750 tons/year but more than 100 tons/year of any regulated pollutants for the installation of PEMS.

2.3.3 Increase in ambient noise level

2.3.3.1 Baseline Environmental Condition

The main sources of noise and vibration will be the vehicle movement during the hauling of spareparts and materials needed for optimization and of billets for plant operations. The noise will be short term noise.

Noise level measurement was conducted in four (4) sampling locations outside the project site and its vicinity. The measured noise level from the established stations is used to represent the baseline data of the project. The noise monitoring stations are provided below.

Station 1: Behind parking area, outside Steel Asia Premise;

8° 20' 5.9820" N 124° 27' 58.5360" E

Station 2: Infront of bunkhouse;

8° 20' 7.5552" N 124° 28' 6.8520" E

Station 3: Near Casino residence;

8° 20' 9.2508" N 124° 28' 8.6880" E

Station 4: Vacant lot outside San Martin Steel;

8° 20' 9.2580" N 124° 27' 40.6764" E

Provided in the Tables below are the Noise Level Measurement Results for 1 hour during daytime, 1-Hour Noise Sampling During Day Time towards Evening (afternoon), 1-Hour Noise Sampling During Nighttime and: 1-Hour Noise Sampling in the Morning.

Table 2.3.3.1.1: 1-Hour Noise Sampling During Day Time

Location	Noise Level (dBA)	DENR STANDARD Maximum Allowable Noise Level dBA,	Remarks
Behind parking area, outside Steel Asia Premise; 8° 20' 5.9820" N 124° 27' 58.5360" E	56.1	Class "D" Heavy Industrial Area Classification (day time) 75	Within
Infront of bunkhouse; 8° 20' 7.5552" N 124° 28' 6.8520" E	51.2	Class "D" Heavy Industrial Area Classification (day time) 75	Within
Near Casifio residence; 8° 20' 9.2508" N 124° 28' 8.6880" E	52.3	Class "A" Residential Area Classification (day time) 55	Within
Vacant lot outside San Martin Steel; 8° 20' 9.2580" N 124° 27' 40.6764" E	51.2	Class "D" Heavy Industrial Area Classification (day time) 75	Within

Noise level measurements were conducted for 1-Hour sampling duration and recorded in decibels (dBA).

The noise level measurements recorded for the four (4) stations are all within the allowable limit as compared with the DENR Ambient Noise Quality Standards Section 78 Chapter IV, article 1 of NPCC Rules and Regulations 1978 standard limit for Class "D" for Heavy Industrial Area Classification (evening) and for Class "A" for Residential Area Classification (evening).

Persons exposed with source of noise above the maximum level must be equipped with Personal Protective Equipment (PPE). It must be emphasized that individual measurements are conducted during a certain point of time. It must not be considered a universal condition of the area or process involved.

Noise level measurements were conducted for 1-Hour sampling duration and recorded in decibels (dBA).

The noise level measurements recorded for the four (4) stations are all within the allowable limit as compared with the DENR Ambient Noise Quality Standards Section 78 Chapter IV, article 1 of NPCC Rules and Regulations 1978 standard limit for Class "D" for Heavy Industrial Area Classification (day time) and for Class "A" for Residential Area Classification (day time).

Persons exposed with source of noise above the maximum level must be equipped with Personal Protective Equipment (PPE). It must be emphasized that individual measurements are conducted during a certain point of time. It must not be considered a universal condition of the area or process involved.

Table 2.3.3.2: 1-Hour Noise Sampling During Day Time towards Evening (afternoon)

Location	Noise Level (dBA)	DENR STANDARD Maximum Allowable Noise Level dBA,	Remarks
Behind parking area, outside Steel Asia Premise; 8° 20' 5.9820" N 124° 27' 58.5360" E	52.4	Class "D" Heavy Industrial Area Classification (day time) 75	Within
Infront of bunkhouse; 8° 20' 7.5552" N 124° 28' 6.8520" E	51.8	Class "D" Heavy Industrial Area Classification (evening) 70	Within
Near Casino residence; 8° 20' 9.2508" N 124° 28' 8.6880" E	49.4	Class "A" Residential Area Classification (evening) 50	Within
Vacant lot outside San Martin Steel; 8° 20' 9.2580" N 124° 27' 40.6764" E	51.2	Class "D" Heavy Industrial Area Classification (evening) 70	Within

Table 2.3.3.3: 1-Hour Noise Sampling During Nighttime

Location	Noise Level (dBA)	DENR STANDARD Maximum Allowable Noise Level dBA,	Remarks
Behind parking area, outside Steel Asia Premise; 8° 20' 5.9820" N 124° 27' 58.5360" E	47.9	Class "D" Heavy Industrial Area Classification (night time) 65	Within
Infront of bunkhouse; 8° 20' 7.5552" N 124° 28' 6.8520" E	47.4	Class "D" Heavy Industrial Area Classification (night time) 65	Within
Near Casino residence; 8° 20' 9.2508" N 124° 28' 8.6880" E	49.7	Class "A" Residential Area Classification (night time) 45	Exceeded
Vacant lot outside San Martin Steel; 8° 20' 9.2580" N 124° 27' 40.6764" E	47.4	Class "D" Heavy Industrial Area Classification (night time) 65	Within

Table 2.3.3.4: 1-Hour Noise Sampling in the Morning

Location	Noise Level (dBA)	DENR STANDARD Maximum Allowable Noise Level dBA,	Remarks
Behind parking area, outside Steel Asia Premise; 8° 20' 5.9820" N 124° 27' 58.5360" E	49.8	Class "D" Heavy Industrial Area Classification (morning) 70	Within
Infront of bunkhouse; 8° 20' 7.5552" N 124° 28' 6.8520" E	50.9	Class "D" Heavy Industrial Area Classification (morning) 70	Within
Near Casiño residence; 8° 20' 9.2508" N 124° 28' 8.6880" E	51.9	Class "A" Residential Area Classification (morning) 55	Within
Vacant lot outside San Martin Steel; 8° 20' 9.2580" N 124° 27' 40.6764" E	51.7	Class "D" Heavy Industrial Area Classification (morning) 70	Within

Provided below is the sampling site map for air and noise.

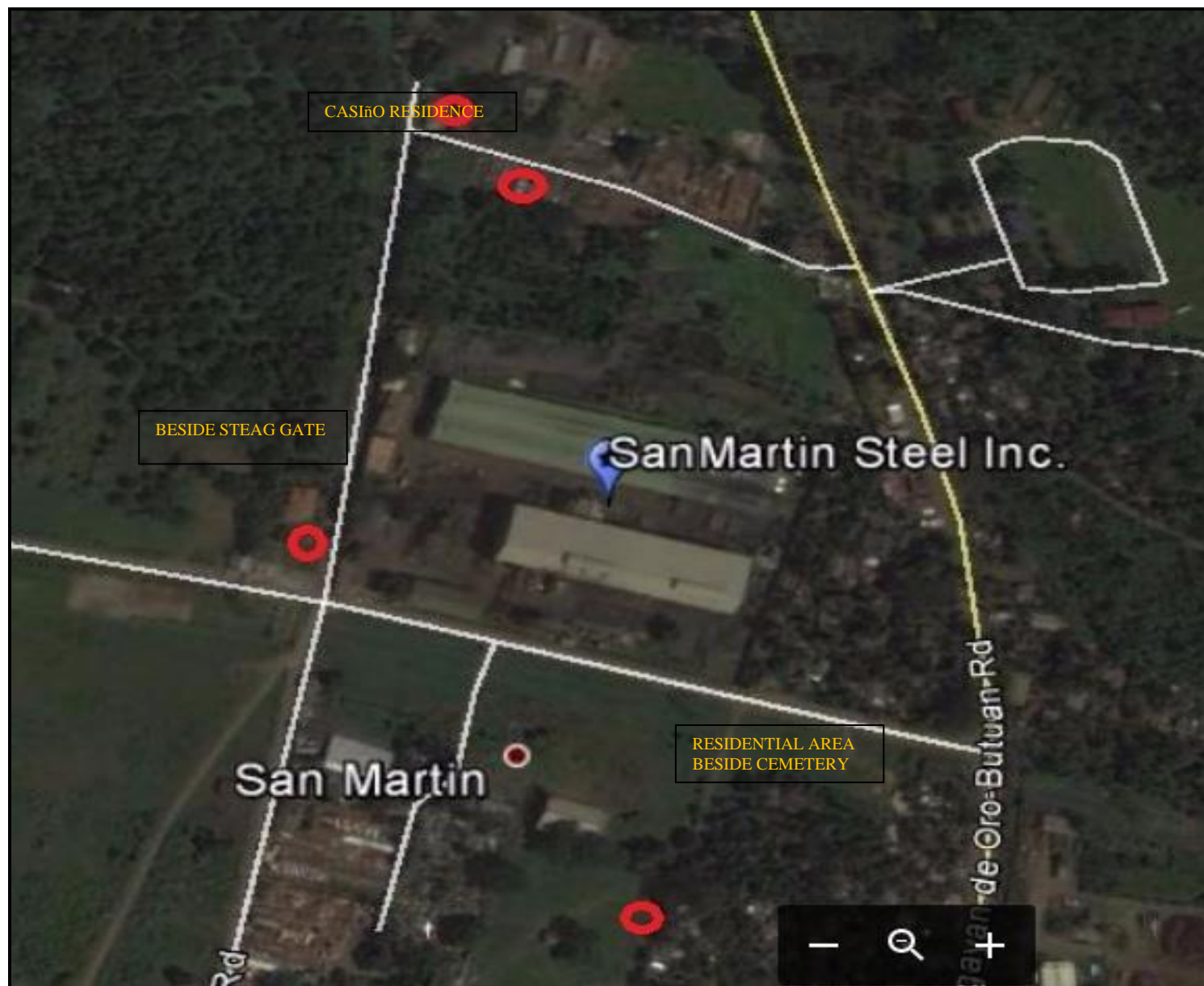


Figure 7: Air and Noise Sampling Site Map

2.3.3.2 Impact Assessment and Mitigation

2.3.3.2.1 Construction Phase - NA

2.3.3.2.2 Operation Phase

Quantitative Analysis

The sound power level during operation was assumed to be at steady state base load and bypass operations and will not consider following activities:

- Commissioning phase;
- Failure conditions;
- Emergency conditions; and
- Other abnormal operating conditions.

The sound power levels derived/anticipated for each equipment item identified during the operation of the rolling mill were based on the given equipment noise data/sizes/dimensions extracted from a previous project. The list of power mechanical equipment during operation is presented in Table 2.3-28. However, it is advised that the detailed design should be updated to reflect equipment data whenever the design changes.

Table 2.3.3.2.1: Equivalent PWL of Power Mechanical Equipment for Operation Phase

Power Mechanical Equipment	PWL, dB(A)
Reheating Furnace	90
Rolling Mill	90
Twin Finishing Blocks	95

Source: SteelAsia Manufacturing

The total estimated sound power level for the operational equipment is 96 dB(A) from the data listed above.

The total power level takes into account assumed maximum numbers of equipment and an assumed 'on-time' for the equipment, that is, period in percentage terms during which the equipment will be operating. The operational activities are predicted to be its worst case scenario where 24-hour operation. CUSTIC software predict a continuous operation where it simulated continuously for 24-hours.

Modeling Input Data

The following input data were used to execute the noise simulation for the operation of rolling mill project:

- Internal source such as rolling mill, roller mill, compressors or any other noise source placed inside of a building.
- Noise power (dB): This is the noise power at source position in decibels.
- Ambient Data: Ambient conditions are defined by the land and atmospheric conditions in the vicinity of the pollutant emission.
- Terrain – the data will use to draw topographical lines.
- Scale command – Use to set the scale in the X-axis width (in meters)

The Scale use for the model is 500 m x 500 m grid which is a scale view of CUSTIC 2.0. The following assumptions were made to execute the model:

Ambient Temperature - 25°C

Relative Humidity – 90%

Frequency – 500 Hz

The modeling guidelines used is the Technical Memorandum on Noise of Hongkong Environmental Protection Department, Noise Control Authority. Noise levels should be summed in a pairwise fashion and the final total rounded to the nearest whole dB(A), with values of 0.5 or more being rounded up.²

Table 7 shows the summation of noise levels. The summed noise assumed to be at the centre of the project area.

Table 2.3.3.2.2: Summation of Noise Levels

Difference in dB(A) Between Two Noise Levels Being Summed	Amount in dB(A) to Add to the Higher Noise Level
0 to 0.5	3.0
1.0 to 1.5	2.5
2.0 to 3.0	2.0
3.5 to 4.5	1.5
5.0 to 7.0	1.0
7.5 to 12.0	0.5
More than 12.0	0

Source: Technical Memorandum on Noise, Hongkong Environmental Protection Department

The total power level takes into account assumed maximum numbers of equipment and an assumed 'on-time' for the equipment, that is, period in percentage terms during which the equipment will be operating.

² Technical Memorandum on Noise, Hongkong Environmental Protection Department, Noise Control Authority, January 1996

Noise Prediction

Noise prediction for was derived using CUSTIC 2.0 modeling software. CUSTIC 2.0 is capable of executing predicted noise contours showing sound pressure as it moves away from the source.

Noise Sensitive Receivers (NSRs)

Noise sensitive receiver can be defining as those locations or areas where dwelling units or other fixed, developed sites frequent human use occur (FHWA).

Modeling Input Data

The following input data were used to execute the noise simulation during the optimization phase of the project:

- External source: External means a noise source placed out of a building (for example, a vehicle engine).
- Noise power (dB): This is the noise power at source position in decibels.
- Ambient Data: Ambient conditions are defined by the land and atmospheric conditions in the vicinity of the pollutant emission.
- Terrain – the data will use to draw topographical lines.
- Scale command – Use to set the scale in the X-axis width (in meters)

The Scale use for the model is 500 m x 500 m grid which is a scale view of CUSTIC 2.0. The following assumptions were made to execute the model:

Ambient Temperature - 25°C

Relative Humidity – 90%

Frequency – 500 Hz

Noise Modeling Results

The predicted noise levels in all sensitive receivers for the improvement of the plant are all below the noise condition during daytime, morning/evening and night time. Therefore, the noise contribution is not expected to cause any significant noise impacts to the surrounding environment.

Management and Mitigation Measures

The need for the following measures should be considered during the improvement activities of the Plant:

- Scheduling certain high noise emitting works to more acceptable times of day;
- Use of the most environmentally acceptable equipment which is properly maintained and silenced;
- Use of the least intrusive method of work;
- Proper instruction and supervision of staff; and
- Acoustic screening.

The following are the noise control measures that will be applied for the protection of employees working on site as well as the nearest sensitive receptor:

- It is advisable that electrically powered plant should be preferred, where practicable, to mechanically powered alternatives. If mechanical powered plant will be used, it should be fitted with suitable silencers and mufflers;
- Defective equipment/parts with abnormal noise and/or vibration will be either repaired replaced;
- Schedule use of equipment/machines emitting high noise like pile driver during day time operation while, minimize use during night time operation;
- All employees working on site will be provided with proper ear protectors;
- During truck transport along or beside the residential area, traffic transportation will be limited during night operation; and

The Contractor shall at all times comply with all current statutory environmental legislation.

Operation Phase

Quantitative Analysis

The sound power level during operation was assumed to be at steady state base load and bypass operations and will not consider following activities:

- Commissioning phase;
- Failure conditions;
- Emergency conditions; and

- Other abnormal operating conditions.

The sound power levels derived/anticipated for each equipment item identified during the operation of the rolling mill were based on the given equipment noise data/sizes/dimensions extracted from a previous project. The list of power mechanical equipment during operation is presented in Table 2.3-28. However, it is advised that the detailed design should be updated to reflect equipment data whenever the design changes.

Table 2.3.3.2.3: Equivalent PWL of Power Mechanical Equipment for Operation Phase

Power Mechanical Equipment	PWL, dB(A)
Reheating Furnace	90
Rolling Mill	90
Twin Finishing Blocks	95

Source: SteelAsia Manufacturing

The total estimated sound power level for the operational equipment is 96 dB(A) from the data listed above.

The total power level takes into account assumed maximum numbers of equipment and an assumed 'on-time' for the equipment, that is, period in percentage terms during which the equipment will be operating. The operational activities are predicted to be its worst case scenario where 24-hour operation. CUSTIC software predict a continuous operation where it simulated continuously for 24-hours.

Management and Mitigation Measures

It is clearly important to limit the noise emission of all major noise sources in the production area for both environmental and occupational reasons. The specific noise limit to be placed on an individual item of equipment may be dictated by either the on-plant requirements or by the boundary noise limit, depending on the source size, location and elevation.

Providing the majority of the equipment complies with the relevant equipment noise specifications, noise levels on-plant should meet the 85 dBA limit and noise levels at all boundaries would then be expected to meet the DENR and DOLE requirements.

It is important therefore to ensure that appropriate noise limits are specified within the equipment tender documents and that guarantees are obtained for all major equipment. A detailed noise control study should be carried out as part of the detailed design of the rolling mill to ensure that appropriate limits and noise control measures are incorporated.

Moreover, predicted noise levels are high within the radius of the plant premises which may bring negative impact to workers because of excessive noise. Therefore; it is recommended that personnel protection of workers should be provided and it is necessary to carry out the planned protective measures systematically. The stated measures include (i) controlling the noise level inside the rolling mill and the surrounding inhabited areas; (ii) reducing the noise in individual plants and machines; (iii) applying acoustic protection by setting physical barriers or enclosures and applying personal protection instruments of the employees in the mine.

Protective panels, as physical barriers should be used as an additional measure for protecting the settlement from noise along with the envisaged green belt. The effect of the panel is momentary reduction of noise emitted towards the settlement until the designed green belt has reached functional age. In terms of protection from emitted noise, the panels as movable structures follow the progression of the activities.

Protective measures for reducing the negative impacts of noise on the working and living environment include the following:

- The engines of the equipment should be equipped with silencers, maintained in proper condition and used in accordance with the manufacturer's recommendations in order to prevent the creation of excessive noise;
- If the noise level in the surrounding settlements exceeds legally allowed values, barriers should be set – sound protection panels for the reduction of noise;

- If it is practically possible and feasible, noise sources should be enclosed, which directly depends on the source nature;
- It is necessary to provide the equipment for protecting the hearing of the machines operators from the harmful consequences of excessive noise; and
- Planting a green belt around the plant, especially in the part where the level of noise in the vicinity of an inhabited place is the highest.
- Defective equipment/parts with abnormal noise and/or vibration will be either repaired or replaced.

2.4 PEOPLE

2.4.1 Impact Area

Demography

Provided below is the population of San Martin per barangay sourced from the website of the Philippine Statistics Authority as of August 1, 2015. The impact area is the host barangay, Brgy. San Martin.

Table 2.4.1.1: Population of Barangays in Villanueva, Misamis Oriental

Municipality and Barangay	Total Population
VILLANUEVA	39,378
Balacanas	2,524
Dayawan	6,702
Katipunan	5,655
Kimaya	1,100
Poblacion 1	2,539
San Martin	6,924
Tambobong	6
Imelda ^k	3,391
Looc	4,238
Poblacion 2	2,355
Poblacion 3	3,944

Source: Philippine Statistics Authority as of August 2015

Brgy. San Martin, Villanueva is the direct impact area.

Ten Leading Causes of Morbidity and Mortality for 2013, 2014 and 2015

Morbidity

Shown in Table 2. 4.1.2 is the Ten Leading Causes of Morbidity and Mortality for 2013, 2014 and 2015. The most notifiable disease is the Upper Respiratory Tract Infection (URTI) with an increase of more than 100% in 2015 compared to year 2014. Other diseases like Hypertension, Pulmonary Tuberculosis, Wound, Animal Bite, Dengue, Diabetes Mellitus, and Systemic Viral Infection have also increased compared from the previous years. There is a drop in number of cases of Acute Gastroenteritis and Urinary Tract Infection in 2014 but slowly increased in 2015. Dengue on the other hand, gradually grows to almost 100% from 2014 to 2015.

Table 2.4.1.2: Ten Leading Causes of Morbidity for 2013, 2014 and 2015

CAUSE	Number of Morbidity Cases		
	2013	2014	2015
Acute Respiratory Tract Infection	1,189	1,029	2,916
Wounds	83	97	359
Hypertension	85	83	199
Dengue	41	48	80
Acute Gastroenteritis	265	72	135
Skin Diseases	128	126	263
Urinary Tract Infection	291	67	110
Pulmonary Tuberculosis	65	79	91
Abdominal Pain	123	175	210
Diabetes Mellitus	87	101	195
Animal Bites	47	62	71
Systemic Viral Infections	25	41	56
TOTAL	2,429	1,980	4,685

Mortality

Table 2.4.1.3 shows the leading causes of mortality for 2013, 2014 and 2015. These are heart disease, hypertension, accidents, cancer, COPD, renal disease, sepsis, liver cirrhosis, diarrheal diseases, and birth injury. Non-communicable diseases are complications of lifestyle-related diseases such as hypertension, diabetes and cancer which could have been prevented if early regular check-up and compliance to prescribed medications are appropriately followed. Sepsis sets in usually because of delay in seeking care and poor defiance to antibiotic medications.

Table 2.4.1.3: Ten leading Causes of Mortality for 2013, 2014 and 2015

Cause and Number of Deaths					
2013	No.	2014	No.	2015	No.
1. Heart Disease	33	1. Heart Disease	43	1. Heart Disease	62
2. Hypertension	8	2. Accidents	9	2. Hypertension	12
3. Accidents	6	3. Hypertension	7	3. Accidents	7
4. Cancers	6	4. COPD	5	4. COPD	4
5. COPD	6	5. Pneumonia	5	5. Cancer	3
6. Renal Disease	6	6. Bronchial Asthma	4	6. Sepsis	3
7. Sepsis	5	7. Diabetes Mellitus	4	7. Liver Cirrhosis	2
8. Liver Cirrhosis	3	8. Cancer	3	8. Tuberculosis	2
9. Diarrheal Disease	1	9. Systemic Viral Infection	2	9. Diabetes	2
10. Birth Injury	1	10. Birth Injury	1	10. Pneumonia	1

Indigenous Peoples and Informal Settlers

There are no indigenous people nor informal settlers in the project area.

Household Survey

Perception survey was conducted in January 2017. A total of 1079 respondents were randomly interviewed and surveyed, which corresponds to 20% of the estimated population of Brgy. San Martin according to the Philippine Statistics Authority.

Survey Questions

Questions in the survey covered the following:

- Name
- Age
- Gender
- Address
- Occupation
- Monthly income
- Religious affiliation
- Civil status
- Educational attainment
- Number of family members
- Place of work
- Number of years earning income
- Length of stay in the area
- Intention to out-migrate
- Type of House
- Type of Toilet
- Source of Drinking Water
- Kinds of kitchen utensils
- Kinds of appliances
- Illnesses experienced
- Occurrence of calamities
- Garbage Disposal
- Perception about the Current Environmental Conditions
- Awareness on the Project
- Impacts of Increase in Capacity: Positive and Negative
- Perception and attitude towards the Project

Perception Survey Result

SOCIO PROFILE

Demographic Characteristics

Among the respondents, 497 are males and the majority 592 are females. A total of 177 respondents were laborer/skilled, 130 were self-employed, 22 respondents were drivers, another 60 respondents (10.08%), 79 respondents were Government Employees, 5 elected officials, 130 have other types of occupation, 10 did not provide their response and the remaining 497 respondents are jobless.

For the respondents' monthly income, 325 respondents (54.62%) answered to be earning between Php 1,000-5,000. 130 respondents (21.85%) earn a monthly income of Php 5,001-10,000 while 140 respondents (23.53%) obtains a monthly salary of Php 10,001-above.

Among the respondents, majority are Catholic (94.12%), 30 respondents (5.04%) are Protestants while 5 respondents (0.84%) have other Religion.

In terms of civil status, 445 respondents (74.79%) are married, 125 respondents (21.01%) are single, 20 respondents (3.36%) are widowed while the remaining 5 respondents (0.84%) are living together (live-in).

66 households (55.46%) have a family size between 2-5 persons. 46 households (38.66%) answered the range between 6-10 persons while 7 households (5.88%) have 11-15 persons in their family. According to the survey, all respondents and households are residents of San Martin.

In terms of the types of houses, 46 households (38.66%) are concrete, 44 households (36.97%) are made of nipa, bamboo, 27 (22.69%) mixed concrete, and 2 (1.68%) are salvage material. Roofs of these houses are made of steel roof (yero) (45.95%), concrete (35.14%), nipa, and bamboo (17.57%) and salvage material (1.35%).

For the households' method of cooking and fuel, majority (49.25%) uses wood, other households use LPG/Butane (34.33%), 9 households (6.72%) use charcoal, another 9 households (6.72%) use kerosene while the remaining 4 households (2.99%) use electric stove.

In terms of their sources of water, 112 households (40.73%) acquires water from artesian well, 112 households (40.73%) use purified water. 45 households (16.36%) obtains water from the water district while the remaining 6 households (2.18%) get water from deep wells. Most households use water for

drinking/cooking (49.58%) as well as washing (49.58%) while 2 households (0.83%) use water for farming.

88 households (25.36%) have television sets in their homes, 82 households (23.63%) have electric fans, 68 households (19.60%) possesses radio, 58 households (16.71%) owns a CD/DVD player, 28 households (8.07%) have computers while 23 households (6.63%) owns airconditioners.

Majority of the respondents (57.03%) do not own any vehicle but 175 respondents (27.34%) own motorcycle, 60 respondents (9.38%) have bicycles, 30 respondents (4.69%) holds a car (sedan), 5 respondents (0.78%) owns a van/jeepney and the remaining 5 respondents (0.78%) answered the others option. Note: Multiple responses

Health situation, Environmental awareness and Utilities

Each 119 households had a sick family member for the past years and all consulted a doctor although there are multiple responses for this question. The top three causes of illness in the area are Fever/Headache (44.55%), Cough/Flu (39.55%), and Diabetes/Highblood (15.45%), one household (0.45%) answered the others option.

In terms of toilet facilities, 115 households (93.50%) have water closet toilets while 8 households (6.50%) have an open pit toilet.

All 595 respondents (100%) experienced Calamity for the last 10 (ten) years.

PERCEPTION:

580 respondents (97.48%) are aware of the project while 15 respondents (2.52%) are not. Majority of the respondents (28.57%) got informed thorough Barangay/Municipal Officials, 195 respondents (24.22%) acquired information from the neighbors, 160 respondents (19.88%) attended the public scoping and barangay consultation, 60 respondents (7.45%) heard the project from the Project employees, 30 respondents (3.73%) got informed through the media and 130 respondents (16.15%) answered the others option.

Perceived Positive Effects from the Project

270 respondents (39.42%) believed that the project will generate employment for the local residents, 240 respondents (35.04%) believed there will be increase in the revenue of San Martin LGU, 70 respondents (10.22%) thought of assistance thru community projects, 60 respondents (8.76%) said the project can prompt industrialization in the community, 30 respondents (4.38%) believed that community solidarity will be shaped while 15 respondents (2.19%) posted no answer.

Perceived Negative Effects of the Project

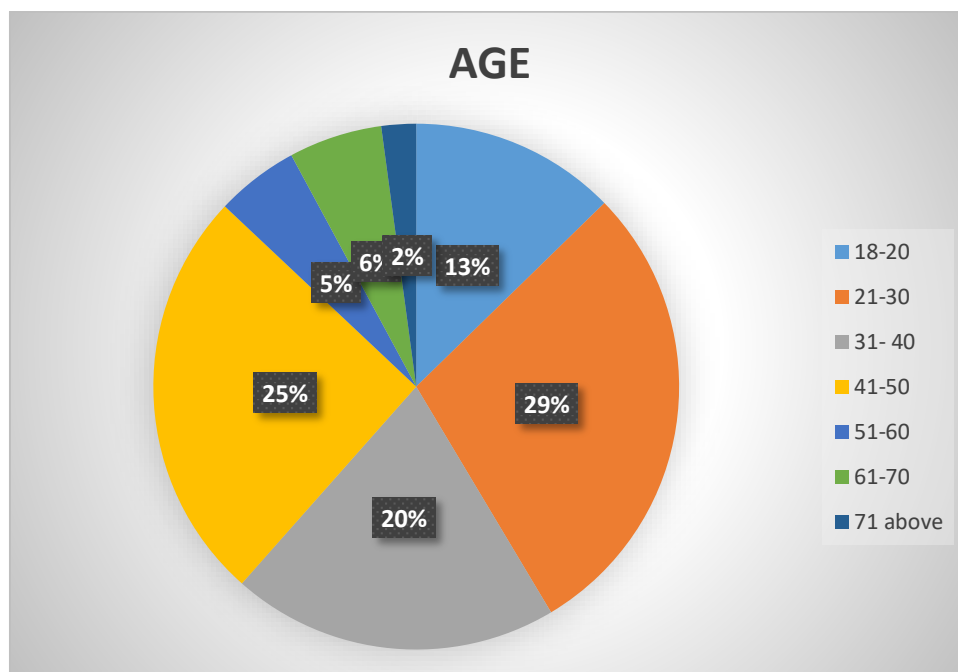
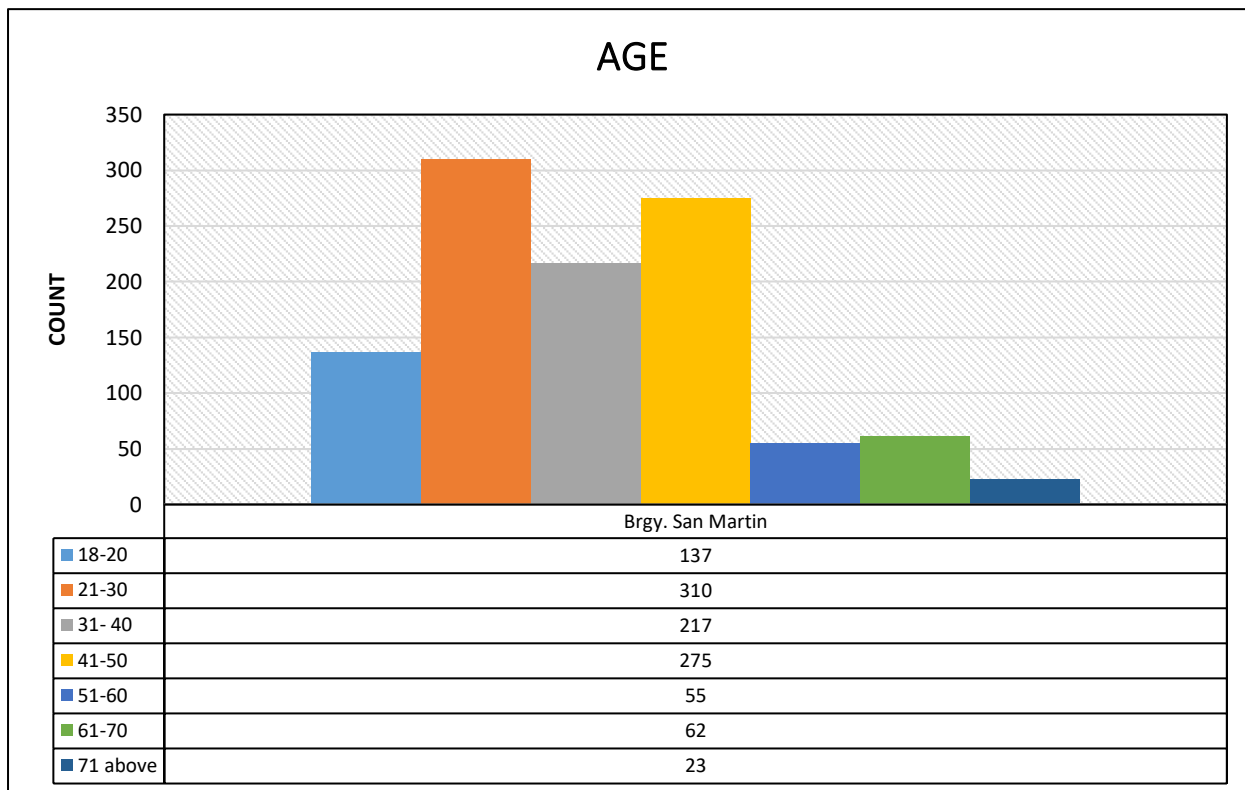
280 respondents (28%) said that the project can be a health hazard, 215 respondents (21.50%) believed that it will cause noise pollution, 170 respondents (17%) assume that it will cause water pollution, 165 respondents (16.50%) stated that it will cause air pollution, 105 respondents (10.50%) presumed that the project can be a reason for peace and order hazard, 60 respondents (6%) stated that it will cause traffic congestion while 5 respondents (0.50%) said that it can decrease the ground water resources in the area.

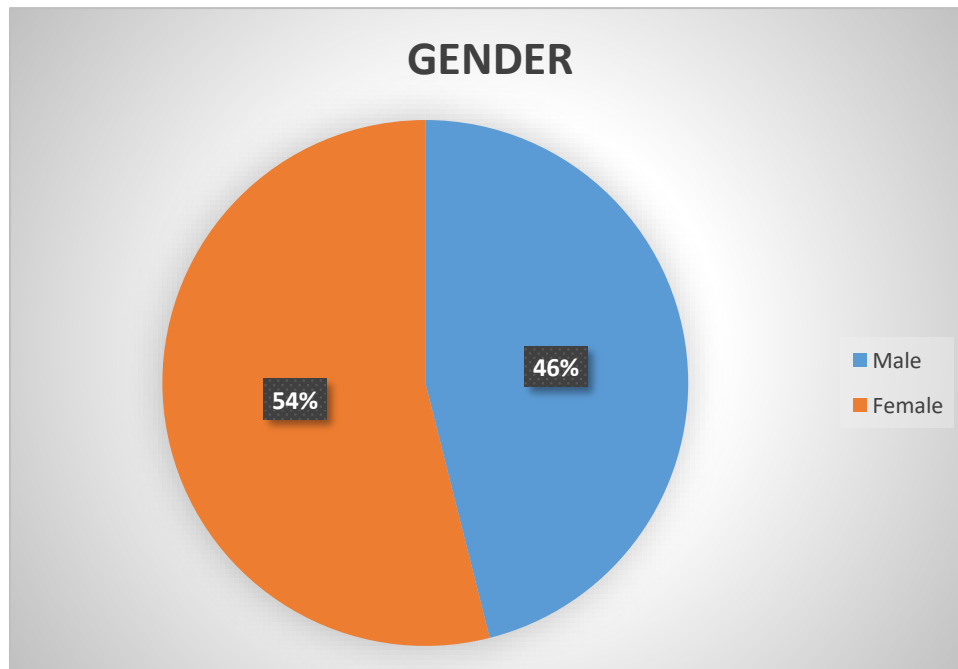
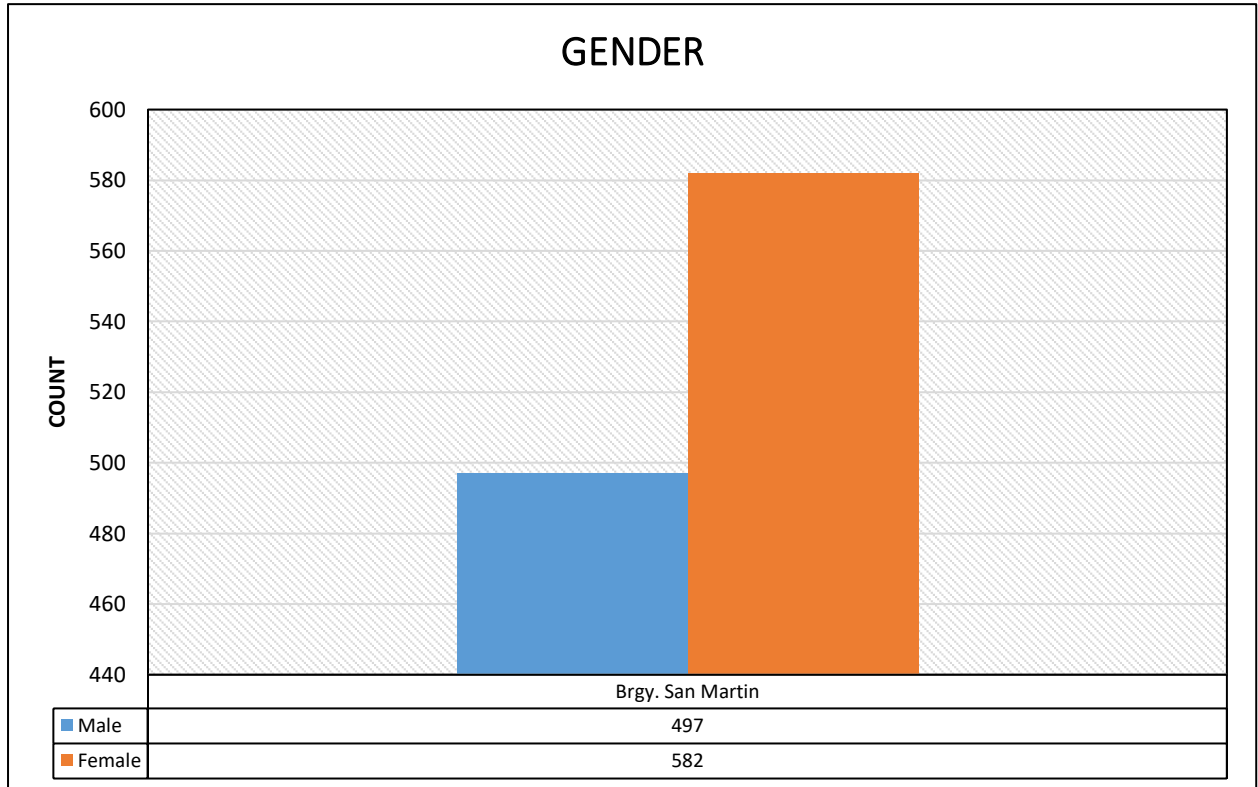
Opinions of the Project

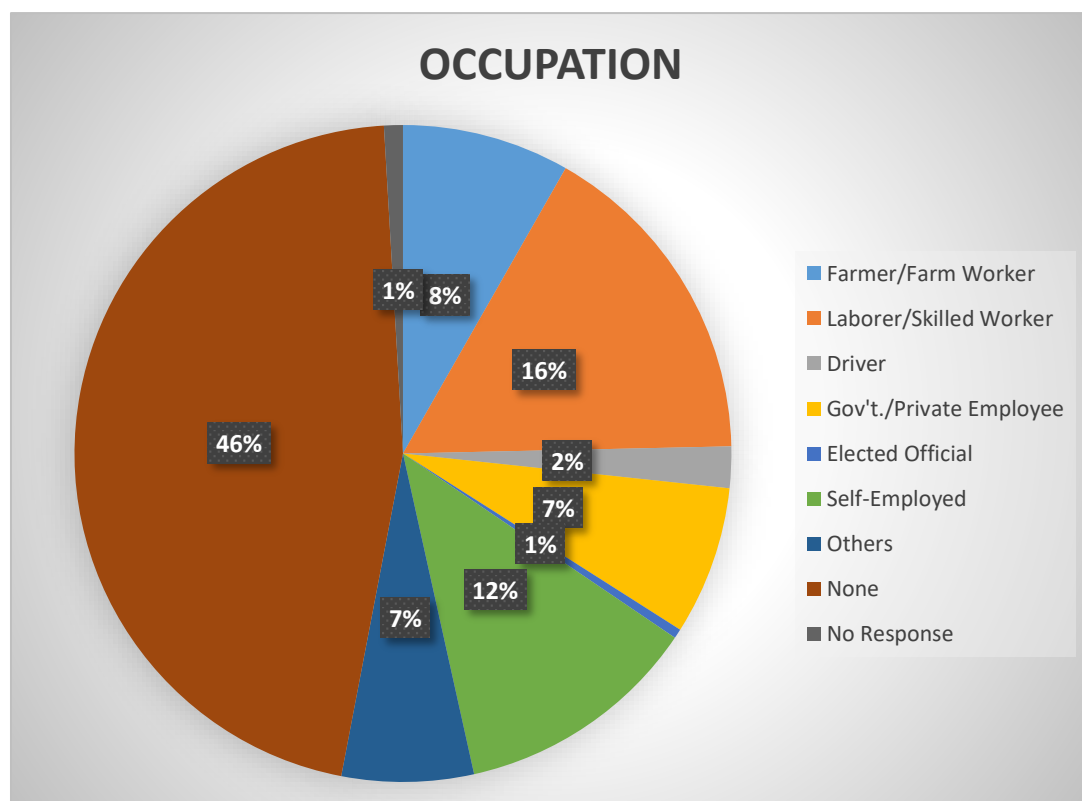
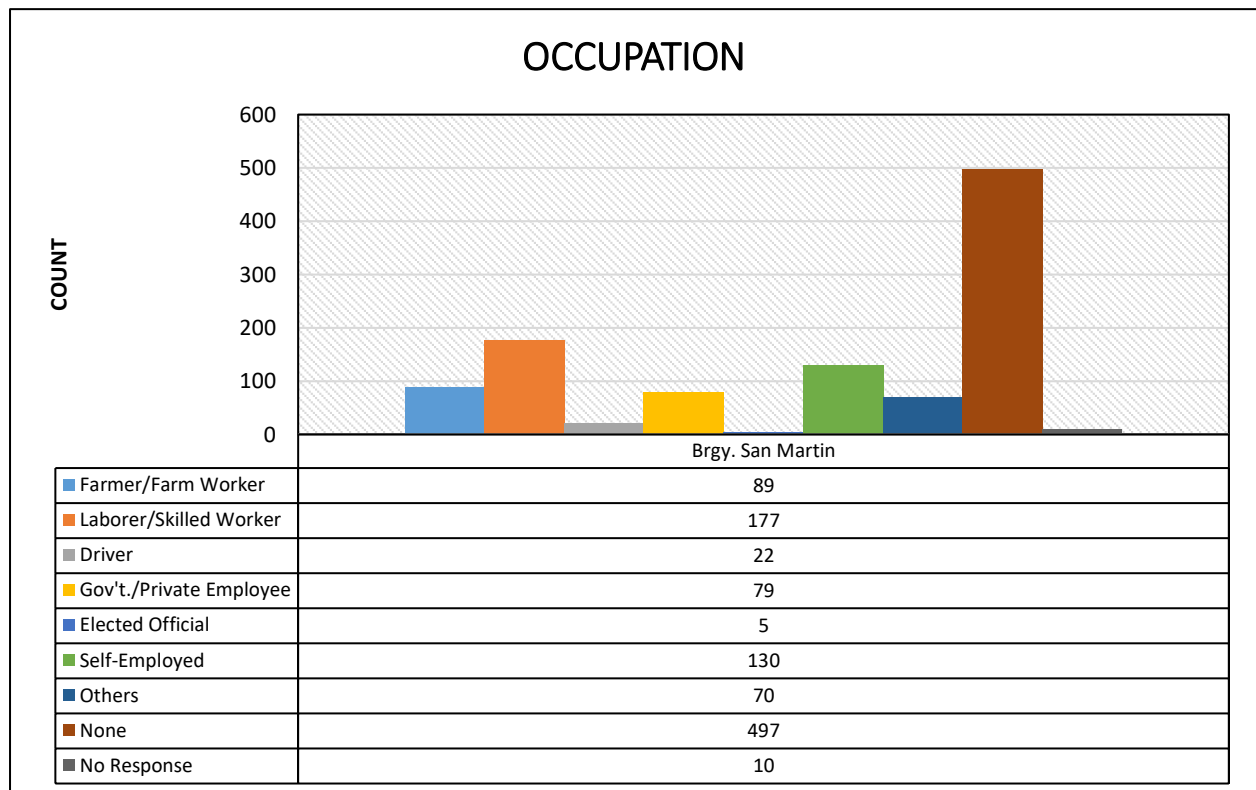
480 respondents (75%) stated that the project can greatly help in improving the community and local residents while 115 respondents (17.95%) uttered that the project will be detrimental to the community and 30 respondents (4.69%) said that the project will be able to help but not that much, the remaining 15 respondents (2.34%) provided no answer.

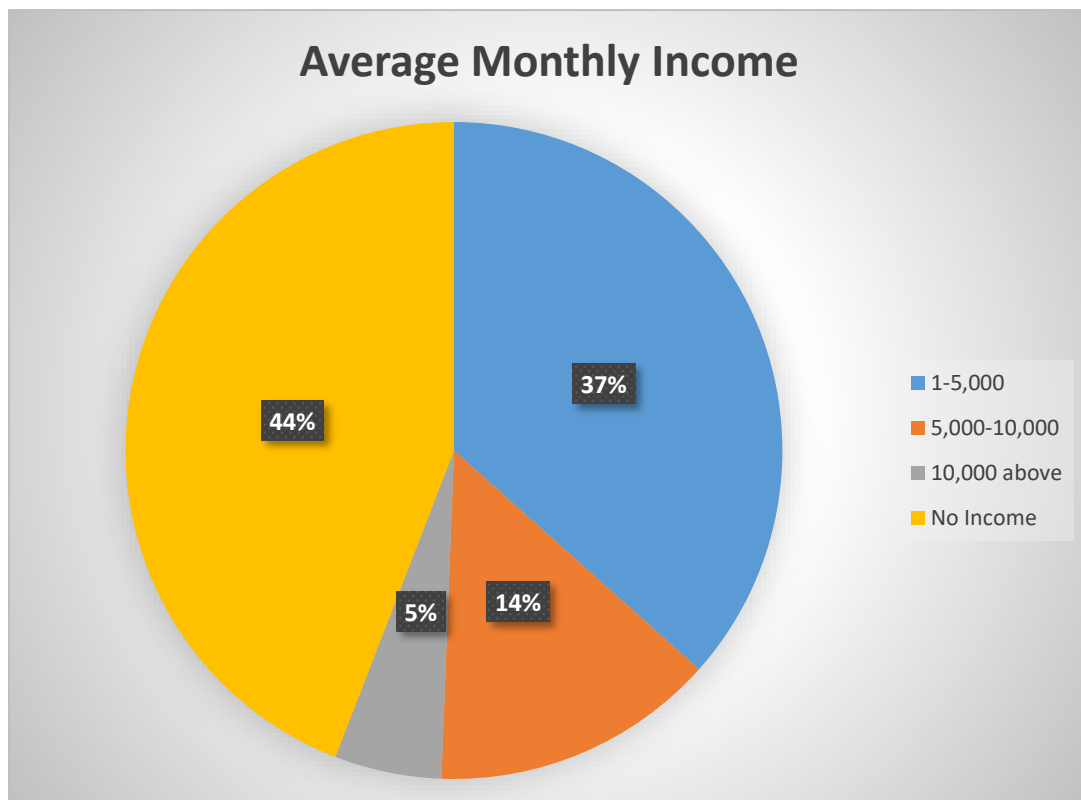
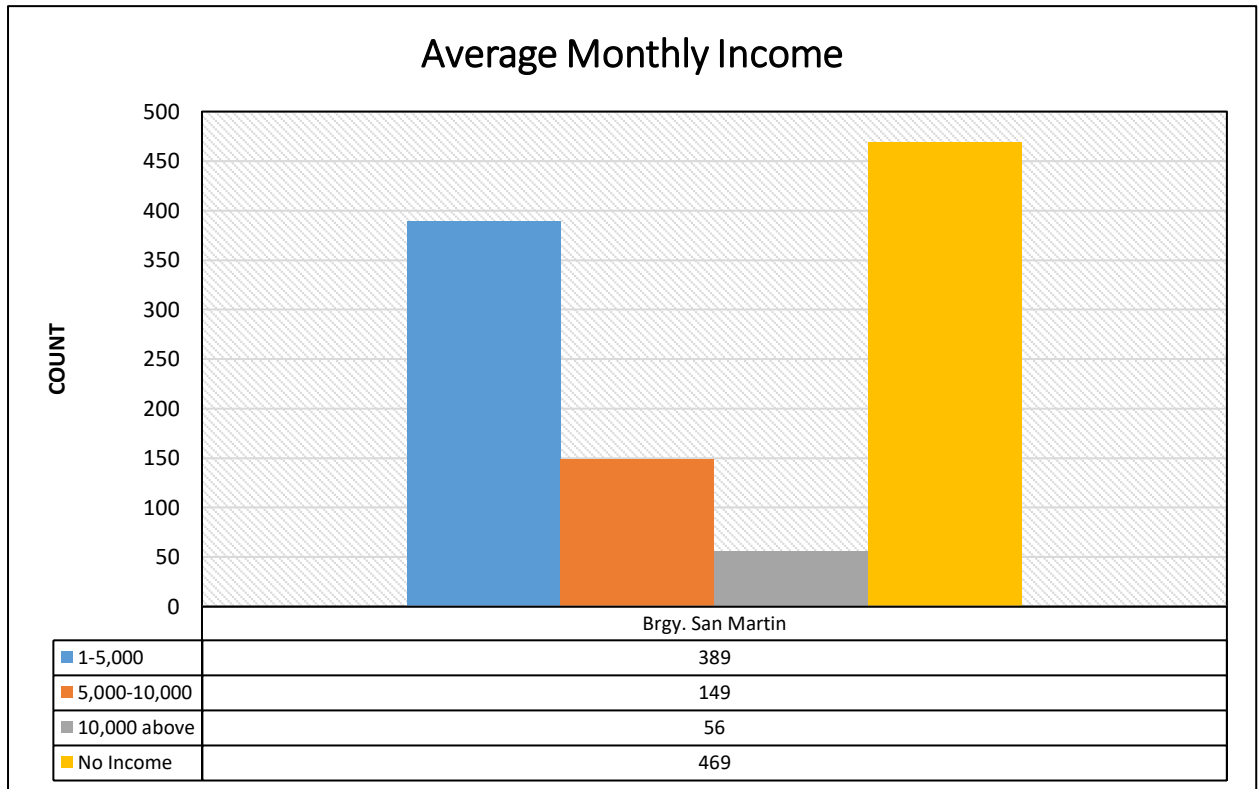
Approval/Disapproval of the Project

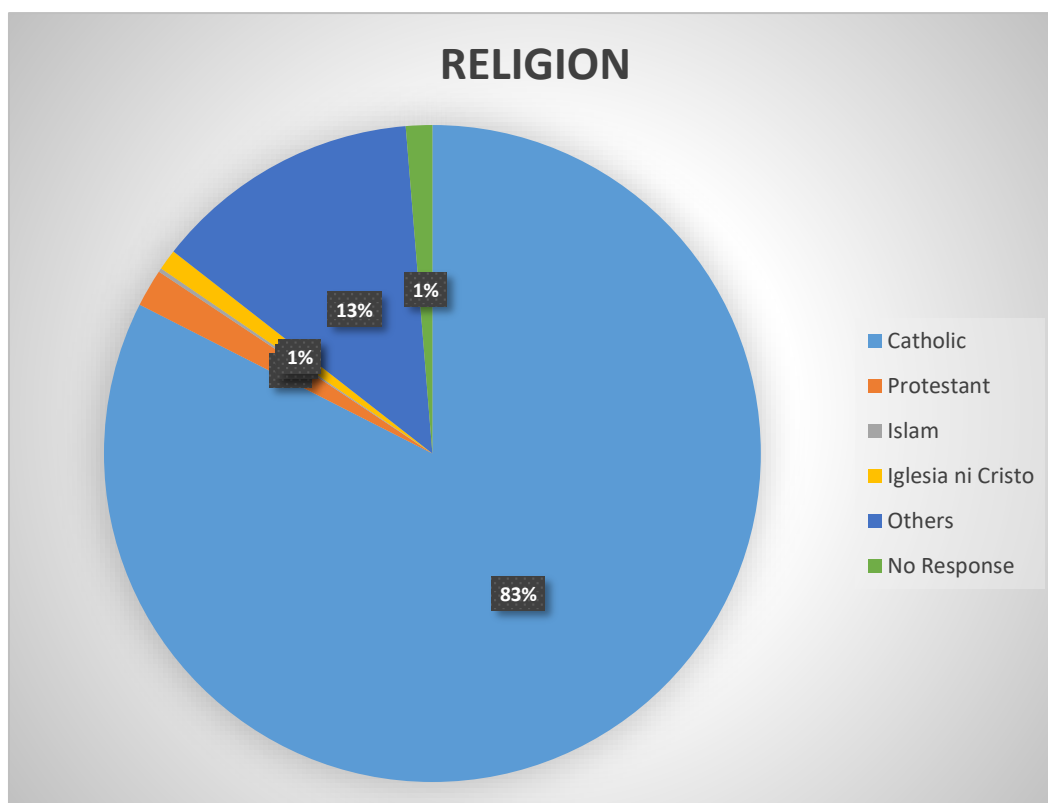
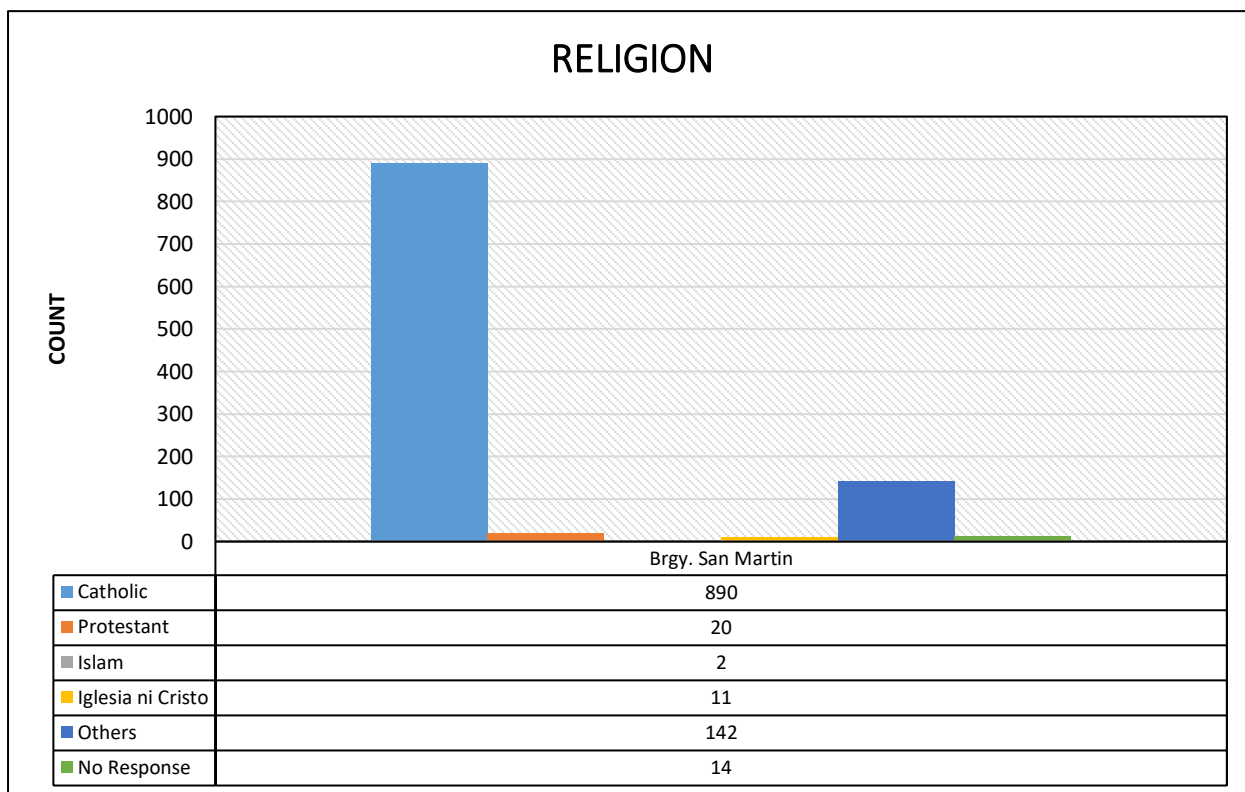
550 respondents (92.44%) approved the project while 15 respondents (2.52%) disapproved because they believe that the project can damage nature and it will make them move to other area, the remaining 30 respondents (4.04%) are not sure.

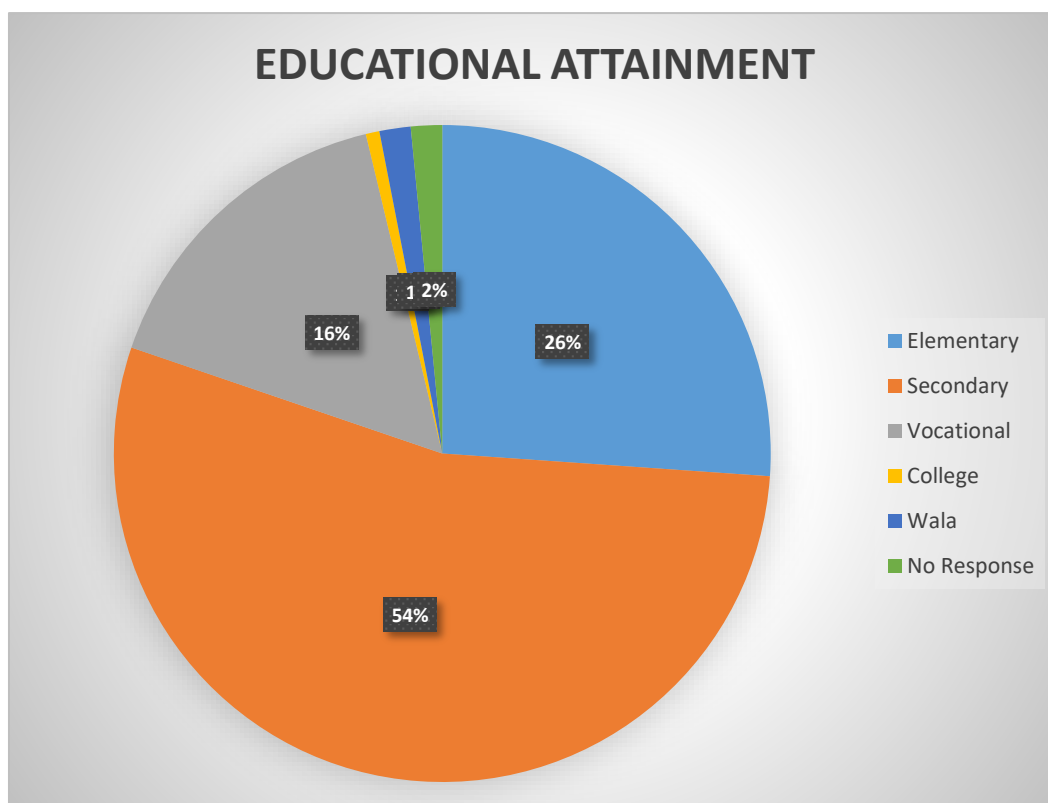
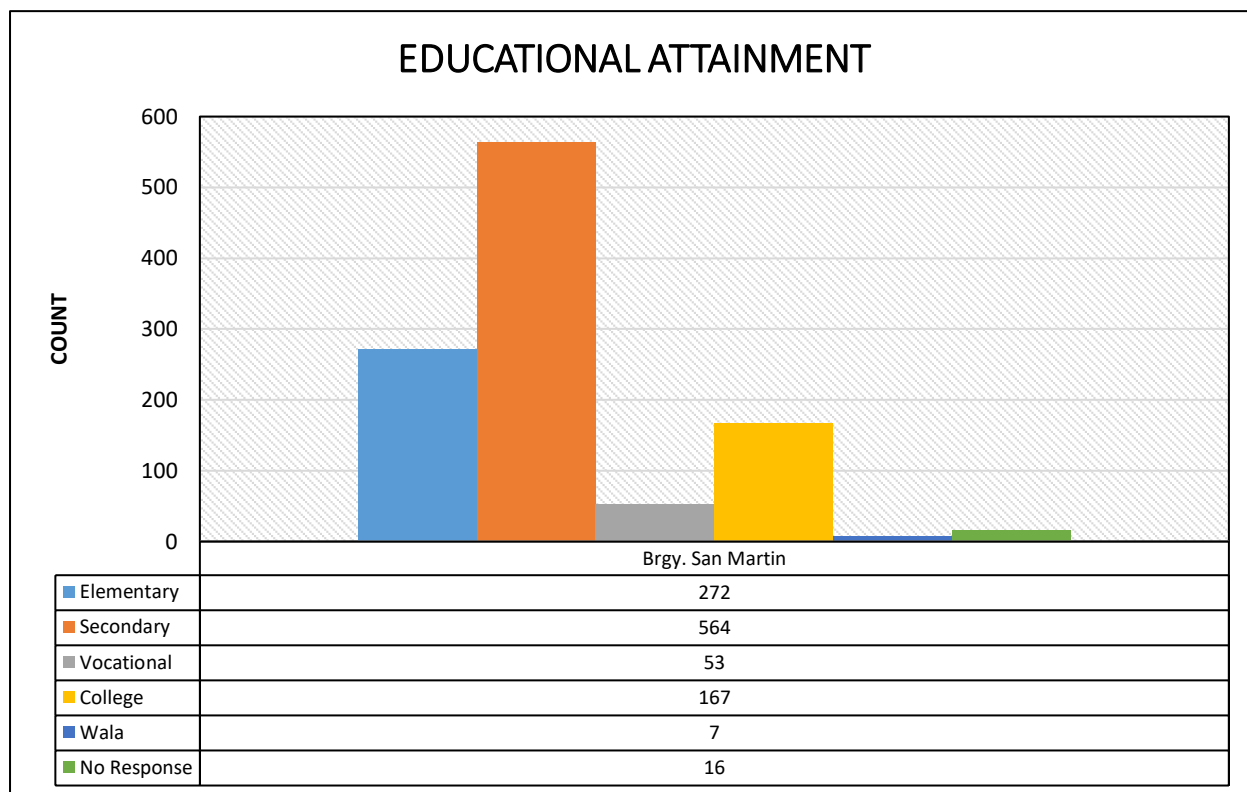


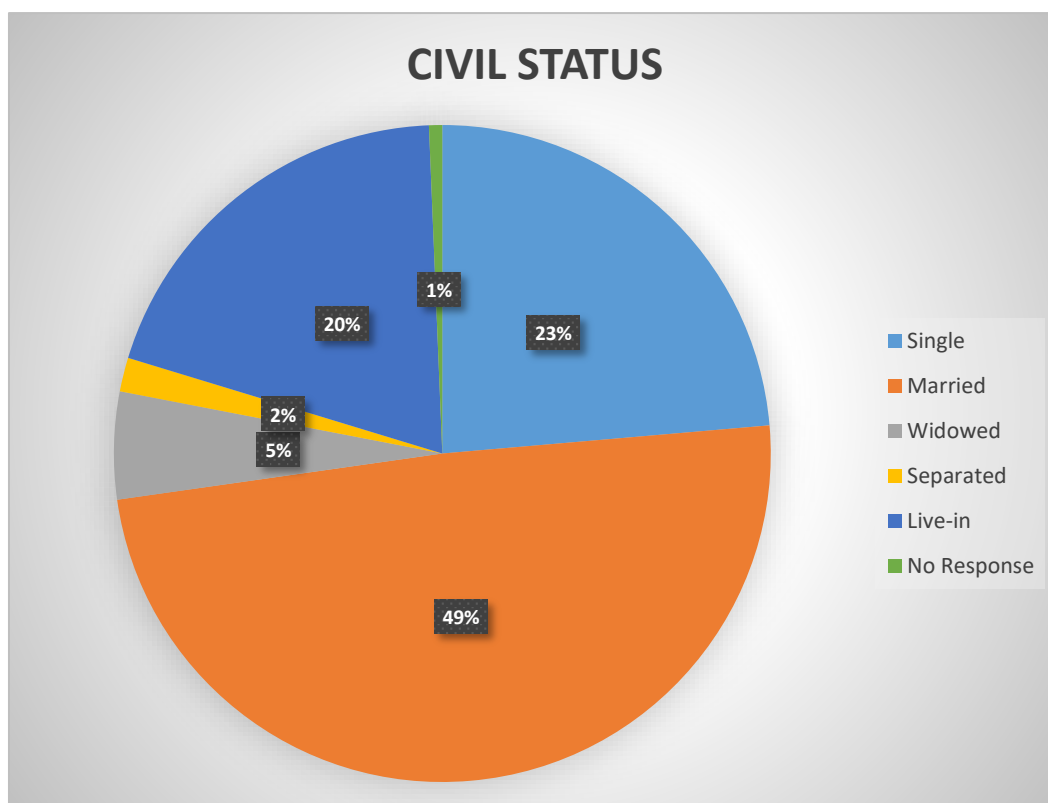
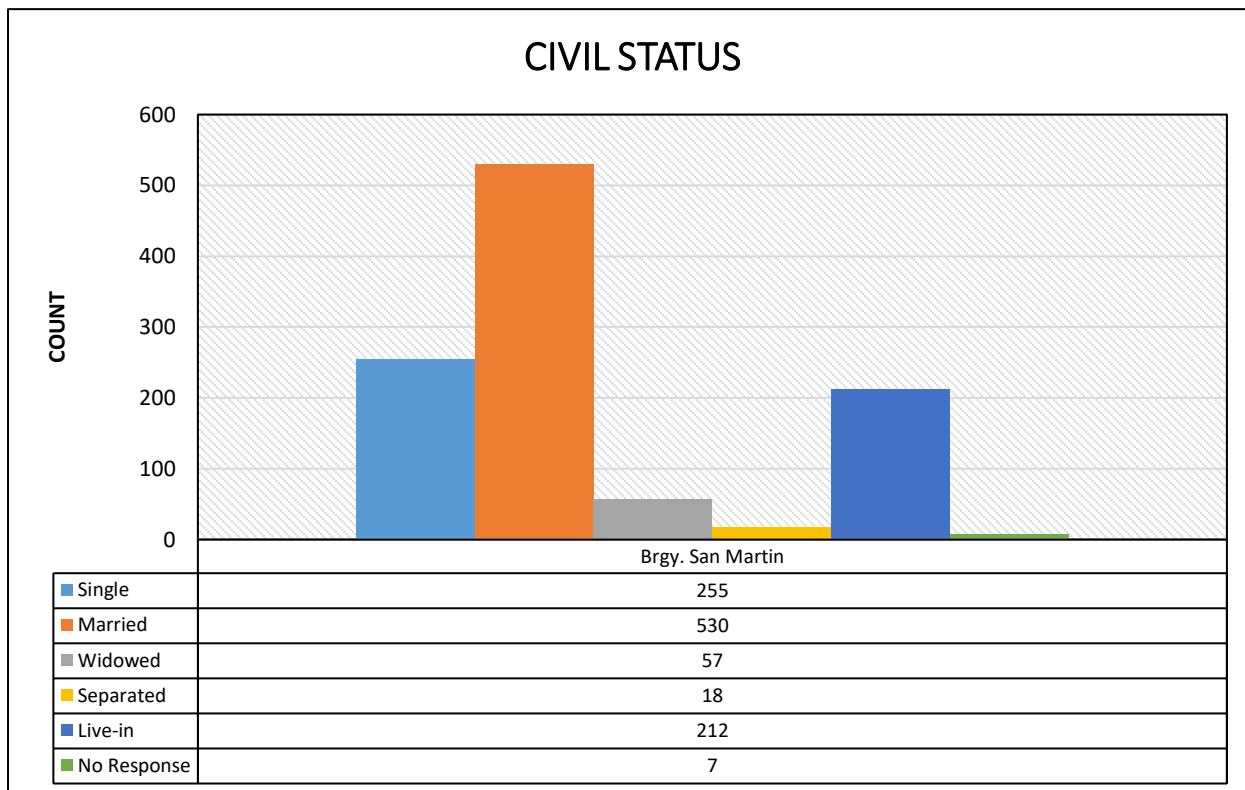


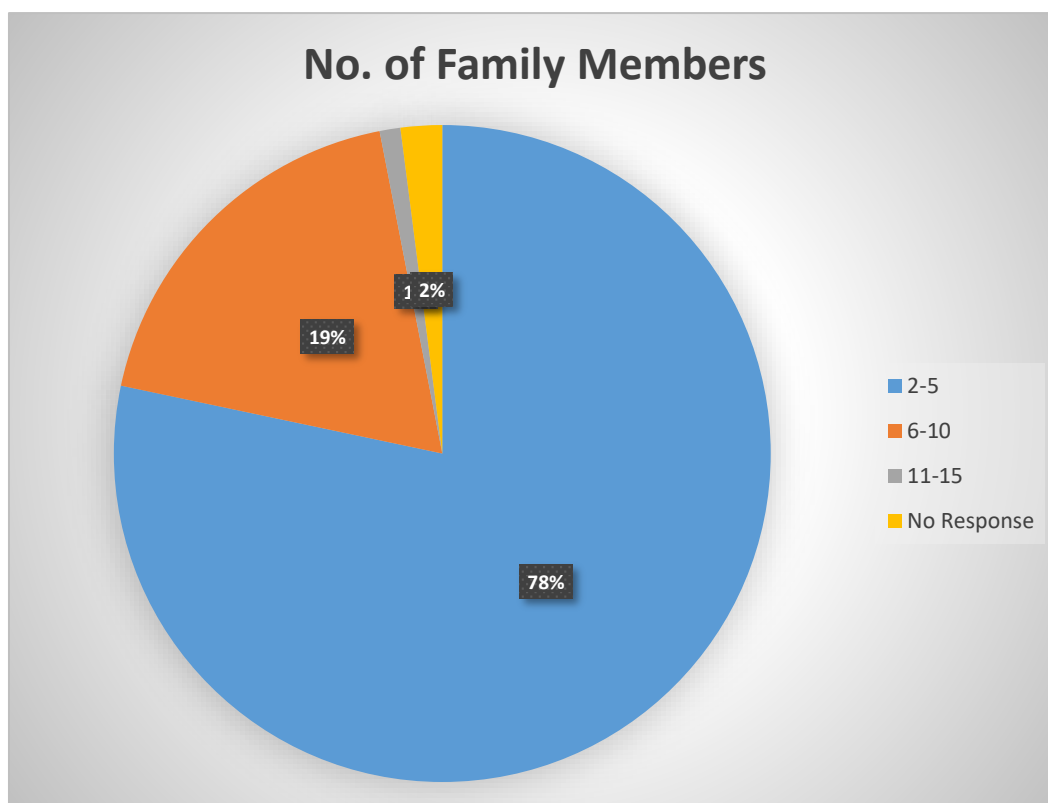
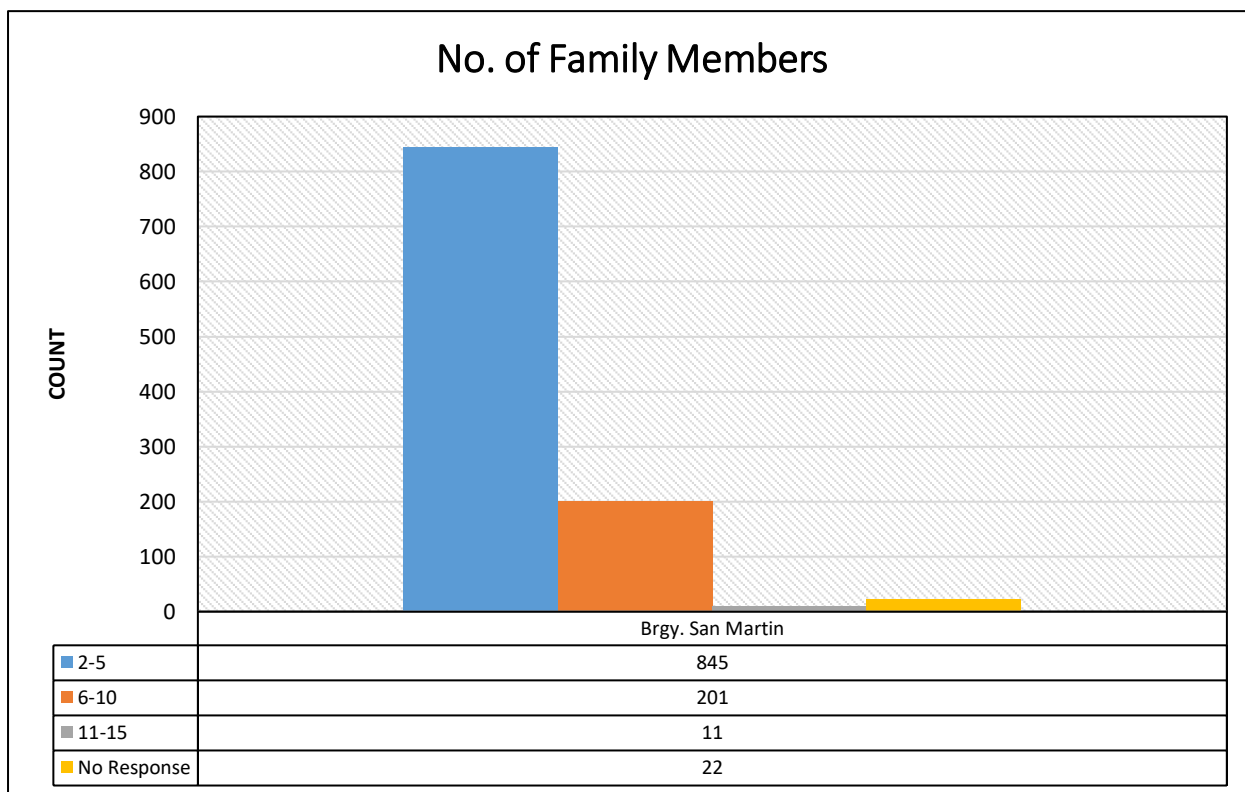


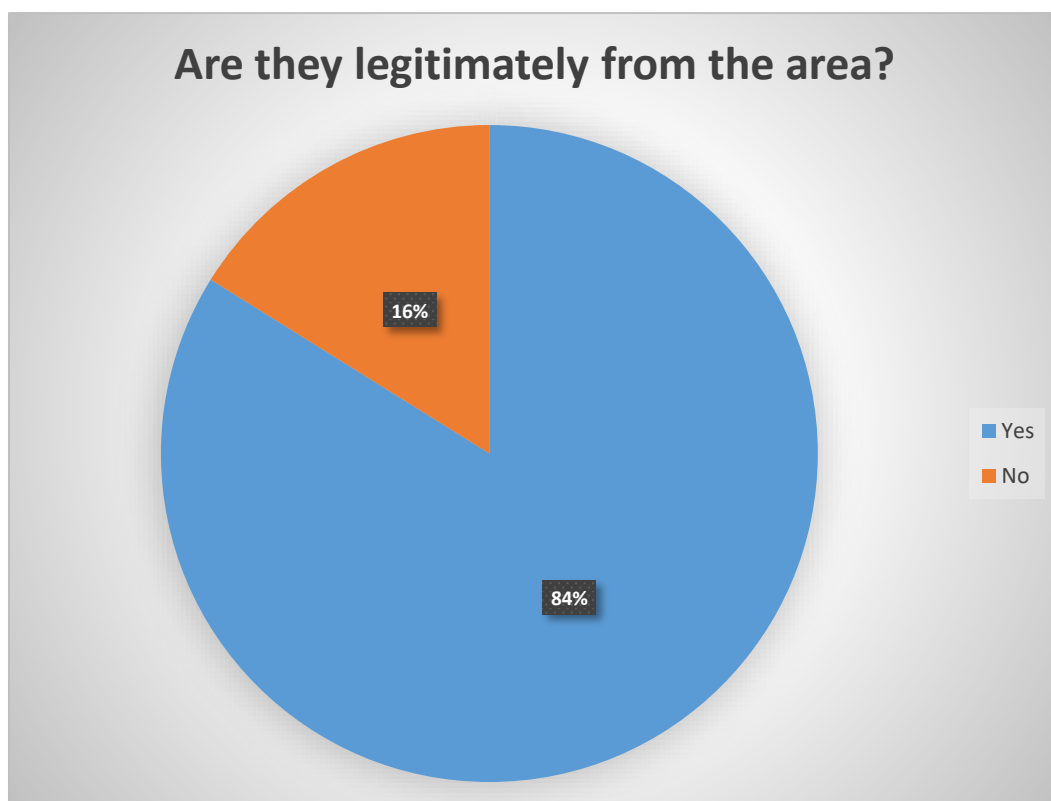
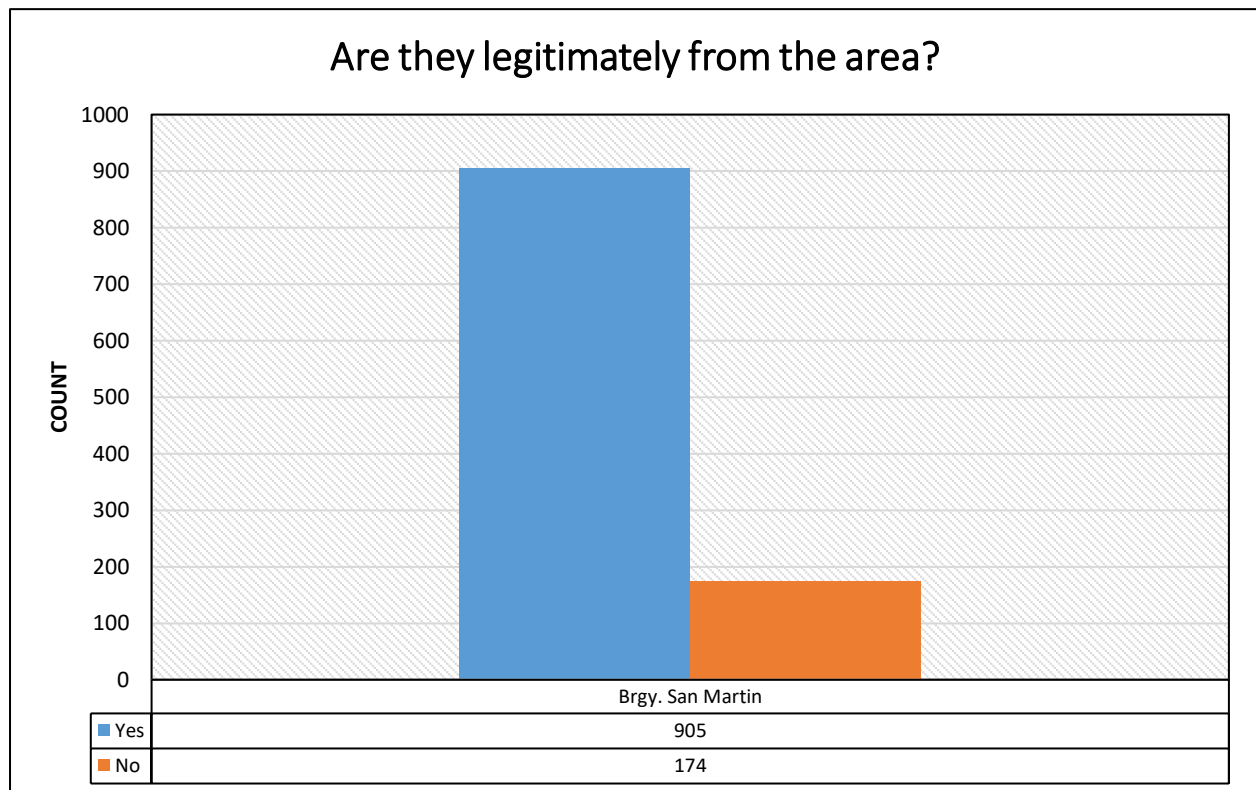


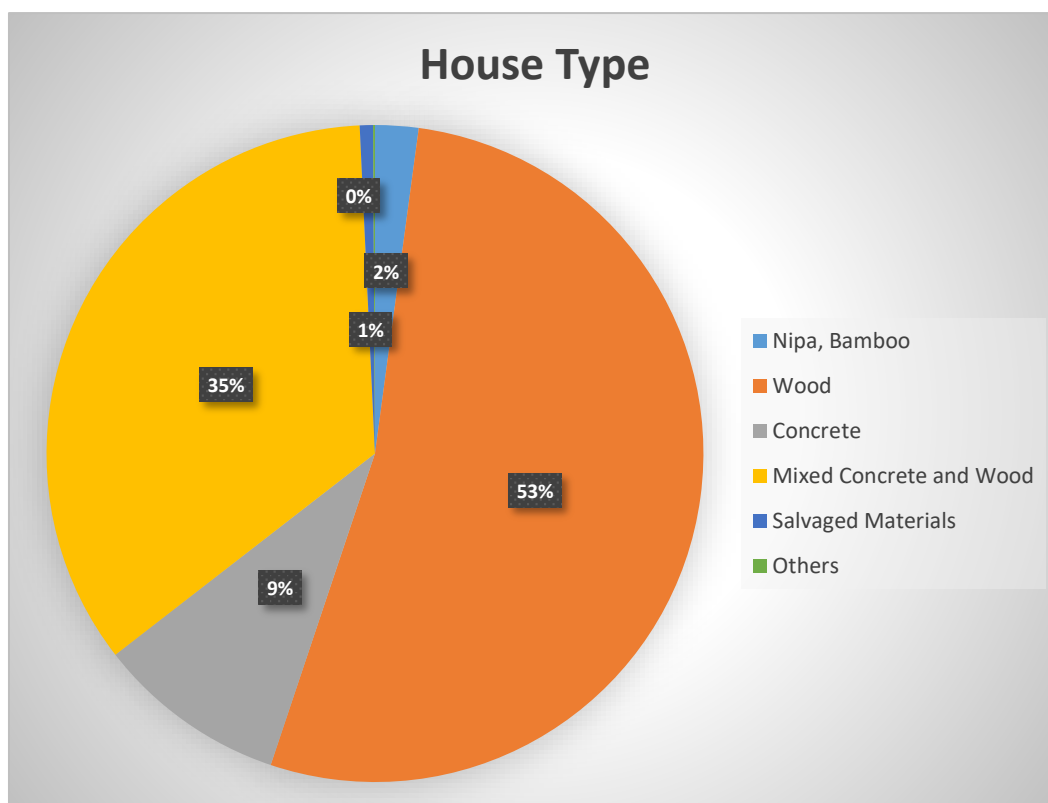
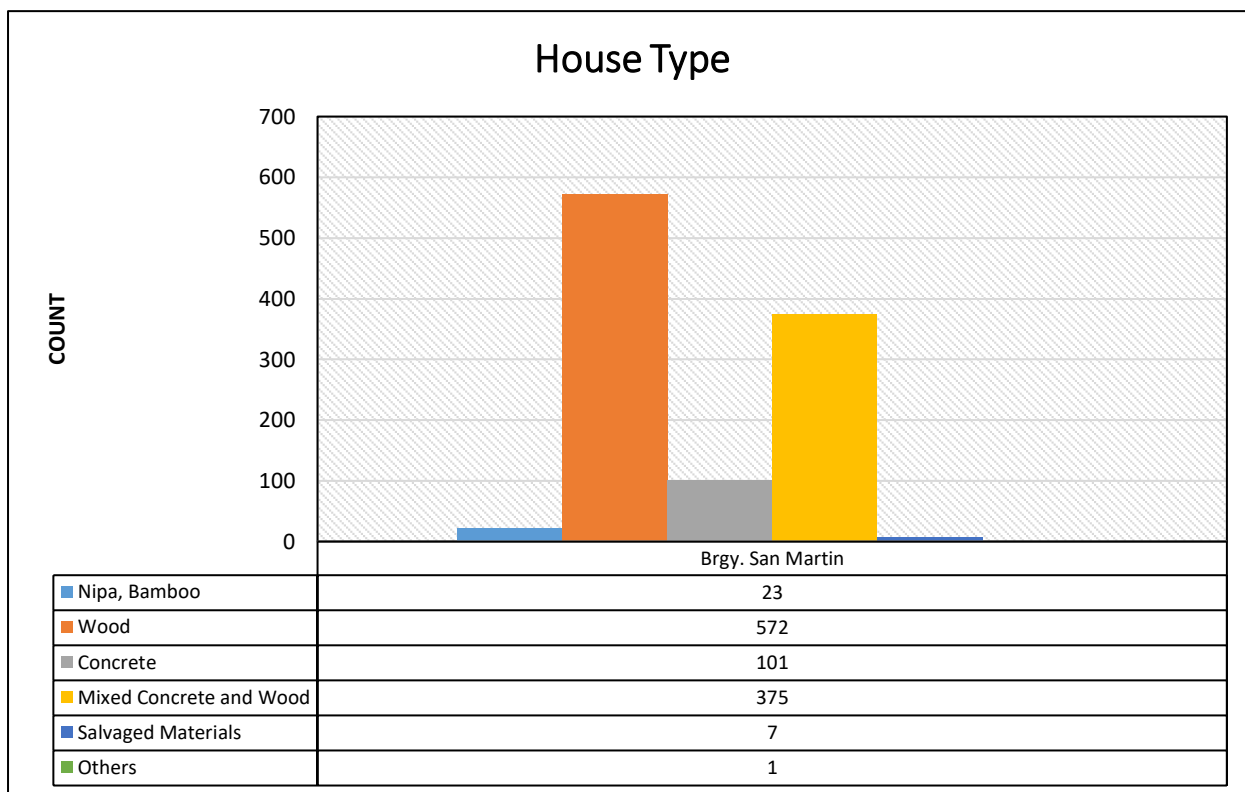


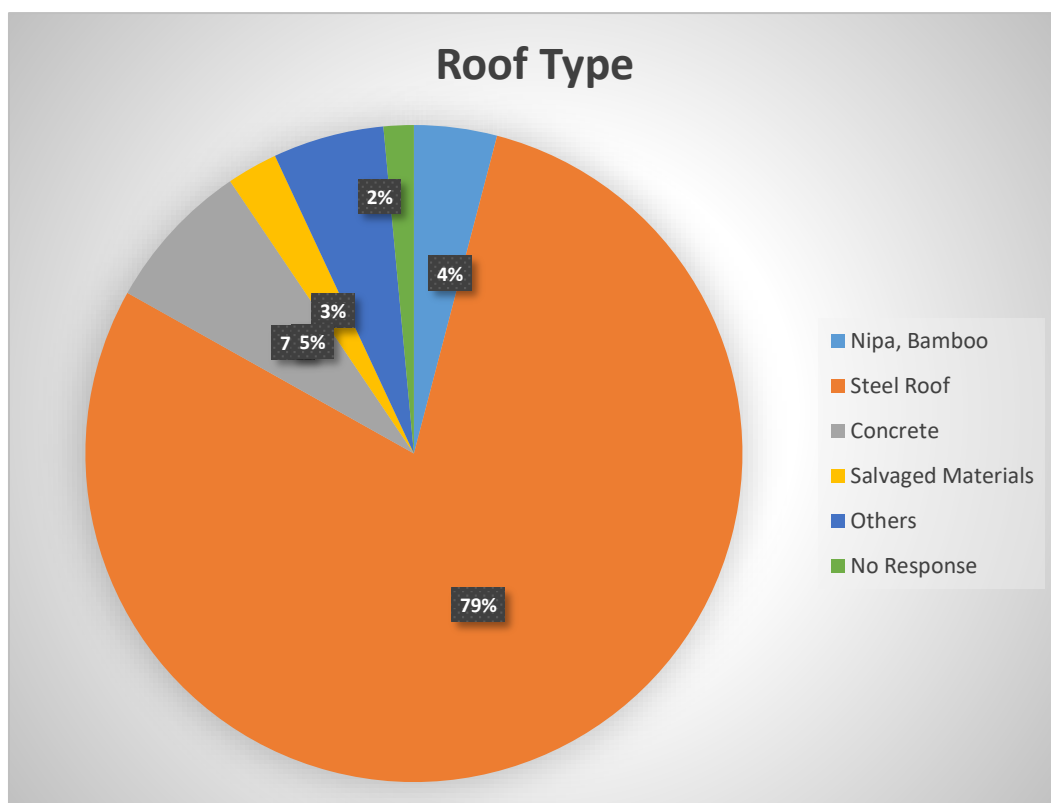
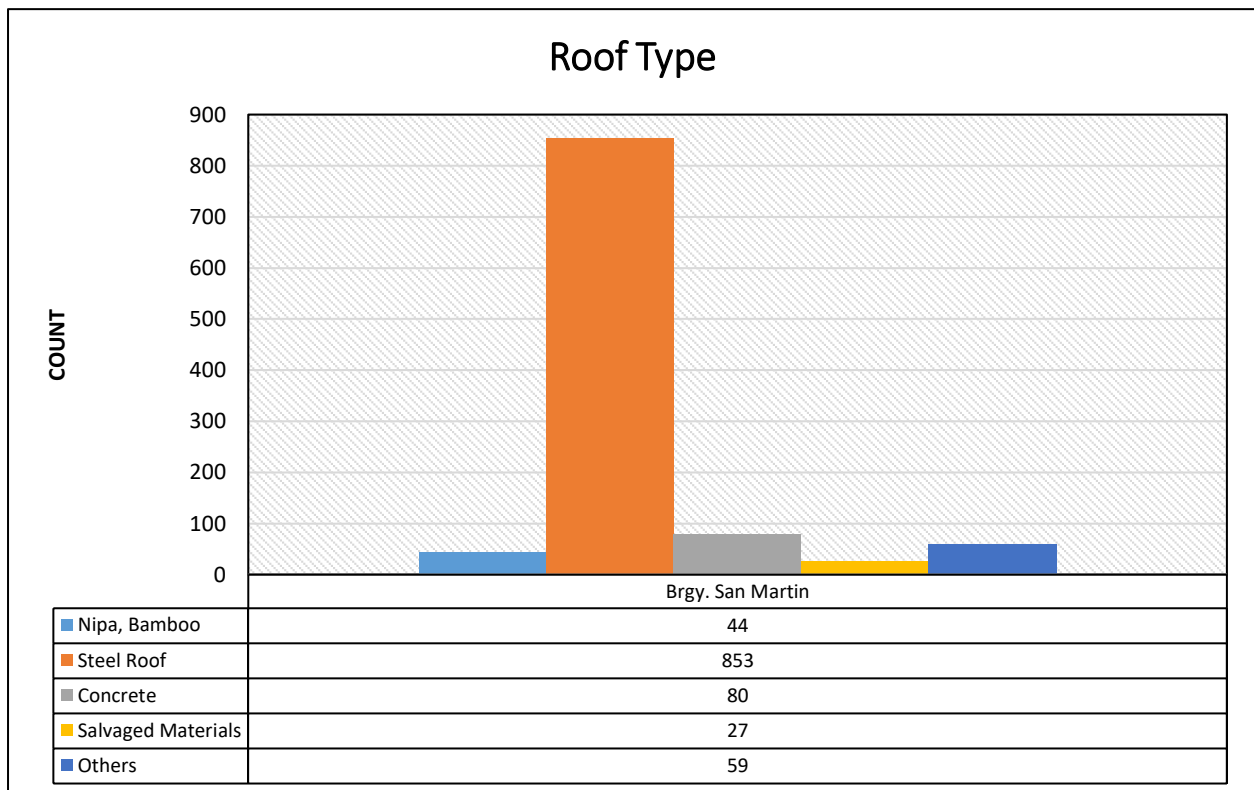


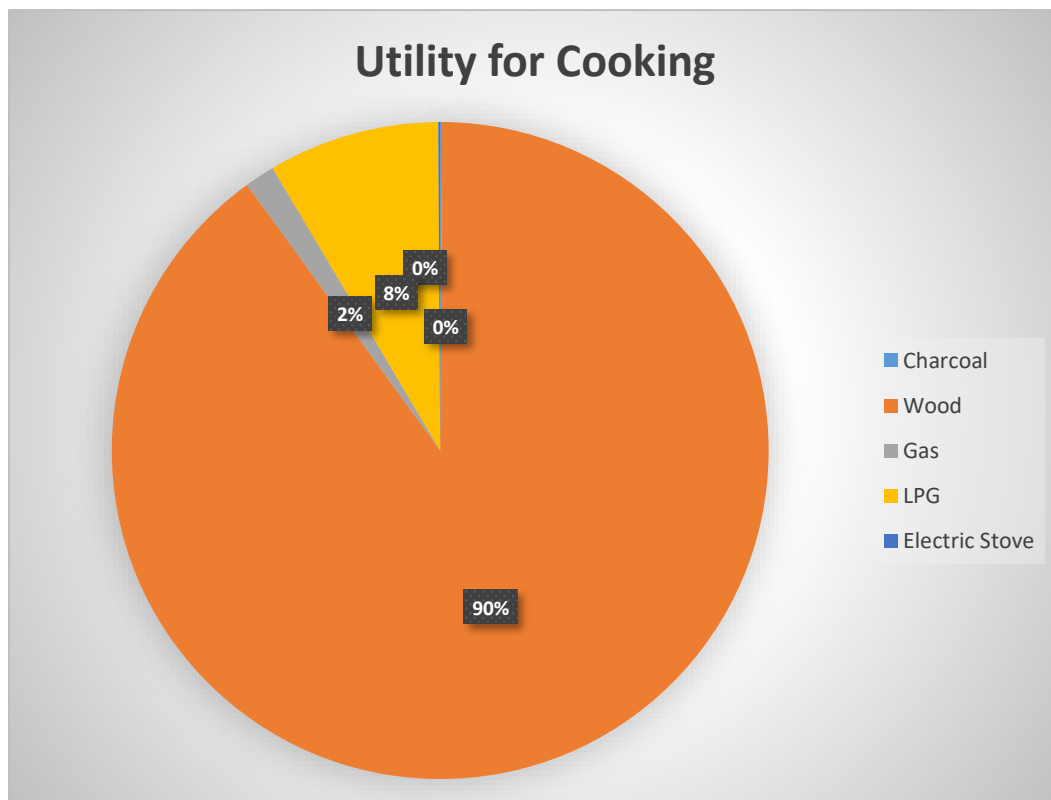
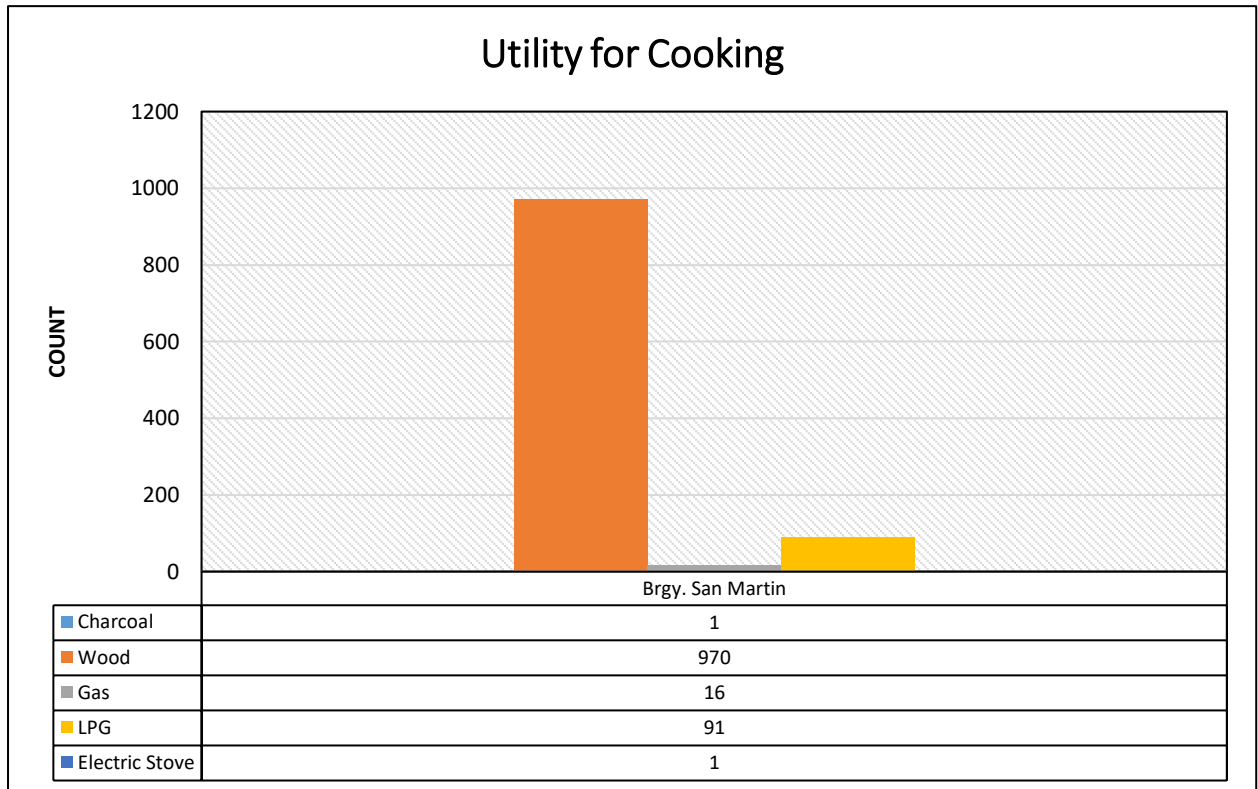


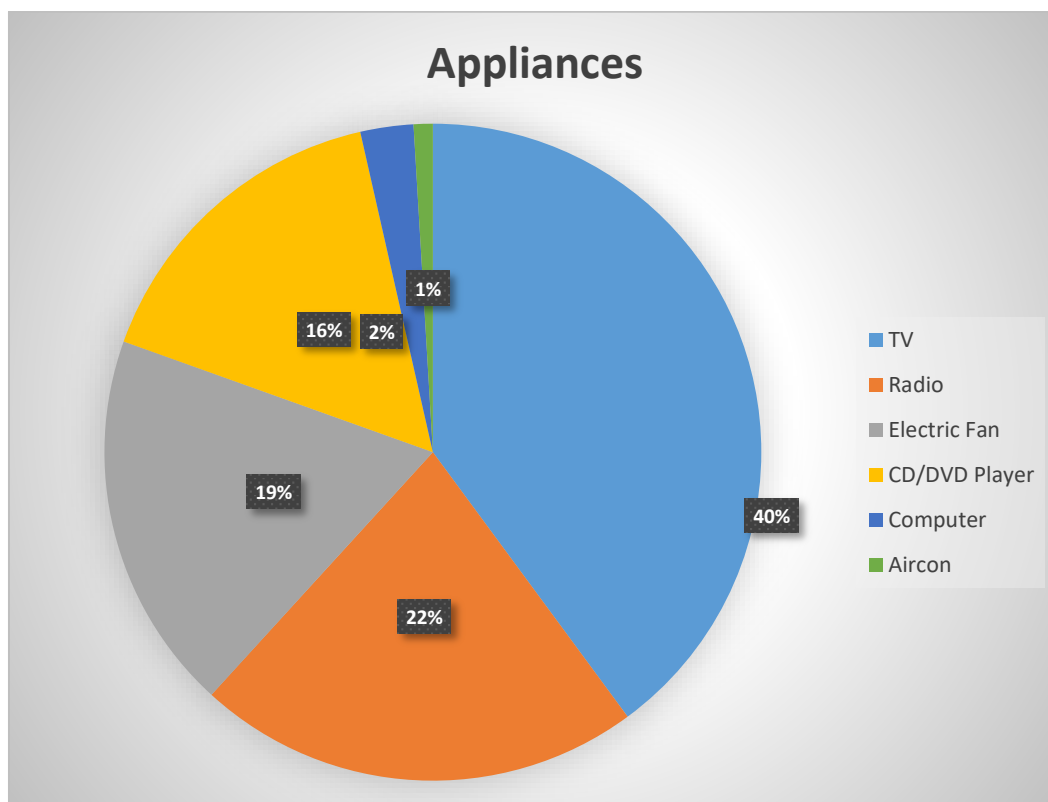
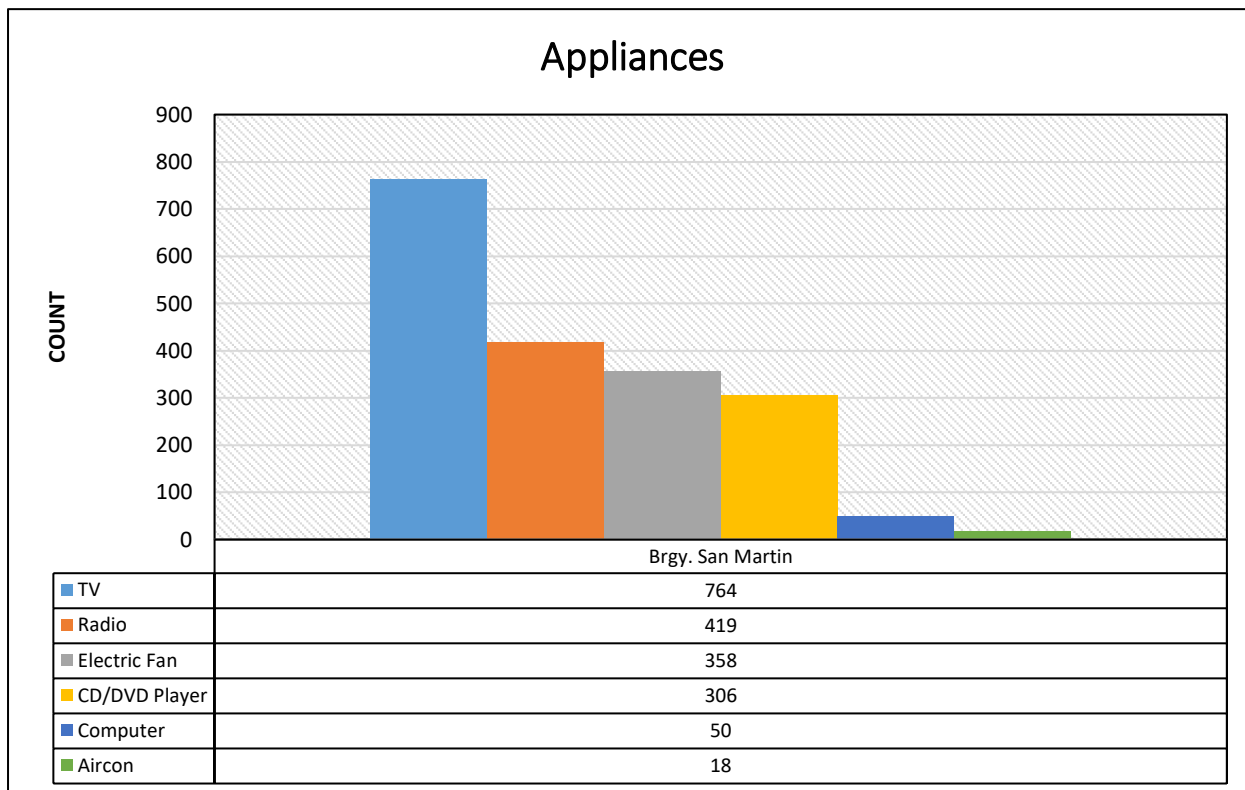


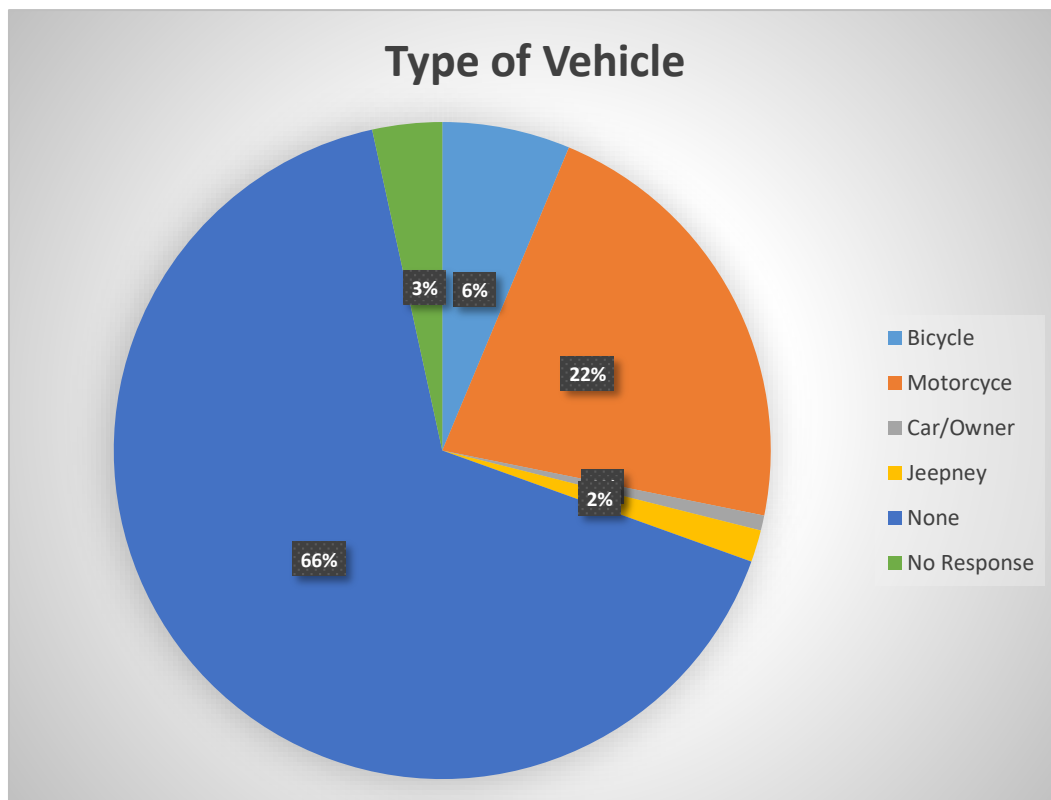
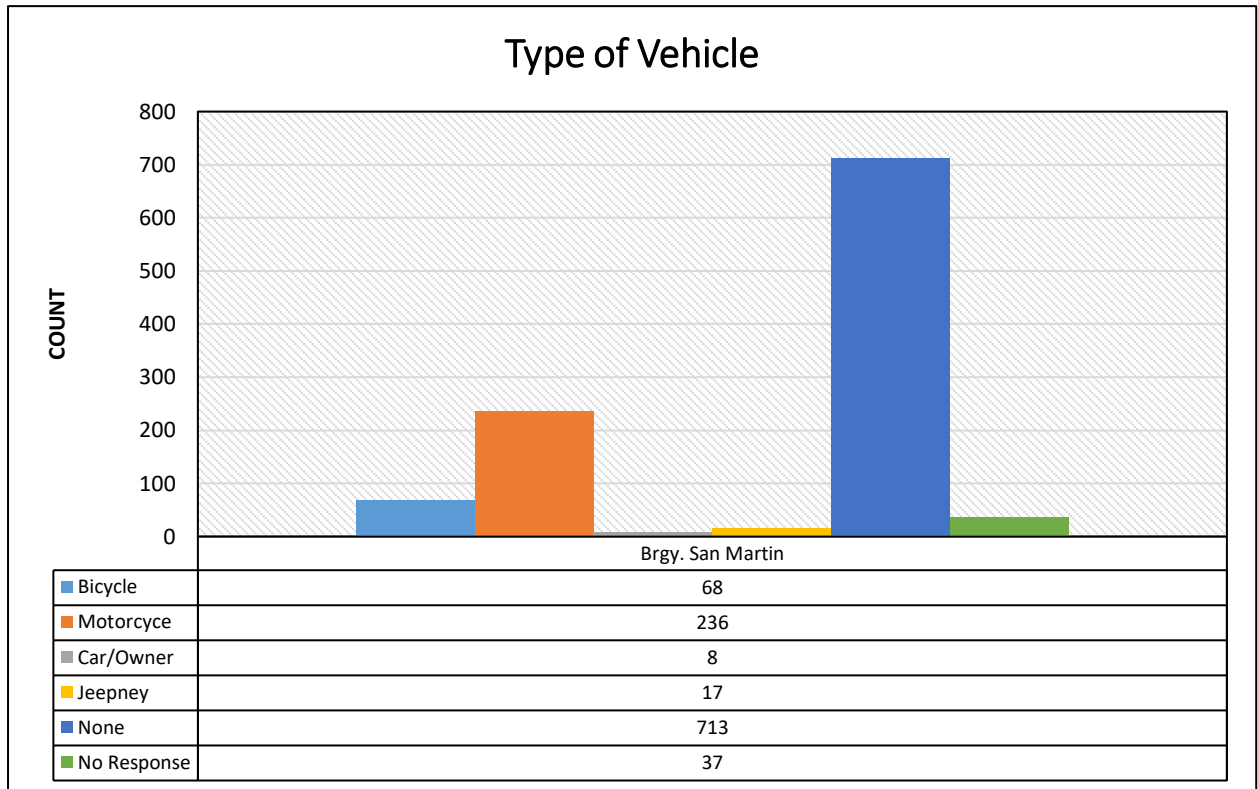




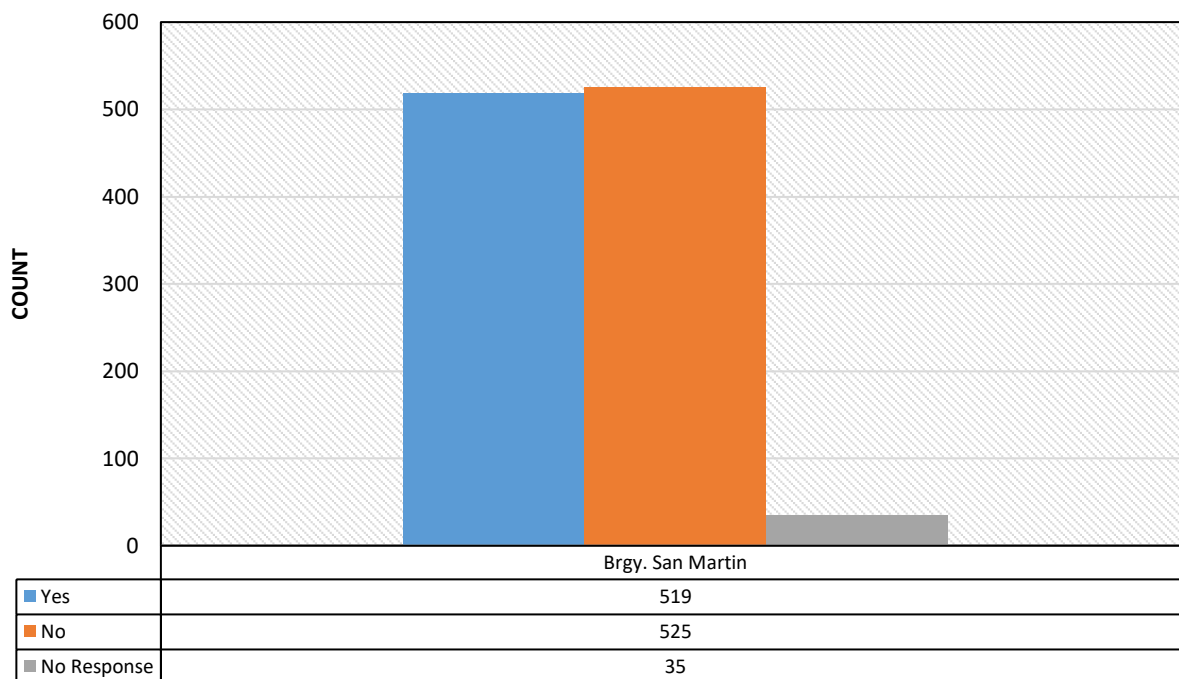




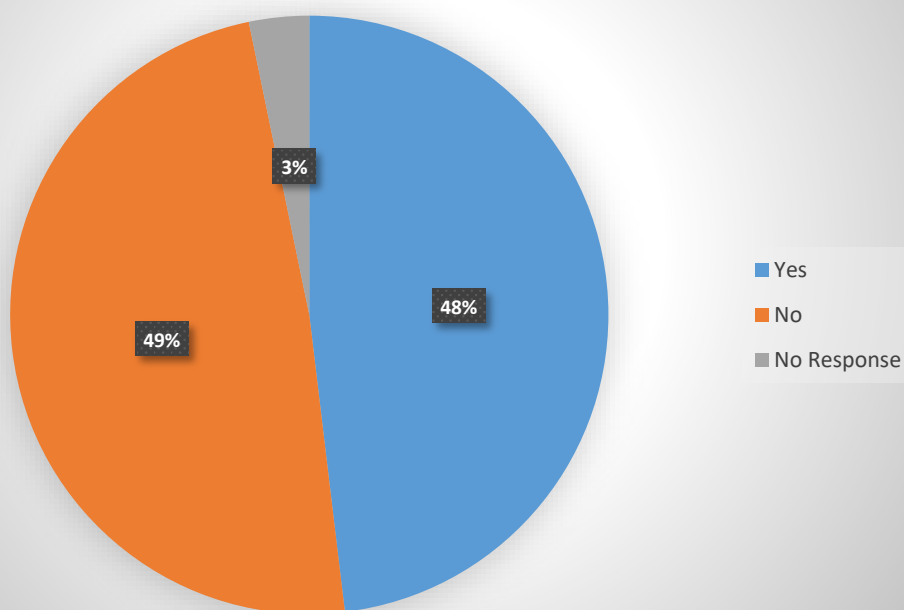


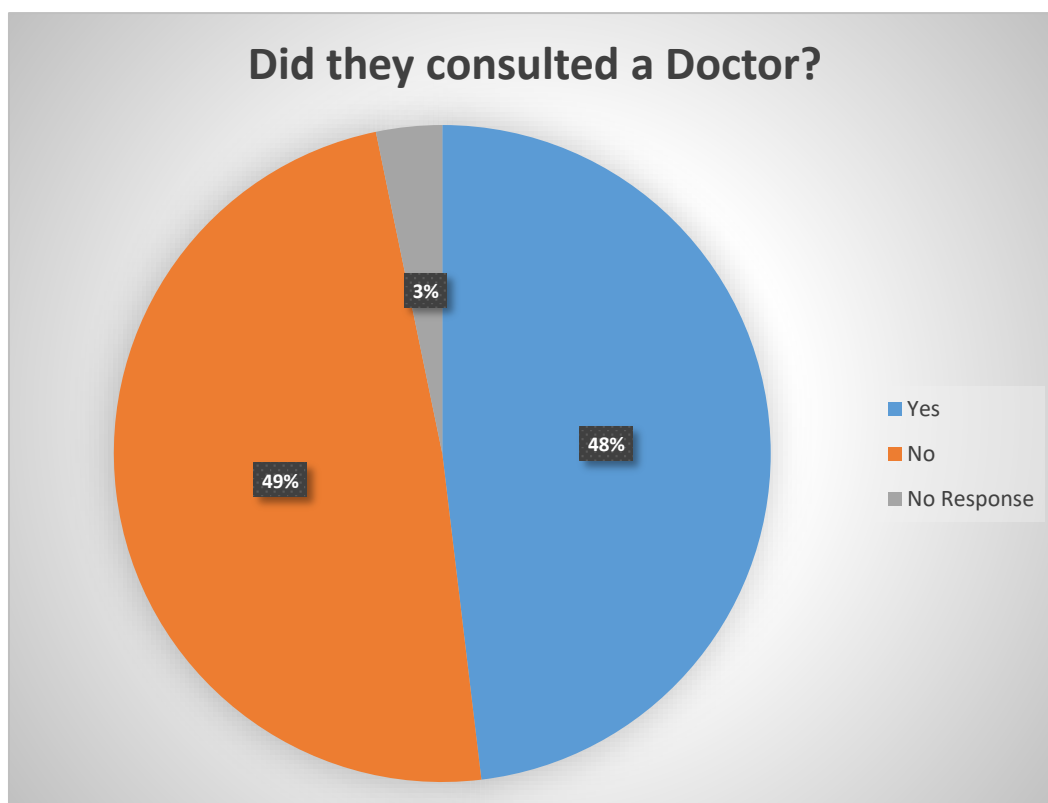
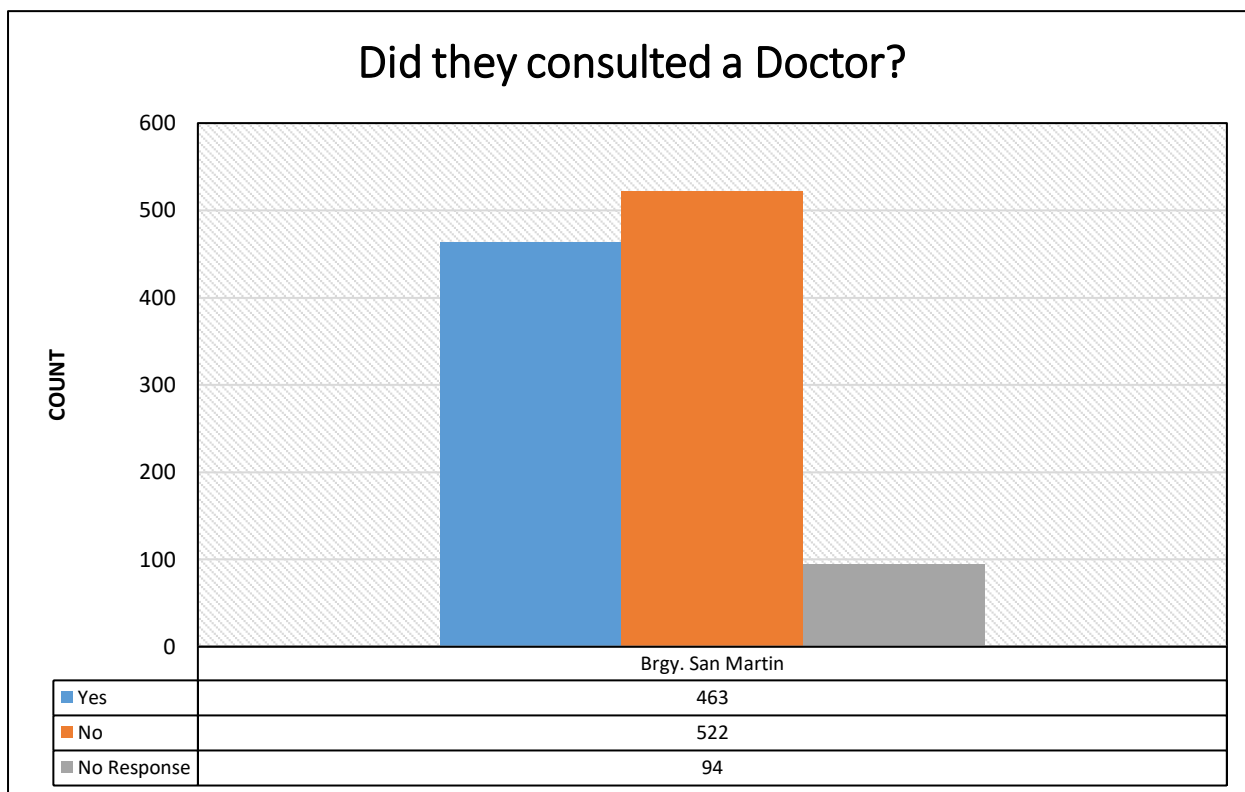


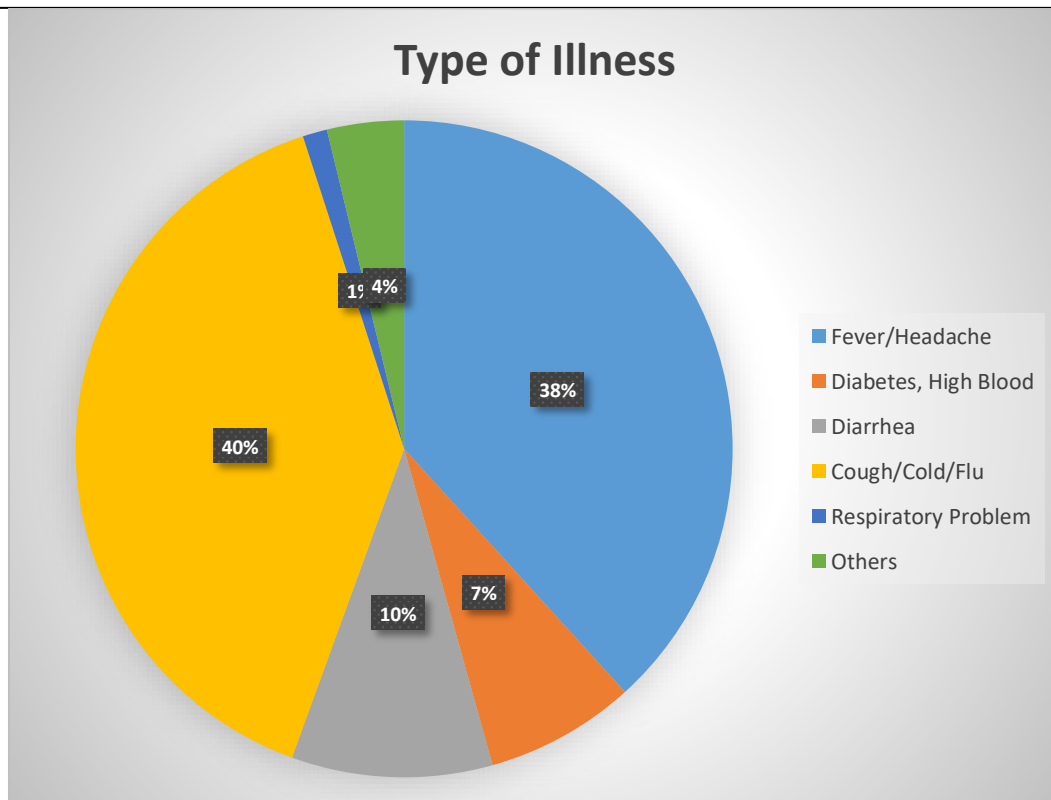
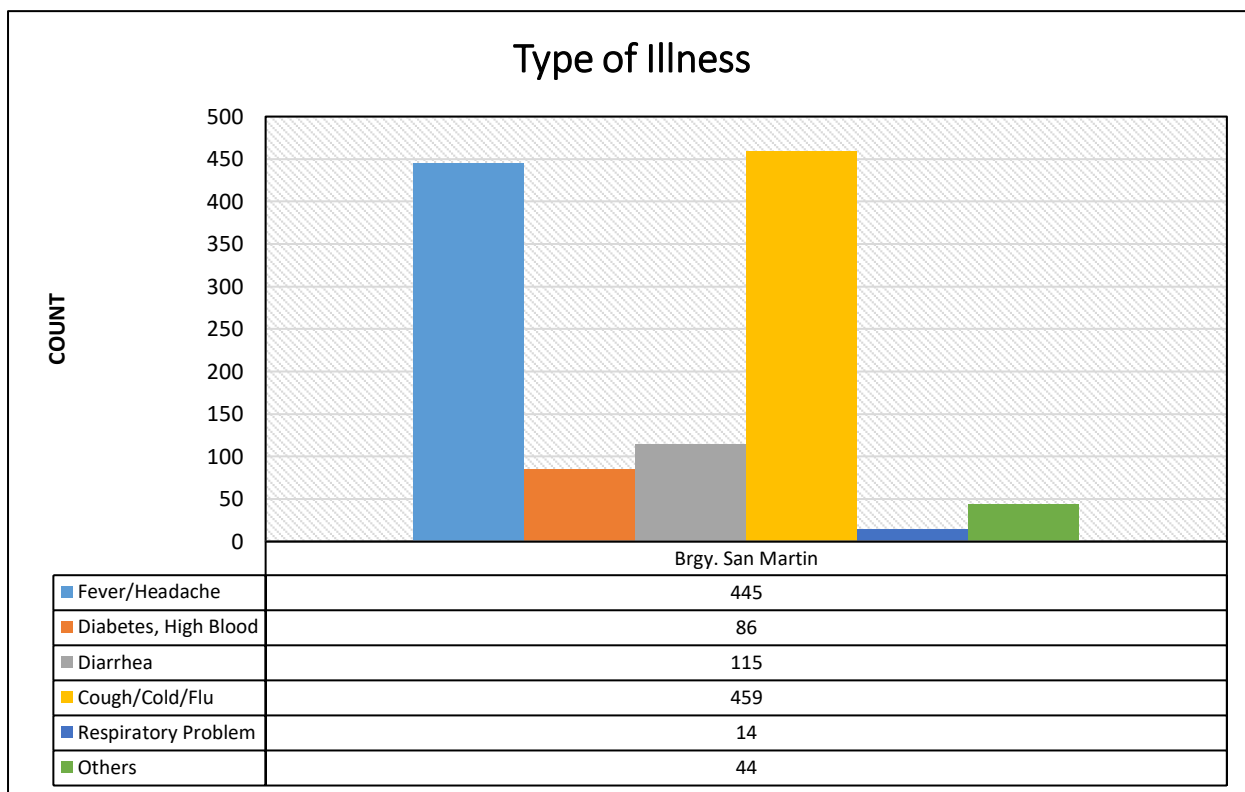
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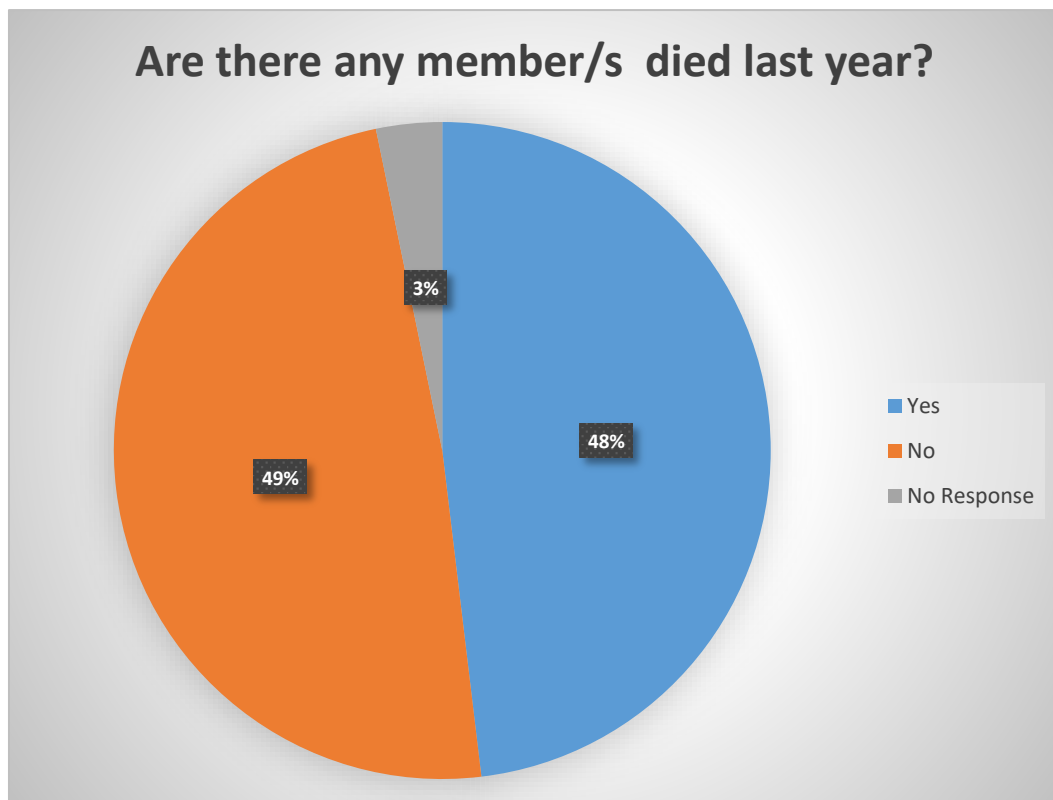
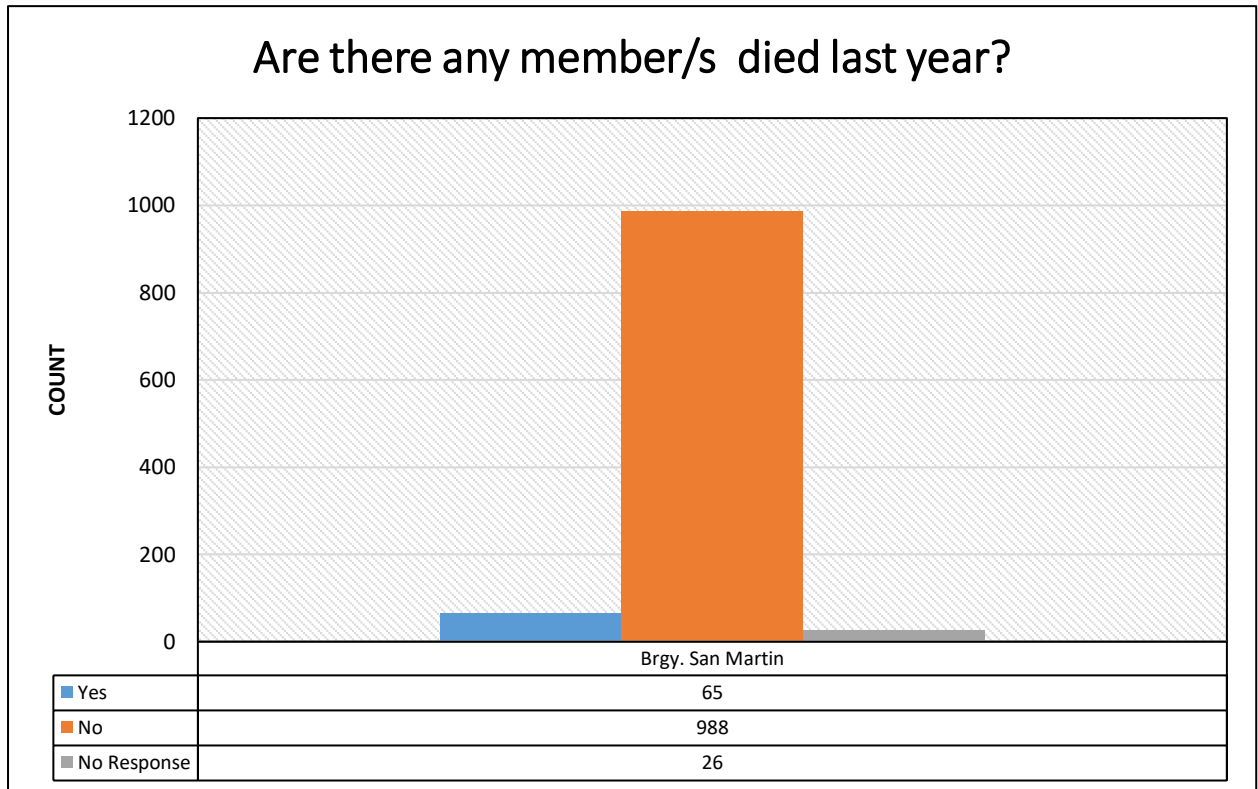


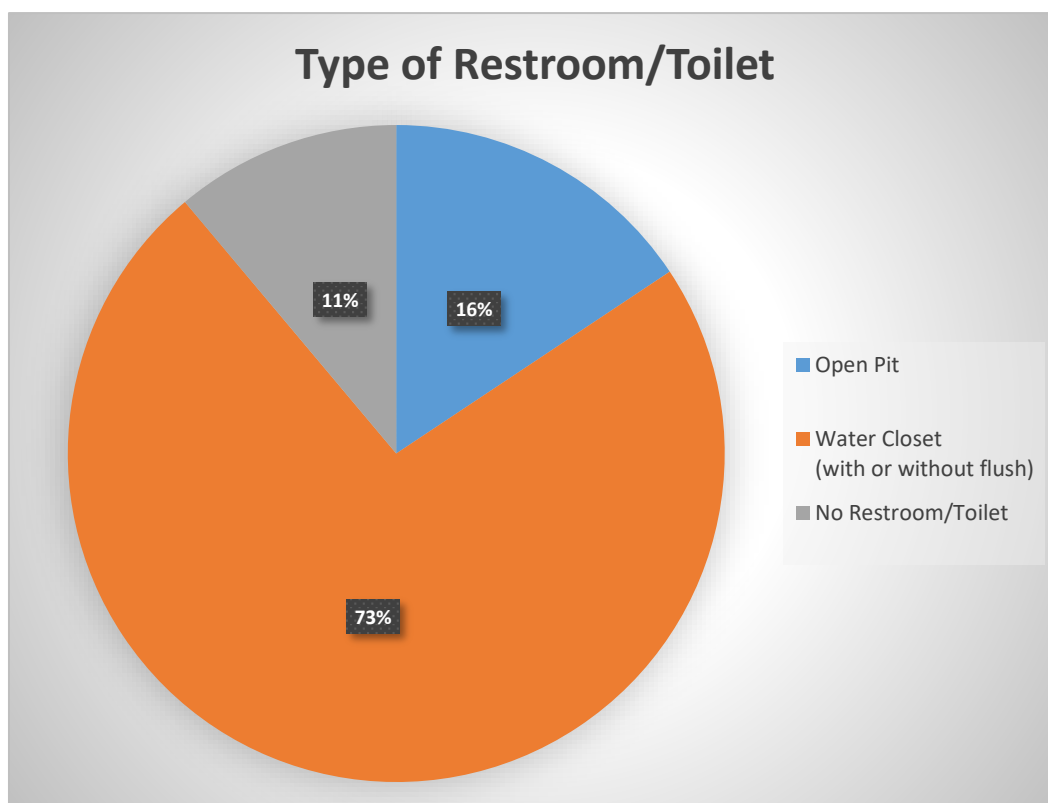
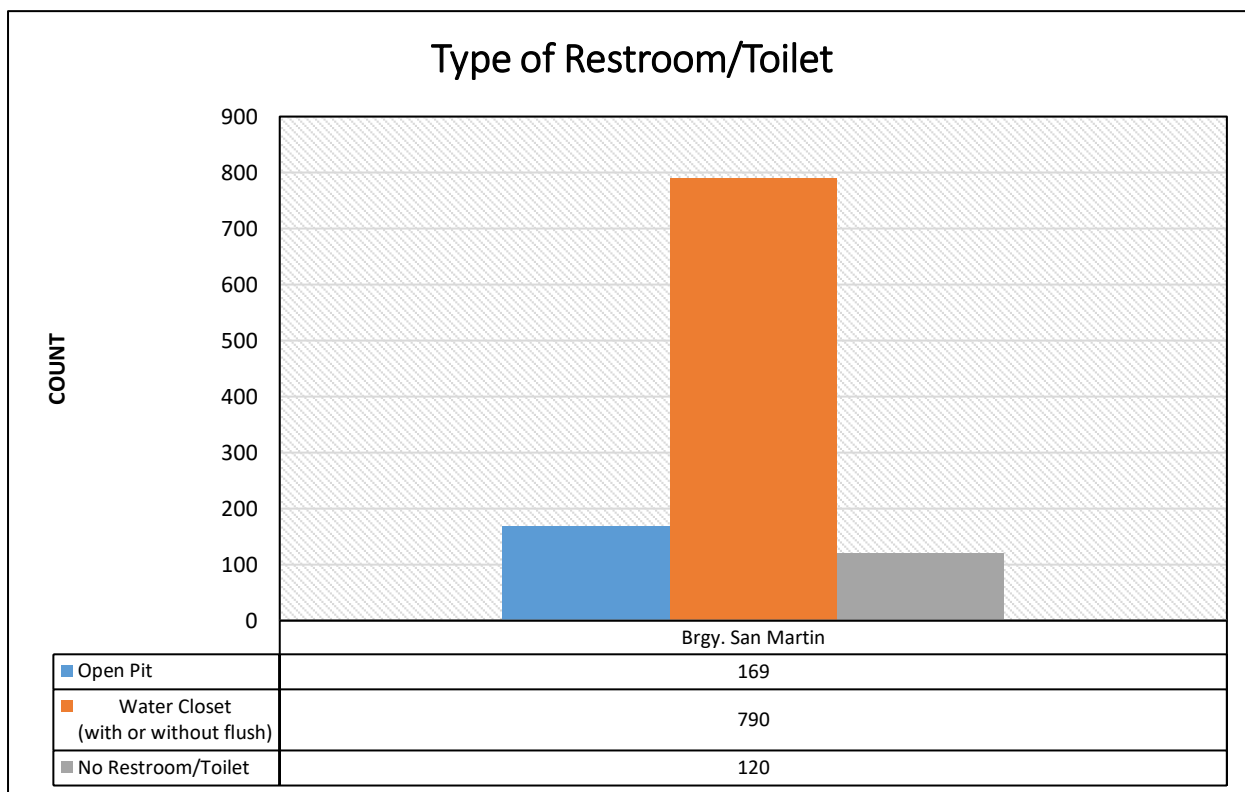
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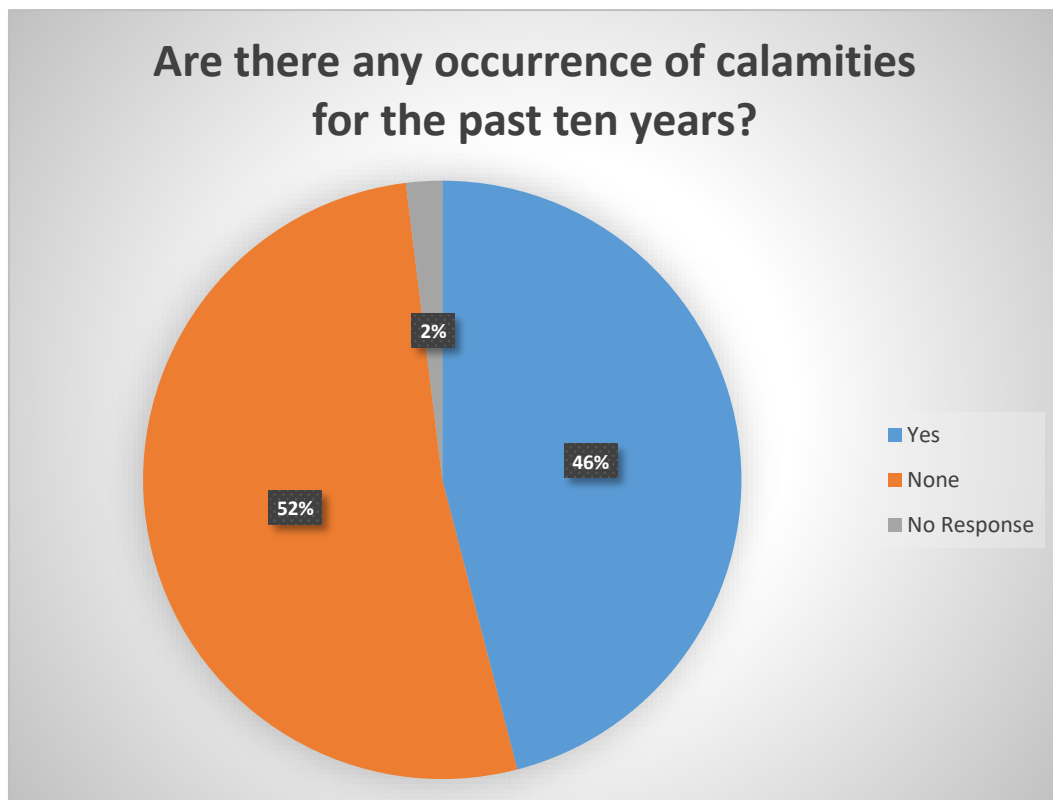
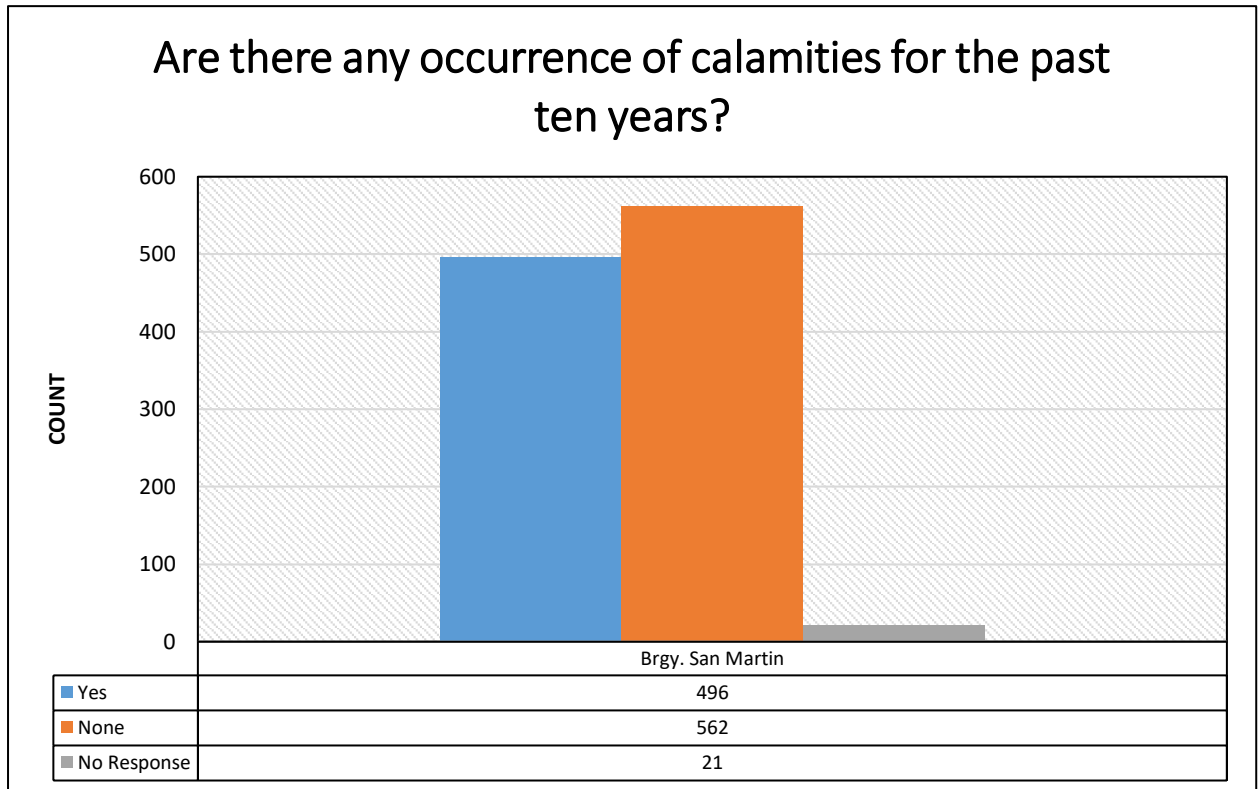


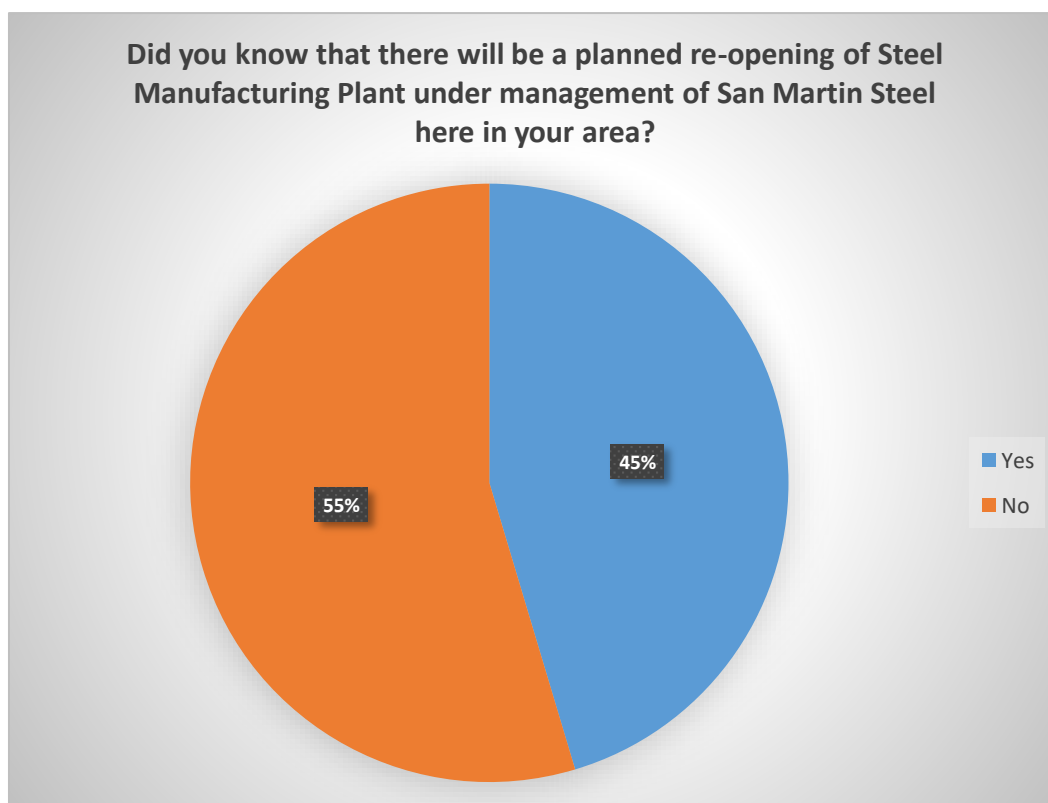
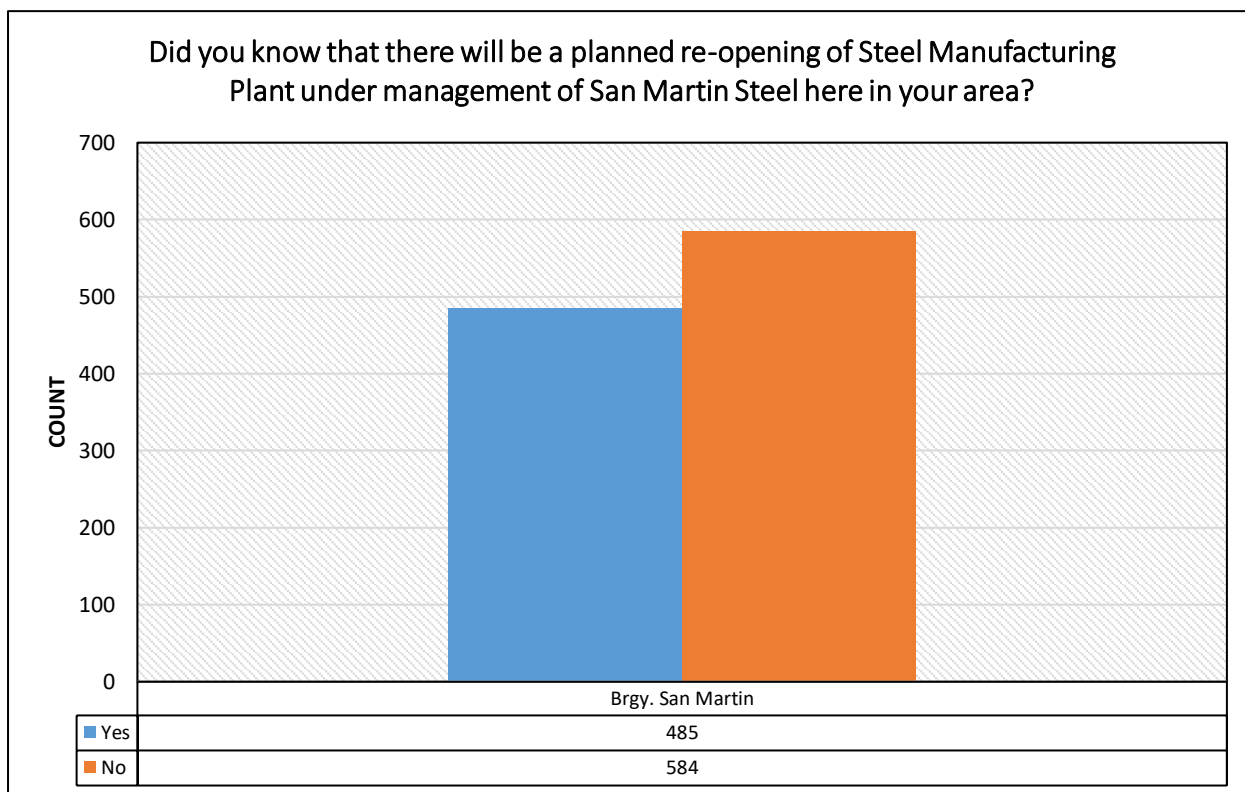


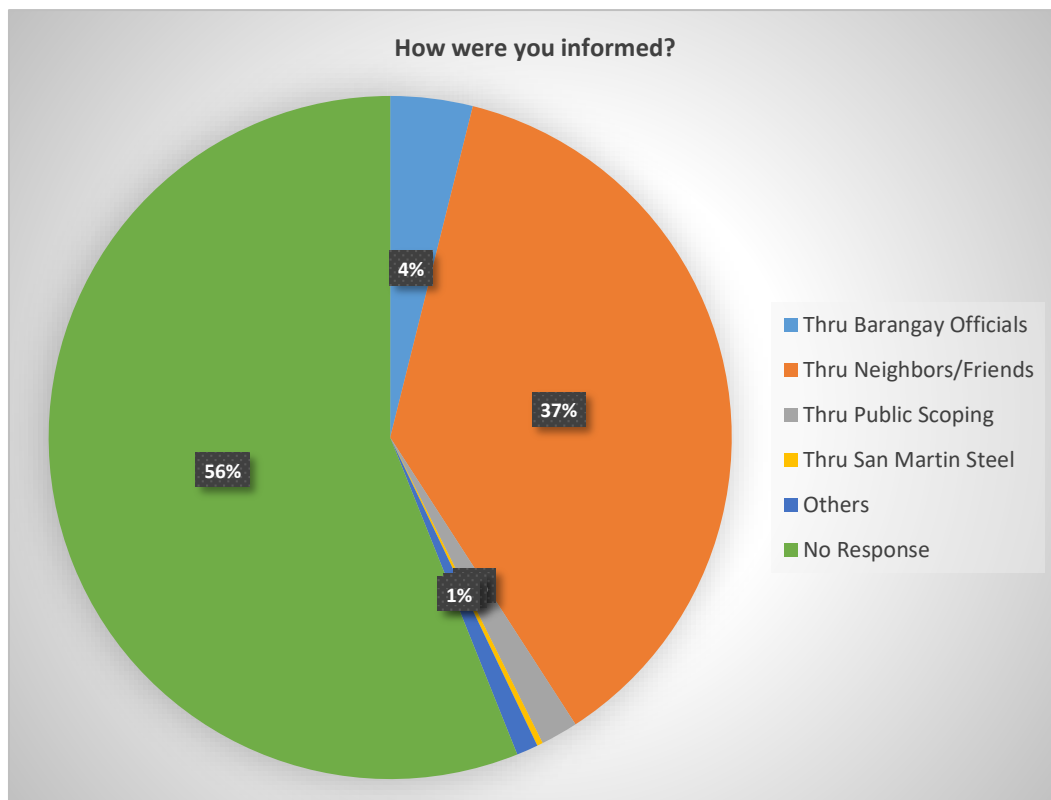
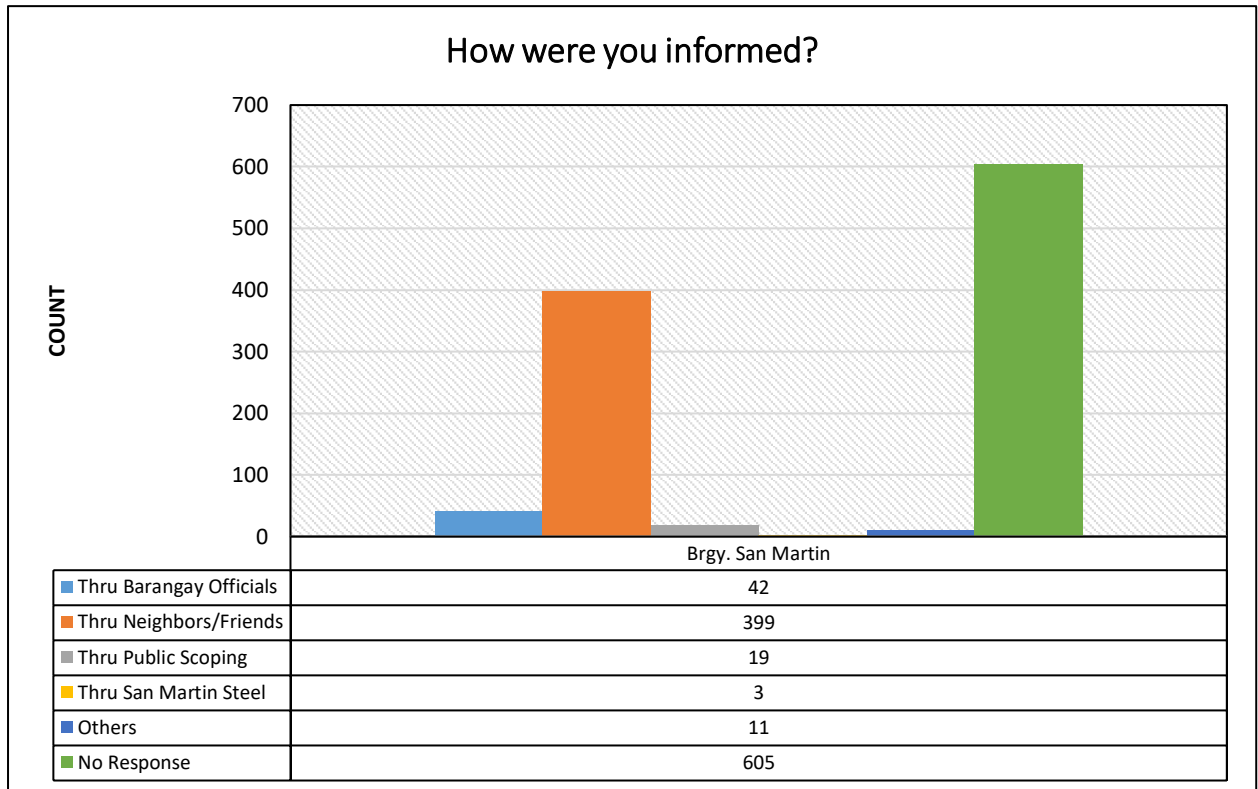


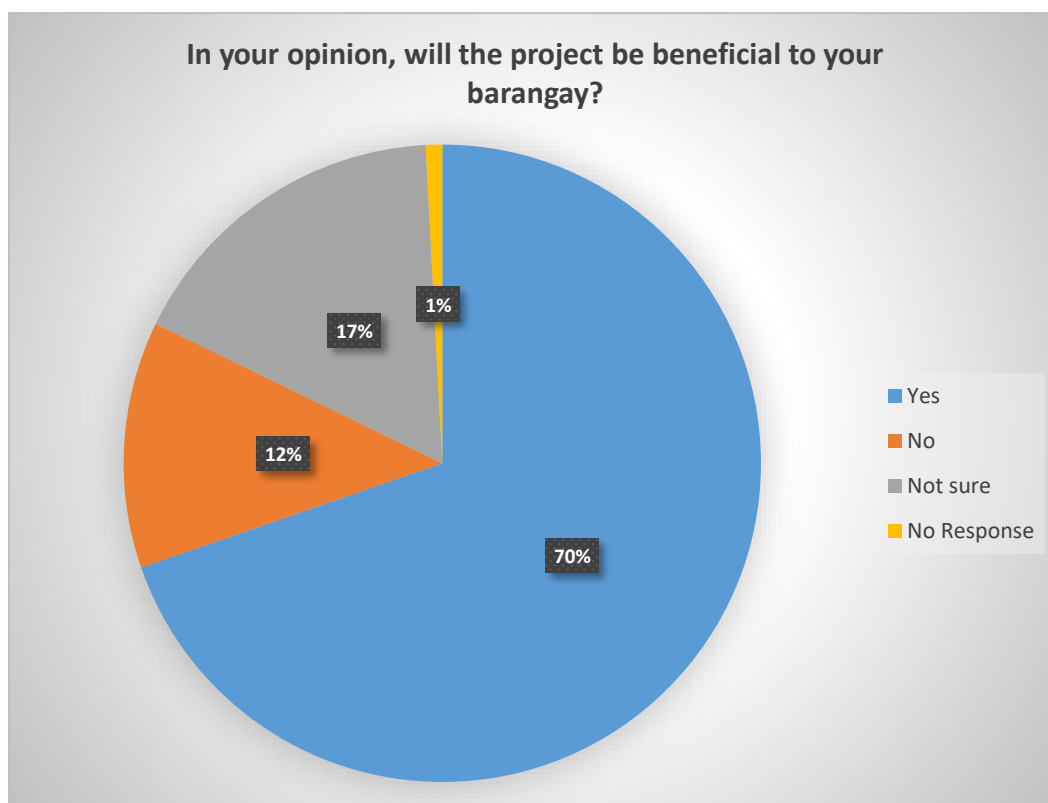
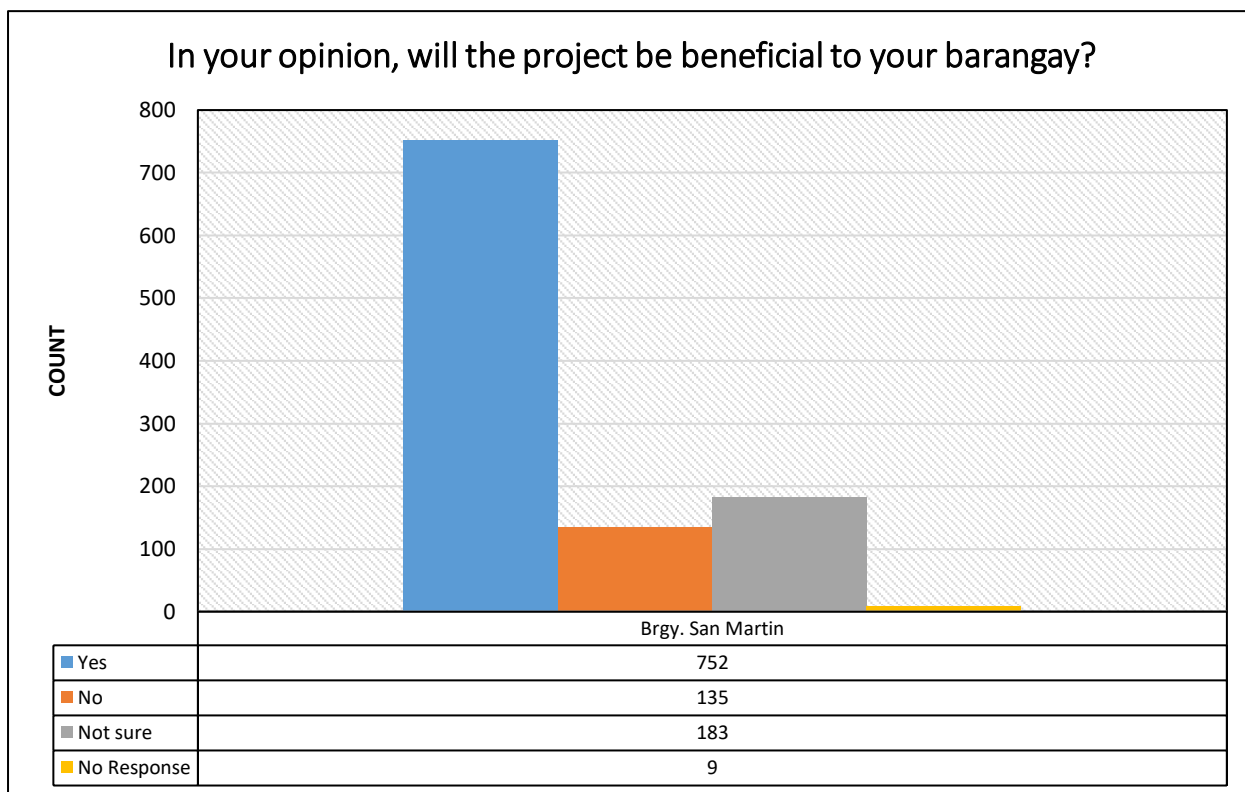


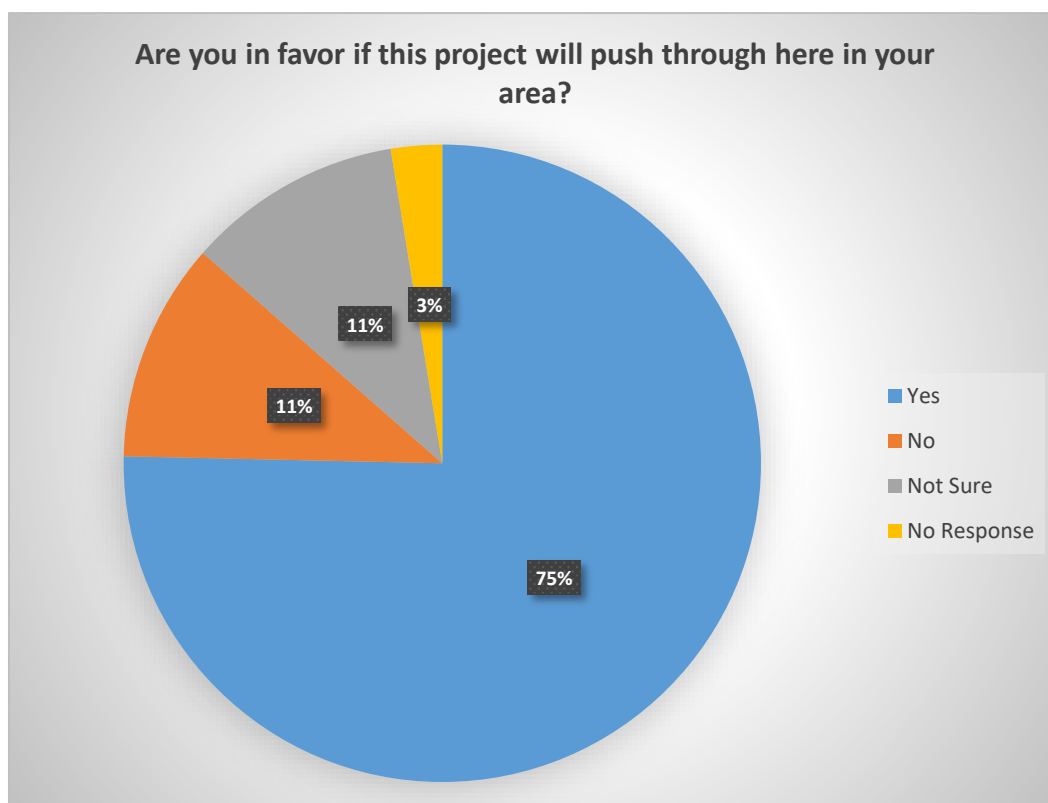
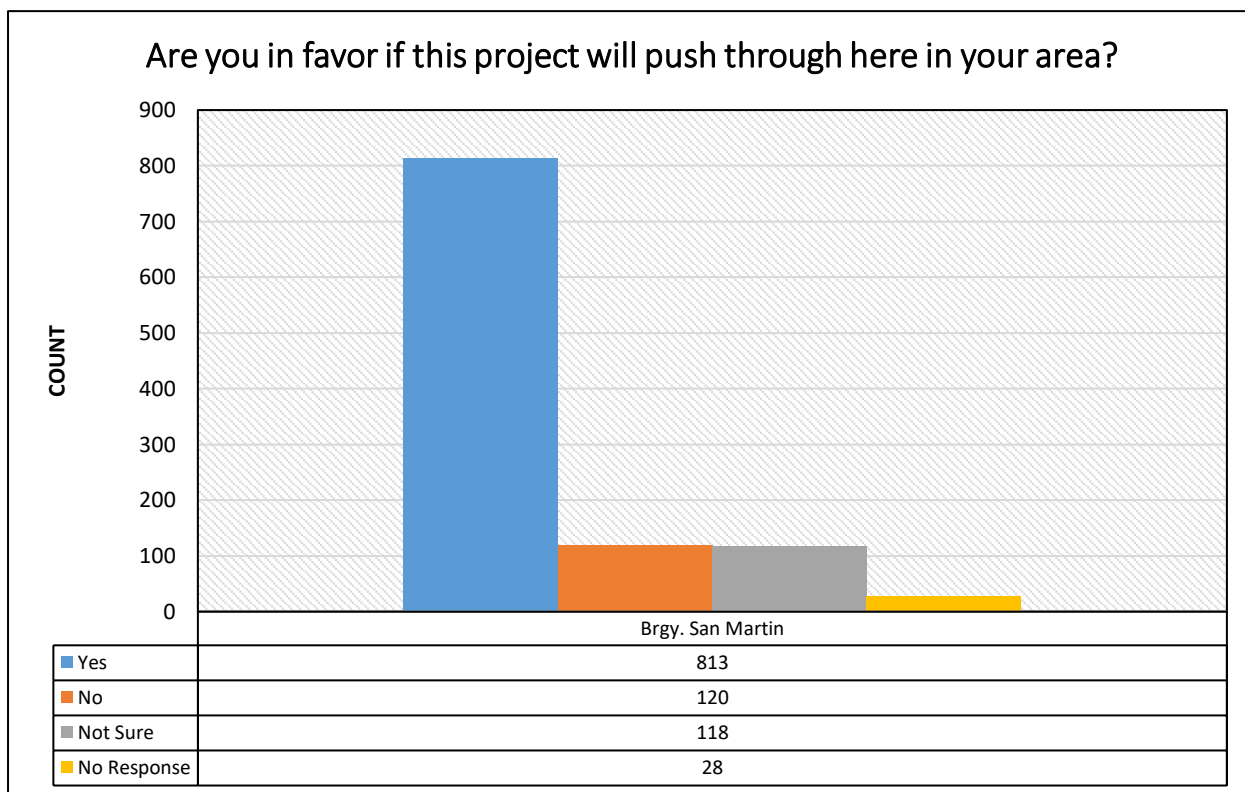












Copy of the survey form used is provided in Annex D.2.

2.4.2 Displacement of settlers

There is absence of settlers in the project area thus there will be no displacement of settlers that will take place.

2.4.3 In-Migration / Proliferation of informal settlers

Immigration is likely to occur brought about by workers from the head office of SteelAsia coming in and out of San Martin because of the Project. Although the company hiring policy will give preference to qualified locals, immigration may further be increased if there are no qualified applicants from the host barangay or municipality. The company will encourage that migrant workers will participate in social activities and social development programs to interact with the community.

2.4.4 Cultural/Lifestyle Change

With the implementation of the project, there will be change in lifestyle of the community that would improve their standard of living. This will be brought about by stable jobs and higher household incomes. As a result, the affected families will be capable of giving their children proper education and widen their opportunities. The company, by example, shall encourage modest lifestyle and simple living standards in accordance with its philosophy. On the contrary, the company will encourage families to participate in livelihood projects that will be sponsored by the company.

2.4.5 Impacts on physical/cultural resources

The project will not affect any physical nor cultural resource in San Martin. It will even support and assist the customs and traditions of the community and assist in the improvement of the physical resources through its social development programs.

2.4.6 Threat To Delivery Of Basic Services /Resource Competition

The Project will not pose threat to delivery of basic services because it will not compete with the services being provided by the local and national government. The Project will even be a partner to deliver and improve the delivery of the basic services for the people because the Project has social development component.

2.4.7 Threat to Public Health and Safety

The Project will not pose threat to public health because all management and mitigating measures will be implemented. Also, the company shall be responsible for the regular check-ups of workers and immediate treatment of any work-related sickness incurred by any worker. The company, as it does in all of its plants, will cover employees and its dependents with an HMO plan. Moreover, the company will have medical and dental missions and other health assistance projects for the community.

2.4.8 Generation of Local Benefits

Following are local benefits that may be generated from the project:

- Enhancement of Employment and Livelihood Opportunities
- Increased Business Opportunities and Associated Economic Activities
- Increased Revenue of LGUs

2.4.9 Traffic Congestion

The expected additional transport vehicles in the area will be tricycles, jeepneys, cars and most significantly, cargo and delivery trucks. Since the road is an existing route, traffic density within the site is high and the size of cargo and delivery trucks may be a potential cause of traffic problem. The company will implement a traffic scheme as follows:

- Marshalling/holding area (no idling zone) is offsite;
- No trucks will be allowed to park outside the Plant compound;
- Comply with government laws on load limit requirements (13.5 metric tons/axle);
- Comply with existing road traffic and smoke belching laws;
- Assist with company's security personnel the traffic entry to and exit from project site;
- Post proper directional and safety traffic signs in coordination with San Martin Traffic Management Office
- Alert concerned government agencies regarding the upkeep and maintenance of the roads.

Delivery of Billets

The capacity of 250,000 Tons per year requires approximately 250,000 Tons of Input billet. Typically, the plant will operate 320 days/yr. A fully loaded truck complying with load limit requirements set by DPWH.

Finished Product

Initially all product will come from the mill to the customers. Ultimately, all product will come from the mill and through the service center. Later when the service center is built, the bulk of 250,000 MT will

be shipped directly from the service center. The traffic to the mill will be through the main existing gate at the

Impacts of the Project on the Existing Traffic

The expected additional transport vehicles in the area will be tricycles, jeepneys, cars and most significantly, cargo and delivery trucks.

During operations, the Plant will produce finished goods of 250,000 tons per year. Likewise, it will consume raw materials (steel billets) of 250,000 tons per year for a total of 500,000 tons of steel materials per year.

A truck can load up to 30 tons per trip. With this, the truck hauling per year of $500,000 / 30 = 16,666$ trucks; which $16,666 / 360$ days = 46.296 trucks per day which is equivalent to $46.296 / 24$ hours = 1.929 or 2 trucks per hour. While trucks hauling consumables such as fuel, oil and lubricants are estimated to be at 1 truck per day or 0.05 trucks per hour. Thus, there will be an average of 2 trucks per hour.

MANAGEMENT PLAN

The concept of the Management Plan is basically premised on the measures that will be implemented by the Proponent in coordination with and authorization of the LGU of San Martin and future (proposed widening and re-concreting of roads and ongoing government infrastructure projects that will contribute to significant reduction of inland traffic and relief in traffic density.

Nevertheless, the following mitigating measures will be instituted:

1. Proper scheduling of hauling of raw materials and finished products in relation to existing truck ban ordinances;
2. No trucks and/or any kind of vehicles, i.e.: cars, motorcycles will be allowed to park outside the mill compound;
3. Designate a substantial area inside the plant site for truck marshalling/holding;
4. Address the parking demands/requirements of employees and visitors through proper allocation of parking slots;
5. Assign a traffic marshals or officers to control the vehicular movements at the entrance / exit of the Project Site;
6. Coordinate with LGU San Martin for crafting of new and better routing scheme within the affected impact zone area;
7. Posting of the project's own traffic enforcers to assist and coordinate with San Martin LGU's Traffic Bureau for orderly flow of vehicle and pedestrian traffic within the identified route of trucks;
8. Post proper and permanent directional and safety traffic signs in coordination with San Martin Traffic Management Office;
9. Assign sufficient number of traffic enforcers during rush hours;
10. Alert concerned government agencies regarding the upkeep and maintenance of the roads.
11. Comply with government laws (DPWH load requirement) on load limit requirements (13.5 metric tons/axle);
12. Comply with existing road traffic and smoke belching laws, and;
13. Conduct free trainings/seminars on Discipline and Traffic Rules Education for all LGU traffic enforcer, Barangay San Martin officers and tanods as well as other interested motorist and pedestrian.

CHAPTER III: ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (EMP) is formulated to minimize the potential adverse impacts while enhancing the beneficial effects of implementation of the project. This EMP shall serve as the environmental monitoring and implementing guidelines for the project.

With the identification of the key project activities at each phase and key impact thereof (Chapter 2) and the delineation of the important baseline conditions (Chapter 3) this Section summarizes the significant impacts and corresponding management plan/mitigating measures.

SMSI is currently implementing the following environmental management measures:

- Waste Management Program intended both for Solid Waste & Hazardous Waste Generation.
- Air Quality Monitoring for 1-unit smokestack annually for parameters SO_x, NO_x, CO, PM, & heavy metals e.g. As, Cr, Pb, Hg
- Ambient Air Quality monitoring quarterly for SO_x, NO_x, CO, & Particulate Matter parameters
- Ambient Noise quarterly during day and night-time
(See graphs attached)
- Tree planting within the SMSI compound which is conducted annually

3.1 Summary Matrix of the Impact Management Plan

Table 3.1 summarizes all the potential impacts and options for prevention.

Table 3.1.1: Summary Matrix of the Impact Management Plan

Project Phase / Environmental Aspect (Project Activity Which will likely Impact the Environmental Component)	Environmental Component Likely to be Affected	Potential Impact	Options for Prevention or Mitigation* or Enhancement	Responsible Entry	Estimated Cost in PhP	Guarantee / Financial Arrangements
I- PRE-CONSTRUCTION PHASE	Sourcing of equipment and contractors; Securing of approvals like ECC issuance, etc.					
II- CONSTRUCTION PHASE	OPTIMIZATION PHASE					
Rehabilitation and upgrading of the Plant	Environmental Aspect # 1: The Land	Generation of debris such as scrap wood and metals and small concrete spills	<ul style="list-style-type: none"> • Temporary area within the site will be designated for storage and segregation • Implement RA 9003 thru provision for Material Recovery Facility (MRF) and practice good housekeeping through segregation of wastes • Implement RA 6969 through Proper segregation and storage of hazardous waste 	Proponent	10,000 min	
	Environmental Aspect # 2: Water	Generation of domestic wastewater discharges	<ul style="list-style-type: none"> • Runoffs will be channeled into a temporary drainage system. • Barracks is equipped with sanitary facilities such as three chamber septic tank 			
Transport of supplies and materials for upgrading	Environmental Aspect # 1: The Land	Generation of dust due to transport of supplies and materials to be used for upgrading	<ul style="list-style-type: none"> • Continuous sprinkling or water in open areas at least once times a day, especially during dry season. • Delivery trucks shall be covered with canvass materials 			
		Degradation of air quality due to SO _x and NO _x emissions from motor vehicles	<ul style="list-style-type: none"> • Regular maintenance of heavy equipment at least once a year and motor vehicles at least twice a year 			

		Safety and health hazards	<ul style="list-style-type: none"> • Strict implementation of Health and Safety Policies at the Plant • Regular conduct of employee safety inspections and toolbox meetings • Regular APE and strict implementation on the use of PPEs • Regular conduct of First Aid Training • Provision of Fire Fighting System 			
		Traffic and road safety	<ul style="list-style-type: none"> • Implement traffic management through proper scheduling of delivery. • Installation of adequate signages approaching National Highway • Provide personnel to manage or direct the vehicle going in and out of the premises. 			
	Environmental Aspect # 4: Air	Generation of fugitive dust	<ul style="list-style-type: none"> • Continuous sprinkling or water in open areas • Delivery trucks shall be covered with canvass materials 			
		Degradation of air quality due to SO _x and NO _x emissions from motor vehicles	<ul style="list-style-type: none"> • Regular maintenance of heavy equipment and motor vehicles 			
	D. People	Safety and health hazards	<ul style="list-style-type: none"> • Strict implementation of Health and Safety Policies at the Plant • Regular conduct of employee safety inspections and toolbox meetings • Regular APE and strict implementation on the use of PPEs • Regular conduct of First Aid Training • Provision of Fire Fighting System 	Proponent	Part of Project Cost	Compliance with Safety Laws, Rules and Regulations
		Employment	<ul style="list-style-type: none"> • Employment generation • SDP • IEC 	Proponent	No cost	N.A.
		Traffic and road safety	<ul style="list-style-type: none"> • Implement traffic management through proper scheduling of delivery. • Installation of adequate signages approaching National Highway • Provide personnel to manage or direct the vehicle going in and out of the premises. 	Proponent	50,000.00	
II- OPERATION PHASE						
Operation of the rolling mill facility on its optimized production capacity	Environmental Aspect # 1: The Land	Solid waste generation	<ul style="list-style-type: none"> • Operation and maintenance of Material Recovery Facility (MRF) • Segregation or establishment segregation within the area is strictly enforced. • Coordination with the local government units for schedule of collection. 	Proponent	10,000.00	RA 9003, ECC conditions and EIS commitments
		Generation of domestic wastewater and sludge from septage	Septic tank management by desludging at least once a year	Proponent	10,000.00	RA 9275

		Possible depletion of ground water source as used by the community	Provide rainwater water harvesting system	Proponent	Part of operating cost	RA 9275
		Effluent generation from cooling and quenching, containing scales and emulsified oil	Construction of wastewater treatment plant for removal of oil and sediments in the process water			
		Possible depletion of ground water source as used by the community	Provide rainwater water harvesting system			
		Water pollution from run-off and domestic wastes	Continuous implementation of Zero Discharge thru recycling of water and water recirculation	Proponent	Part of operating cost	RA 9275
		Generation of hazardous wastes such as used oil, used batteries, contaminated rags, busted bulbs and lamps	Provision of a Hazardous Waste Storage Area with proper labeling, segregation and storage of wastes Transport, treatment, and disposal by DENR accredited third-party contractors			
		Contamination and improper management of hazardous waste materials, e.g. transformer oil spill	<ul style="list-style-type: none"> Provision of Hazardous Waste area with proper labeling, segregation and storage of wastes Management of transformer oil to prevent spills. Storage rooms should have concrete containment. The transformer room/ area should also be designed to prevent accidental spills to contaminate soil in the area. The storage room also for used transformer oils should have containment - this is our Hazmat Storage Facility. Transport, treatment and disposal of DENR accredited third party contractors Provision of secondary containment for oil drums & diesel fuel tanks Provision of oil skimmer for mechanical clean up in case of accidental spillage Proper labelling of oil drums and diesel tanks 	Proponent	15,000.00	RA 6969
Operation of rolling mill facility	Environmental Aspect # 2: Water	Water pollution from run-off and domestic wastes	<ul style="list-style-type: none"> Construction of rainwater cisterns and collection ponds Regular ambient and effluent water quality monitoring using DENR standards Domestic wastewater management by connecting it to the water treatment facility Zero discharge/effluent 	Proponent	Part of Project cost	N.A.
		Water resource use competition/ depletion due to use of river water for make-up water	<ul style="list-style-type: none"> Water reuse and recycling to reduce water requirement Water harvesting 	Proponent	50,000.00	ECC conditions and EIS Commitments

	Environmental Aspect # 3: Air	Possible increase in ambient concentration of PM10, CO2, CO, SOx and NOx	<ul style="list-style-type: none"> Regular maintenance of equipment and making sure the recuperator system is always working Use of low sulfur fuel (LSFO or mixing with Diesel at 60/40 proportion/ratio) Use of enclosures for equipment and insulation for structures Quarterly monitoring of the ambient air to ensure the project's operation is compliant with the clean air act 	Proponent	Part of Project cost	N.A.
		Degradation of air quality due to fugitive dusts from equipment and vehicles	<ul style="list-style-type: none"> Strict implementation of speed limits in vehicles Proper maintenance of equipment Designation of no idling zone Strict implementation of routine plant maintenance and good house keeping Regular wet suppression or water spraying during dry weather condition of the access road Regular maintenance of trucks to reduce or maintain tailpipe emissions 			
		Emissions containing SO ₂ and NO ₂	Use of Low Sulfur Fuel Oil (LSFO), or a mix of LSFO and Diesel as fuel for the reheating furnace			
		Generation of Air Pollution from all sources (Point, Area, Volume, Line, generator set, reheating furnace, rolling mill)	Regular stack test monitoring	Proponent	150,000	RA 8749
		Generation of Greenhouse gas emission	<ul style="list-style-type: none"> Implementation of a reforestation and carbon-sink / greenhouse gas reduction program Use of low sulfur fuel (LSFO or mixing with Diesel) 	Proponent	50,000	
	D. The People	Noise due to plant operations (product handling, waste or by-product gas fans, process cooling and draft fans, dedusting systems, cutting activities, wire rod pay-off units, and transport and ventilation system)	<ul style="list-style-type: none"> Enclose the process buildings and/or insulate structures Maintain appropriate measures and buffer zones along the entire periphery of the industrial complex with appropriate species/dense vegetation cover to enhance the condition of the ecosystem and to serve as noise, vibration and dust buffers; Provision of AC motors Defective equipment/parts with abnormal noise and/or vibration will be either repaired or replaced; All employees working on site will be provided with proper PPE especially ear protectors 	Proponent	Part of Contract	
		Noise from vehicles	The Contractor shall at all times comply with all current statutory environmental legislation especially on noise.			

		Health and safety hazards	<ul style="list-style-type: none">• Strict implementation of Health and Safety Policies at the Plant• Regular conduct of employee safety inspections and toolbox meetings• Regular APE and strict implementation on the use of PPEs• Regular conduct of First Aid Training• Provision of Fire Fighting System	Proponent		
		Traffic due to increase in number of trucks	<ul style="list-style-type: none">• Allocation of open yards and spaces for stationing of the trucks and provide ample parking spaces• Adequate signages and proper scheduled hours for the truck and vehicles coming in and out• Assign traffic personnel to manage the traffic			
II- ABANDONMENT PHASE						
Environmental aspect #1: Demolition of structures	A. The Land	Solid waste pollution/ contamination brought about by scraps and debris from demolished structures	<ul style="list-style-type: none">• Good housekeeping• Planting of endemic species or reforestation	Proponent		
		Oil spill	Conduct of Environmental Site Assessment (ESA) prior to abandonment	Proponent		
	B. Water	Water pollution/ contamination	Conduct of Environmental Site Assessment (ESA) prior to abandonment and provision of rehabilitation and remediation measures if needed	Proponent		
	C. Air	Air pollution because of dusts from demolished structures	Sprinkling of water	Proponent		
		Noise pollution from structures being demolished	Provision of noise barriers during demolition considering Plant's proximity to the subdivision	Proponent		
Environment aspect #2: plant closure or operation stoppage	D. The People	Loss of Jobs	<ul style="list-style-type: none">• Payment of legal social benefits• Retrenchment package• Labor support programs	Proponent		
		Loss of community income	Provision of sustainable livelihood programs under SDP			

Currently, over-all, the environmental performance of the Plant is compliant with the standards set by law and by DENR and the environmental safeguards/measures for the current project operation are sufficient and effective as the test results are all compliant with the standards set by DENR and by law. However, this will be improved through better equipment efficiency thru optimization and better pollution control measures such as dust capture thru dust collectors and dust management system, water recirculation with recycling and additional safety measures.

CHAPTER IV: ENVIRONMENT RISK ASSESSMENT AND EMERGENCY RESPONSE POLICY AND GUIDELINES

4.1 Introduction

Human safety is the major concern of the Environmental Risk Assessment (ERA) in the context of the PEISS. DAO 2003-30's RPM defined ERA as "a process of analyzing and describing the risks associated with a project activity to ecosystems, human health and welfare".

San Martin Steel, Inc. has high regard to the environment and is committed to serving its consumers' and stakeholders' social and economic needs by providing livelihood projects, technical trainings and career opportunities to deserving local residents of Brgy. San Martin.

Annex 2-7e of the RPM provides for the guidelines on the degree of ERA requirements and preparation as provided below:

- Level 1: Preparation of an Emergency/Contingency Plan
- Level 2: Preparation of an Emergency/Contingency Plan and ERA Report

4.2 Scope and Coverage

As required in the technical scoping agreement, the ERA details for this section will only be limited to the information provided in the succeeding section. These information will also provide the basis for further quantitative risk assessment in case will be required in the post EIA stage/process.

- a) Presentation of the different type of safety associated risk relative to the project's operation;
 - Includes discussion on the conditions, events and circumstances which could be significant in bringing about identified safety risks
 - Description & assessment of the possible accident scenarios
 - Description of the hazards, both immediate (acute effects) and delayed (chronic effects) for man and the environment posed by the release of toxic substance (include unloading of raw materials/fuel), as applicable
- b) Presentation of the different type of physical risk associated to the project's operation;
 - Identification of conditions, events and "trigger" which could be significant in bringing about identified physical risks
 - Description & assessment of the possible accident scenarios
 - Description of the hazards both immediate (acute effects) and delayed (chronic effects) for man and the environment posed by the failure of structure, as applicable.
- c) Risk or Hazards Management measures or the general emergency procedures during the worst case scenario

4.3 Type of Risks

4.3.1 Safety Risks

Fire

Description and assessment of the possible accident scenarios

Probable major fires may not occur at the Plant. As an emergency measure, firefighting facilities, principally fire water lines, fire extinguishers and water hose stations and hoses will be installed at the Plant premises. Alarms will also be installed.

Explosion

Identification of conditions, events and circumstances which could be significant in bringing about identified safety risks

The elements for explosion which are the extraordinary/release of energy accompanied by rapid increase in volume of explosive materials are not present in this Project.

Description and assessment of the possible accident scenarios

The possible accident scenarios and the affected population are related to the operation of the major plant equipment and auxiliaries which are not present in this Project.

The instrumentation system of the plant is provided with control, measurements, recording and response mechanism to prevent equipment failures that may result in accidents. Pressure relief valves are installed in sensitive points to cause release of gases away from personnel. Unit or equipment shutdowns are automatically built in the instrumentation system.

Movement of personnel to high structures.

Plant operators and maintenance personnel may necessarily climb to high structures as routine part of their functions. Thus, the potential for falling off from these structures exist.

Movement of vehicles

Delivery trucks for materials will necessarily enter the plant premises. Only accredited vehicles and drivers may be allowed to enter the plant, Road signages will be posted conspicuously at strategic places.

4.3.2 Release of Toxic Substances

There are no toxic substances associated with the Project. Even if such is the case, the proponent will implement health hazard control programs on different levels as follows:

- A. Engineering controls
- B. Administrative controls:
 1. workplace and community level monitoring for noise, dust and smoke emissions;
 2. information, education and training strategies for workers
 3. dialogue, information and education of community members on health hazards of concern;
 4. provision of adequate housing and sanitary facilities for workers;
 5. personal hygiene facilities for workers; and
 6. immunization and/or medical prophylaxis for areas where endemic diseases are present.
- C. Personal protective equipment (PPE):
 1. dust mask and other respiratory protection or workers;
 2. ear protectors (either muffs or plugs) for workers; and
 3. hard hats and other safety PPE for workers.
- D. Proper storage of hazardous waste

Storage is the holding of waste for a temporary period of time prior to the waste being treated, disposed, or stored elsewhere. Hazardous waste is commonly stored prior to treatment or disposal, and must be stored in containers, tanks, containment buildings, drip pads, waste piles, or surface impoundments that comply with DENR regulations.

Busted lamps and bulbs and used automotive batteries are among the hazardous wastes that may be generated. These may be stored in containers or any portable device in which a hazardous waste is stored, transported, treated, disposed, or otherwise handled.
- E. Disaster management prevention and minimization:
 1. there must be a provision for a medical clinic at the plant site;
 2. first aid and emergency plan for plant accidents which needs trained people and detailed steps to include transport facilities and communication with the referral hospitals;
 3. disaster plan in case of excessive emissions of pollution, and

Toxic Metals in Air

Under the Philippine Clean Air Act, the emission limits for stationary sources (new facilities) for mercury and lead are: 5 mg/NcM and 10 mg/NcM respectively.

Under the Toxic and Hazardous Wastes Law (R.A. 6969) following are the limits for metallic elements:

<u>Elements</u>	<u>Maximum Concentration</u>
• Mercury & mercury compounds	Includes all wastes with a total Hg concentration > 0.2 mg/ Also include organ mercury compounds

- Lead compounds Includes all wastes with a total Pb concentration > 5 mg/l

Complete inventory of hazardous wastes, incorporating the inventory in the emergency response plan for hazardous wastes with high risks

Or

List of the Identified Hazardous Substances within the Plant and its Physical and Chemical Properties

Nature of hazardous wastes	Source/Generator	Inventory (Initial estimate only)
Accidental Oil spills	From vehicles and plant	Variable but small in quantities
Spent lighting bulbs	Equipment Lighting for Offices and Plant premises	To be determined but small in quantity
Spent computer parts for office use only	Office computers	Small in quantity
Oil Sludges	From Storage Tanks	Generated only during tank cleaning which is undertaken after several years of operation, thus minimal volumes

4.3.3 Physical Risks

Breakdown or Failure of Equipment and Facilities

Temperature Extremes as Precursor to Accidents

At worst case scenario extreme temperature rise is predicted at 2.4°C for a short term period of June/July/August in 2050. At the peak ambient temperature at this time of 29.3°C the effect on operations and maintenance personnel is unlikely.

Indirect adverse effects even if unlikely have to be factored in the design of equipment and safety system, noting that process design take into consideration ambient conditions, e.g., temperature. Failure of systems (e.g. instrumentation) may in theory trigger accidents.

Rainfall Extremes as Precursor to Accidents

Aberrations in predicted rainfalls are seen from the above table. Certain months exhibit decrease in rainfalls while in other periods increase is predicted. These predicted increases are however, not expected to trigger accidents in the operation of the plant. Potential effects of heavy rainfall is flooding. The plant however is designed with appropriate drainage system.

4.3.4 Hazards

Natural Hazards

"Hazard is a potentially damaging physical event, phenomenon or human activity, which may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. It can include latent conditions that may represent future threats and can have origins, natural (geological, hydrometeorological and

"Natural Hazards" are the natural processes or phenomena occurring in the biosphere that may constitute a damaging event. It can be classified by origin: geological, hydrometeorological or biological.

Floods

Floods usually occur during or after heavy rainfall wherein the river channels are saturated with water resulting to river swelling and overflowing of floodplains. The project area falls moderate susceptibility to flooding as delineated by Mines and Geosciences Bureau. The project site, could experience "localized flooding" if the drainage systems are inadequate and not fully maintained.

Earthquake

Earthquake is the perceptible trembling to violent shaking of ground caused by either tectonic movements or volcanic activity. The Philippines is located near or along the so called "earthquake belt"

and is prone to seismic hazards. Areas that are susceptible to this seismic hazard are those underlain by unconsolidated soils and sediments deposited on the low-lying areas.

Social

In terms of Social aspect, following are the concerns during abandonment phase:

- ✚ Loss of jobs thru loss of income
- ✚ Loss of taxes paid to the government
- ✚ Loss of independent economy dependent on the project
- ✚ Loss of projects by contractors

SMSI is implementing an emergency response procedure which includes Medical Emergency, Natural Disaster, Oil and Chemical Spill, Civil Disturbance, Fire and Explosion.

Continuous implementation is practiced such that conduct of announced and unannounced drills at least twice a year involving other government agencies e.g. BFP, Phil. National Red Cross. Formation of different teams for emergency cases are also implemented such as Fire Brigade team, Search & Rescue team, Medical Response Team, Spillage team and Evacuation team involving competent & duly trained SMSI employees.

Specifically, the Emergency Response and Disaster Preparedness Plan (DPP) of SMSI is provided below:

4.4 Emergency Response and Disaster Preparedness Plan (DPP)

1. Introduction

The Emergency Response Procedure (ERP) is a consolidated compendium of guidance for management of emergencies in all phases of the project cycle starting from the construction/optimization stage to the abandonment phase.

An Emergency Situation is defined as any situation or occurrence of serious nature which may develop suddenly and unexpectedly, posing threat to life, property or even the environment that demand immediate action, including, but not limited to accidents, fire, explosions, acts of terrorism and sabotage.

The success of this plan depends upon the cooperation of everybody at the site of an emergency and adherence to safety precautions and directives of this plan. The prime concern is everybody's safety which requires unwavering discipline and preparedness.

This plan reflects the Management System that is applied to ensure compliance with San Martin Steel, Inc.'s standards and other applicable Philippine legal requirements pertaining to rolling mill operations.

The scope of this "Plan" is to set the minimum standards required and identifies the persons responsible for applying safe working conditions, procedures and practices including emergency situations potentially arising from plant operations. Whether natural or man-made the accidents or consequences of hazards will not be societal in scope but most confined to the plant personnel.

Notwithstanding that there are preventive measures to be undertaken, e.g. in the storage of diesel oil, it is prudent for operating companies to develop their internal response plans.

The response and procedure will depend on the nature of the emergency and will include the following generic guidelines:

- Establishment of official detailed responses per type of emergency: Thus each plan would be relevant to emergency situations such as fire, earthquake, and even from attacks of criminal elements.
- Contact of necessary and important agencies and offices outside of the plant and facility for assistance depending on the type of emergency;
- Sought after or obtaining the assistance of the Disaster Reduction and Management Coordinating Council;
- Conduct of emergency drills with emergency evacuation as an integral part of the drill;
- Installation or securing of necessary emergency response facilities/equipment, e.g. firefighting system, oil spill containment boom (in an event of accidental oil spill at the jetty), vehicles for use in emergency cases, situations and disasters; and

- Setting up of communication lines, e.g. with barangay, fire department, police department, clinics or hospitals.

During actual emergencies

- Designation of on-site emergency marshal;
The on-site team leader should be pre-determined. Night shift supervisors are the logical leaders during night time emergencies.
In case of more serious situations, the on-site team leader may have to call assistance from his supervisor who may be outside the plant premises.
- Communicating with outside parties for help when necessary:
Contact numbers and means of communications should be well established and be posted in conspicuous places in the plant premises and buildings.
- Execution of emergency procedure; and
As a basic first step, emergency alarm signals should be set on. The alarms may be coded depending on the type and seriousness of an emergency.
- Evacuation of personnel: Evacuation routes should be well defined and known to the plant personnel.

After emergency

- Audit or investigation of cause of emergency, if man-made such as fire;
- Assistance to injured people

2. Purpose

The ERP will serve the following general and important purposes:

- Guide and assist the proponent including all its employees, contractors' management, and other service provider/suppliers to handle emergency situation;
- Pre-identify responsible parties including their roles and responsibilities in handling emergency situations and cases;
- Achieve Zero Loss Time Injury, Occupational Illness and minimize the rate of incidents
- Comply with the Philippine legal requirement and international standards for handling emergency, health and safety practices and measures; and
- In case of emergency situations/cases and abnormal conditions, prevent contamination to ground water, surface ground stability, destruction of flora and fauna and if they occur take measures to manage them in timely, safely and environmental friendly manner.

3. Emergency Action Team (EAT)

The Emergency Action Team (EAT) shall be responsible for execution of the ERP. The Team is composed of:

During the Construction/Optimization Work:

- Chief Marshall – Construction/Project Manager,
- Members – LGUs including the Police Department, Fire Department, National Risk Reduction Committee members and the Health Department.

Under the general supervision of the Project Manager, the EAT will be responsible for providing direction, guidance, and taking appropriate measures in safeguarding life and property. The EAT will also maintain close liaison with the Project Proponent and affected communities/people.

During the Operations Phase:

For serious accidents or emergencies, the EAT shall be headed by the most senior personnel of the Proponent who would be at the site of the emergency.

Emergency Action Officer

Emergency Response Procedures shall be under constant close supervision of the Emergency Action Officer (EAO). The EAO shall maintain central control of the execution of the plans. All incidents under emergency situations shall be reported to him. The EAO shall command, coordinate, communicate and direct necessary actions and measures. The mandate of EAO is to establish command and control. However, this does not preclude abstinence of others, especially supervisory employees, from emergency tasks requirements.

In addition to the emergency duties, the EAT shall provide training and/or arrange drills around the year so as to train employees on handling emergency situations.

Threat/Emergency Analysis

When there is an emergency incident e.g. fire or any type of threat or emergency as mentioned below, the first person who sees, hears or recognizes danger should immediately inform the EAO.

Designation of Safe Haven

Safe Haven is a place of safety, shelter, refuge or rest where there is no danger to life. Based on the type of incident, the safe haven shall be determined and designated where the people affected by an emergency situation shall proceed. In case of fire or explosion, the Safe Haven shall be the open space distant from the fire site.

By nature of the project the site is an open area; the safe haven should be pre identified and well informed to all the personnel.

Evacuation Policy

In the event of any emergency, an alarm or siren or alternately a sound generating device shall be blown / activated. The alarm may be coded to signify the intensity and nature of the emergency situation. The EAO shall direct and provide guidance to all persons affected. All affected persons shall be enjoined to strictly follow as instructed.

The evacuation route/roads will be clearly delineated.

4. Standard Operating Procedures

Fire

All persons near the fire site should be evacuated. Firefighting shall be handled by the EAO in the beginning until assistance from the LGU shall have been obtained.

Acts of Sabotage

Act of sabotage may cause fire, explosion, or damage to life and property. If a threat of sabotage is identified, the Emergency Action Team shall analyze and assess the impact of such sabotage and will determine course(s) of action. The EAO shall maintain liaison with the concerned government agency (ies) e.g. Bureau of Fire Protection, Police Department, etc. Should a fire or explosion happen due to sabotage, the corresponding procedure specific to the situation shall be followed.

Terrorist Attacks or Kidnappings

The EAT shall analyze, assess and maintain constant but safe contact with the attackers, review all incoming and outgoing communications, designate or task others for action. The EAO shall ensure compliance of the planned strategy and psychological tactics to counter terrorism and provide guidance for dealing with these incidents. An officer shall be designated to maintain direct or indirect contact with the kidnappers, maintain liaison with the Client and other pertinent Government Agencies, principally the police or the military.

Natural Disasters

Natural disasters such as landslides and earthquakes are beyond human control with respect to occurrences. The EAT shall analyze the situation and take appropriate measures. In the event of earthquake, workers shall come out of their workplaces, wear hard hats, and assemble at Safe Haven. Search and Rescue Team shall start search and rescue operations when needed.

As a matter of complete guidelines natural disasters are included although the occurrence of such are deemed remote.

Severe Weather Disturbances

Extreme rainfall and strong typhoon events should be prepared for.

The most effective measure is precautionary action. Constant communications with the PAG ASA and the NDRMC should be made. Warnings which are posted at the websites should be constantly referred to. Work stoppage may be mandated by management when severe weather disturbances may be forthcoming. The movements of vehicles should be regulated on account of dangers slippery roads.

Search and Rescue Team

This team shall work in close cooperation with the LGUs. The primary function of this team is to handle the smooth evacuation of personnel, supplies and personal belongings during the emergency. It is also the duty of this team to rescue personnel trapped or injured in any of the rooms of the building.

Coordination and Communication

One of the most important aspects in any Emergency Response Procedure is efficiency of immediate communications with the parties which will manage an emergency situation.

In an event of fire, explosion or an act of terrorism and sabotage, the EAO shall maintain constant coordination and communication with other senior officers at site or the department heads to locate employees trapped in a work area and take appropriate measures to evacuate them.

Transportation

The EAO shall plan ground transportation of personnel or evacuees for transport to the city, hospital, medical professionals, etc.

Funds and Expenditures

Under the direct supervision of the Project Manager, the EAO shall manage funds for meeting emergency expenditures. This includes, but is not limited to, transportation, medication, expenditures arising out of emergency treatment, hospital and medical expenses, etc.

During the operations phase, the Proponent shall ensure that the emergency response plans are properly supported by funds and resources, the latter involving people and equipment.

Emergency Numbers/Contact Persons

A list of the emergency contact numbers, typical of which is shown in Table 7.1-1 should be in the possession of all plant personnel.

Table 41-1: Proforma List of Emergency Contact Numbers

Agency Resources/Contact Persons	Telephone No.
LOCAL GOVERNMENT AGENCIES	
Barangay Captains	
Fire Station	
Hospital	
Police Station	
Local office of the National Disaster Management Council	
PROONENT'S PERSONNEL	
Plant Manager	
Safety Engineer	
CONTRACTOR'S PERSONNEL	
Project Manager	
Site Engineer	

The emergency numbers/contact persons shall be posted in conspicuous places especially in the offices and in the toll booths, the latter during the operations phase.

Emergency Drills

A protocol will be developed for the conduct of emergency drills at regular schedules.

Administration of first aid especially involving vehicular accidents is among the important drills/training that will be imparted to the EAO for the operations phase.

Trainings and Seminars

The Proponent shall organize and conduct regular trainings and seminars to be conducted by professionals in safety and emergency management. Attendance to these on the part of the personnel shall be compulsory. Members of the LGUs as well as heads of community sectors/sitios/tribes shall be invited as well for their own education.

Among the topics to be discussed during these training programmes are: proper use of Personnel Protective Equipment (PPE), First Aid, Basic Life Support such as Cardiopulmonary Resuscitation; training in the handling of injured persons; training in search and rescue operation and fire-fighting. The assistance of NDRRMC at least from the City level in conducting drills or training for earthquake situations should be explored.

5. Institutional Set Up

The Plant Team will constitute themselves as the Emergency Response Team. Inasmuch as by its nature the occurrences of emergency situation cannot be reasonably anticipated the most senior personnel at the scene of an emergency situation will be designated as On Site Emergency Marshall. The supporting personnel will be dependent on the nature/extent of the emergency and the number of persons who may be exposed.

CHAPTER V. SOCIAL DEVELOPMENT PLAN (SDP) AND IEC FRAMEWORK

5.1 The Social Development Plan (SDP)

SteelAsia and Sustainable Development

Business activities that are *sustainable* are those that positively reinforce a company's feasibility over the longest conceivable term. Thus, activities that create a social or ecological impact that in turn increase the long term viability of a company are sustainable.

As part of SteelAsia's mission, CSR or being socially responsible means ensuring that stakeholders of our business, including the community, labor, the local government, and local business, suppliers and customers among others benefit from our business and support it as well in a manner that is long-term and reinforcing. CSR is embedded into SteelAsia's business model, and are never separate activities distinct from the main activities and purposes of the company. For our country, this is being **part of the solution**.

SanMartin Steel as part of SteelAsia Group is currently undertaking SDPs in consonance with its Corporate Social Responsibility (CSR) mission, which includes but not limited to the following:

- Livelihood training programs with the Samahan ng Kababaihan sa Pangkabuhayan to make rugs, potholders and ecobags
- Adopt a School Program and Brigada Eskwela with DepEd
- Environmental/Climate Mitigation Actions: Reforestation and Carbon Sink Programme
- Water supply and health hazards: installation of reverse osmosis (RO) system for potable drinking water supply for all employees, duly monitored quarterly for its bacteriological and physico-chemical analysis using DOH & PNSDW standards.

The SDP provided in the Table 5.2-1 below shows the programs needed by the community based on the perception survey conducted and issues and concerns raised during the Public Scoping and Public Consultation.

Attached in Annex D.1 is the complete documentation of the Public Scoping.

Table 5.2-1: Social Development Plan (SDP)

CONCERN	Responsible Community Member / Beneficiary	Government Agency/ Non-government Agency and Services	PROPONENT	Indicative Timeline	Source of fund
Livelihood / Employment (Men, Women, Youth & elderly) • Sustainable livelihood training programs (rugs, potholders and ecobags) • Skills training	Qualified Project Affected Men, Women, Youth & Elderly	<ul style="list-style-type: none"> • Barangay Council • City Council • TESDA • Samahan ng Kababaihan sa Pangkabuhayan 	Community Relations Officer	Operation	Proponent
Education and Recreation • Scholarship • Adopt a School Program • Brigada Eskwela	Barangay Kagawad for Education • Project-affected Families • Target School	<ul style="list-style-type: none"> • DepEd 	Community Relations Officer	Operation	Same
Environment and Sanitation • Reforestation and Carbon-Sink Program • Tree nursery • Climate Change and Disaster preparedness • Coastal and river clean-up • Water supply and health hazards: installation of reverse osmosis (RO) system for potable drinking water supply for SMSI employees, duly monitored quarterly for its bacteriological and physico-chemical analysis using DOH and PNSDW standards	Barangay Kagawad for Environment • Project Affected Community	<ul style="list-style-type: none"> • CENRO • MHO 	Community Relations Officer	Operation	Same
Peace and order	Barangay Kagawad for Peace and order	<ul style="list-style-type: none"> • LGU • PNP 	Chief Security Officer	Operation	Same

CONCERN	Responsible Community Member / Beneficiary	Government Agency/ Non-government Agency and Services	PROPONENT	Indicative Timeline	Source of fund
	• Project Affected Community				
Medical Assistance	Barangay Kagawad for Health and Sanitation • Project Affected Community	• LGU • MHO	Municipal Health Officer	Operation	Same
Free Blood Sugar, Cholesterol and Uric Acid Test, Free Nerve & Bone Screening for SMSI employees	Barangay Kagawad for Health and Sanitation • Employees	Proponent	Resident Manager		

Also, the prospective multiplier effect of the project such as business opportunities, support to basic services like infrastructure and medical assistance and other opportunities for the community and LGU will likely lose when the project is not pursued.

Provided below are the current accomplishments of SanMartin in implementing CSR programs.

A. Adopt a School Program

San Martin Steel Inc. (also known as SteelAsia - Villanueva Works) responded to the call of the Department of Education to revisit and strengthened Republic Act 8525 in order to build and sustain a mutual connection between DepEd and Stakeholders to participate in nation building through investments in the education of Filipino children. Section 2 of RA 8525 “ It is the policy of the State to provide quality and relevant education to the Filipino youth and to encourage private initiative to support public education. Towards this end, the State shall institute programs to encourage private companies and enterprises to help in the upgrading and modernization of public schools in the country, particularly those in poverty-stricken provinces.”

San Martin Steel Inc., represented by its Resident Manager Jacques C. Maandig, donated worth Php 14,932.15 of deformed rebars for San Martin Elementary School children's Comfort Room construction dated August 27, 2019. The rebars were accepted wholeheartedly by the school property custodian representing the School Principal Mr. Genes P. Lesaca, witnessed by the elementary school teachers and pupils and SteelAsia's representatives.



Plate 5.1.1: Photo documentation of Adopt a School Program

B. Brigada Eskwela 2019

INTRODUCTION

The traditional way of "Filipino Bayanihan" where barrio men carrying a bahay -kubo has now been evolved into its modern way "Brigada Eskwela" where volunteers from different sectors of society come together to help repainting classroom walls, ceilings and blackboards, cleaning surroundings, repairing perimeter fences in public schools in preparation for the upcoming opening of Elementary and High School classes.

SteelAsia being a strong advocate of quality education for Filipino children, donated several resources like product rebars, several cleaning tools, paints and its additives and even manpower to the cause. Spearheaded by the Resident Manager Jacques C. Maandig, the said activity has been carried out successfully with the help of its committee represented by different volunteers from different department of San Martin Steel Inc.

Brigada Eskwela is a confirmation or proof that a strong partnership between private stakeholders like SteelAsia/San Martin Steel Inc and with government agencies like DepEd is indeed possible. It is a way of "bringing the spirit of education to the community" through our voluntary efforts and donation of additional resources to help improve public schools. As we continually carry-out our corporate social responsibility programs year after year, we'll surely be able to help uplift the social and economic conditions of the Filipinos particularly the marginalized areas of the society.

Opening Program on May 20, 2019 – Villanueva Senior High School with Schools Supervisor Cydel P. Valmores and Johnny Redondo of DepEd, School Head (Virgilio Diaz), PNP representatives and SanMartin Steel Inc./SteelAsia (RM Jacques C. Maandig).

Beneficiary School 1: Villanueva Senior High School – Brgy. San Martin Villanueva Misamis Oriental



Roles & responsibilities briefing with Resident Manager Jacques C. Maandig



**Beneficiary School 2: Kirahon Elementary School – Sitio Kirahon Brgy. San Martin Villanueva
Misamis Oriental**

**Steel Inc/SteelAsia (RM Jacques C. Maandig), Brgy.
Chairman Jeric G. Emano Sr.**



With School Head (Virgilio Diaz) and his Co-Teachers of Villanueva Senior High School, PNP representatives, SanMartin

**SteelAsia/SMSI Resident Manager –
Jacques C. Maandig – with his speech
during Brigada Eskwela Opening Ceremony**





The “FINALE” “Good Job Ev



C. Livelihood Program

1. Background

Steelasia's mission to help communities lift themselves out of extreme poverty has been put into action through its livelihood programs. Our M6- Resident Manager Jacques C. Maandig visited the LGU Villanueva Office to meet the women's association "SKP" known as the "Samahan ng mga Kababaihan para sa Pangkabuhayan" dated November 12, 2019. The samahan consists of 14 members whose primary skills are cutting and sewing. Lead by their master sewer Luzviminda Altreche, the samahan were able to produce round rags, potholders, flaglets and eco-friendly bags --in response to the government's nationwide campaign against the use of plastics - "a known worldwide problem" these days.

After meeting with SKP at the LGU Office, we go directly to visit their location at Purok 3, Poblacion 3 Villanueva Misamis Oriental. The point of this actual visit is to tailor approaches that are appropriate, practical and achievable to both Steelasia Management and the SKP Association.

METHODOLOGY

This program begins with listening and identifying the association's most urgent needs and the factors that stand in their way. Then follows the identification of their strengths, knowledge and skills that already exist and finding ways to break down barriers that is, "the lack of additional sewing equipment".

PROJECT OBJECTIVES

Steelasia's aim for this livelihood program is to provide opportunities for the working poor or economically marginalized population to realize their earning potential and help them increase their income-generating capacity.

2. Budget

ITEM	BREAKDOWN	COST	SUBTOTAL
High Speed sewing machine (3 units)	Brand: JUKI Specifications: AP Clutchmotor Model: DOL-250, WATT:250 VOLTS: 220, CLASS: 60 AMPS: 1.8, CYCLES: E RPM: 3450, CAPACITOR: 14uF400V	14,800.00	44,400.00
			Php 44,400.00

Photo Documentation:



Meeting with LGU & Samahan ng Kababaihan para sa Kabuhayan Association at the Mayor's Office Date: November 12, 2019



Site Visit at Purok 3, Poblacion 3, Villanueva Date: November 12, 2019



Products of the Association = Eco bags, potholders, round rags

C. Coastal Clean-up at Ecobricks Boulevard



SteelAsia with teachers & students of Villanueva High School



while others are singing Villanueva hymn....



SteelAsia with Villanueva MENRO



First area of assignment starts here...

STEEL ASIA

Location: Zone 6 Barangay San Martin Villanueva



short briefing of tasks by LGU representative...



getting ready....



The TRASH Collection stage

On our way to the next area of assignment



Clearing waterways under the heat of the sun



With Barangay San Martin volunteers



SNACKS Distribution



Per department volunteers



5.2 The Information, Education and Communications (IEC) Implementation Plan

The Proponent is already implementing its IEC. This involves several forms such as perception surveys, public consultations and Focus Group Discussions (FGDs). As per Annex 2-19 of the Revised Procedural Manual of DAO 2003-30.

The IEC Plan is shown in Table 5.2-2 below.

Table 5.2-2: 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
1. Residents of Brgy. San Martin	Awareness for the people on the Project, actual impacts and mitigating measures of the Project and concerns related to Climate Change Adaptation and Disaster Risk Reduction (CCA-DRR)	Group methods	• Stakeholders' Consultative Planning Session / Community Projects Planning Sessions	Annually	35,000.00
2. Students of elementary schools of impact barangay, i.e. Brgy. San Martin		Multi-media	• Informal discussion/ / meeting with stakeholders	Monthly	
3. Stakeholders meeting		Group methods	• Educational Tour with the four elementary schools of the impact barangays	Once a year	50,000.00
4. San Martin Steel, Inc. employees	Awareness and safety	Group methods	• Stakeholder's meeting • First Aid Training • Hazard Identification and Risk Assessment Training • Top Occupational Illnesses Awareness • Viral Infections Awareness • Fire & Earthquake Emergency Response Drills	Once a year	Part of company budget for employees

CHAPTER VI: ENVIRONMENTAL COMPLIANCE MONITORING

Provided below is the environmental performance of SanMartin Steel, Inc. from 2016-2018. Please note that there was no record transferred to San Martin Steel by the former company / Project Proponent environmental performance, in particular. Thus, San Martin has undertaken its own primary data gathering to serve as its baseline information and to date, it already has its 2 years performance. SanMartin has also initiated Compliance and Self Monitoring Reports submissions since the ECC was transferred to them in August 2015.

Copies of CMR and SMR are provided in Annex E.

6.1 Environmental Performance

6.1.1 Ambient Air Monitoring

Provided below is the ambient air test results gathered from 2016 to 2019. Results (Figure 6.1.1) show that the Plant's ambient air emission is within the standards set by the Clean Air Act or RA 8749.

Ambient Air Quality Test Results

STEEL ASIA

Frequency – Per Quarter (latest: Dec.03, 2019)

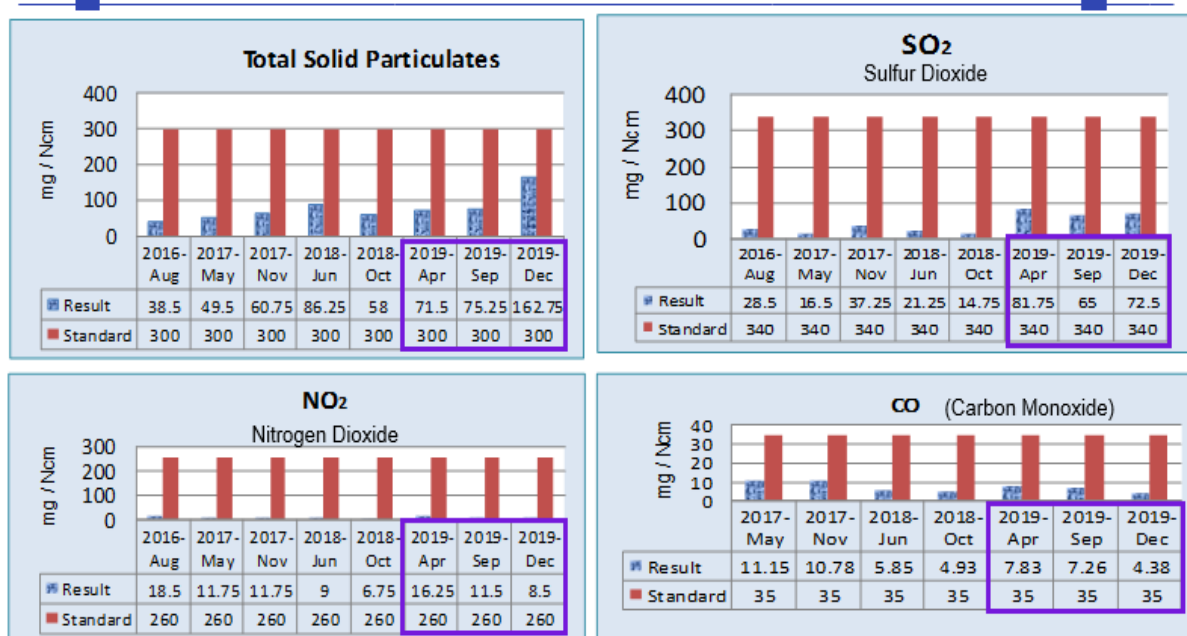


Figure 6.1.1: Ambient air test results from 2016 to 2019

6.1.2 Stack Monitoring

Shown in Figure 6.1.2 is the stack emission test results from 2016 to 2019. Results provided that the Plant's stack emission is within the standards set by the Clean Air Act or RA 8749.

Smokestack Emission Results

Frequency – Annual (latest April 3, 2019)

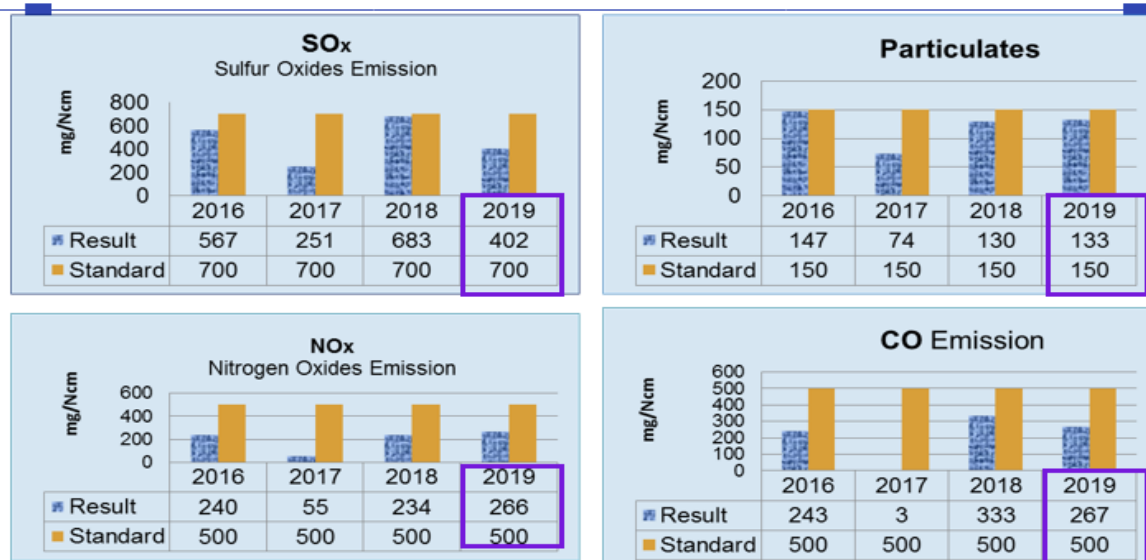
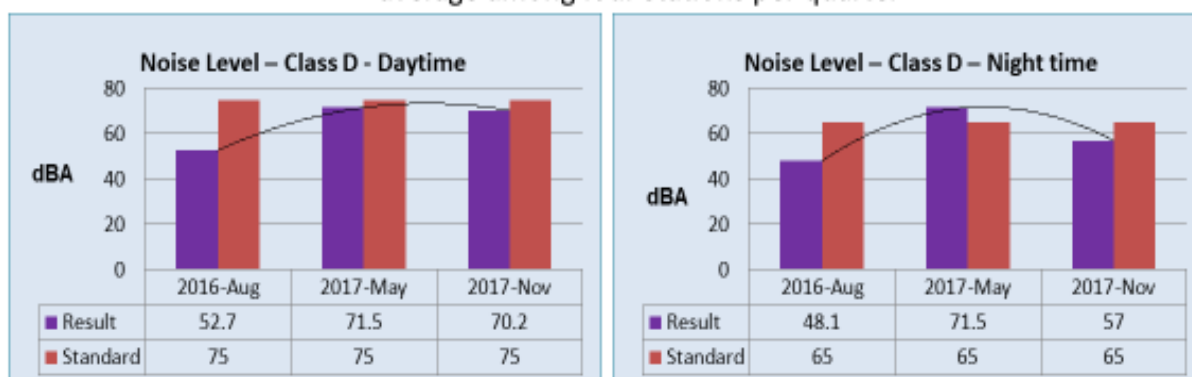


Figure 6.1.2: Stack emission test results from 2016 to 2019

6.1.3 Ambient Noise Quality Monitoring

Figure 6.1.3 is the ambient noise test results from August 2016 up to Nov. 2017. Results showed that the Plant's ambient noise is within the standards set by the DENR.

Ambient Noise Test Result average among four stations per quarter



6.1.4 Ambient water quality

6.1.4.1 Macajalar Bay and Tagoloan River

SanMartin Steel does not have effluent as the water is being recycled for process use. Also, even if Tagoloan River is near the project site, the nearest area / point is about 2.53 kms while Macajalar Bay is about 1.71 km. For baseline purposes, it secured secondary data from EMB Region 10 to show the existing condition of these water bodies. Shown in the tables below are the results of the ambient Water Quality Monitoring

Table 6.1.4.1.1: Water Quality Results from Macajalar Bay

Description/Location of Monitoring Station	Macajalar Bay, Balacanas, Villanueva						
BOD,mg/L	7(10)	1	3	1	1	1	3

TSS,mg/L	<30 mg/l Rise from The Baseline (EIS=34mg/L)	58	75	71	53	12	45
Cr ⁶⁺ mg/L	0.1	0.004	<0.002	0.003	<0.002	<0.002	0.009
Oil and Grease, mg/L	3	3	2	1	<1	2	2
Pb,mg/L	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hg, mg/L	0.002	<0.0001	<0.0001	<0.0001	0.0007	<0.0001	<0.0001
Total Coliform MPN/100ml	5000	<1.8	49	<1.8	13	23	2.0
pH	6.0-8.5	7.6	7.8	7.0	8	7.9	6.8
Temperature, °C	Maximum 3°C rise	29	31	29	27	28	30
DO, mg/L	5.0 (minimum)	7	5	7	7	8	7

Analysis Done By: CRL Environmental Corporation

Table 6.1.4.1.2: Water Quality Results from Tagoloan River

Outlet No.	Tagoloan River Upstream N:- 8181867.558214 E: 11793454.082825									
Date	Ph	Temperature (°C)	BOD (mg/L)	TSS (mg/L)	Color (TCU)	Dissolved Oxygen (mg/L)	Chlorides (mg/L)	Nitrate,NO ₃ (mg/L)	Phosphates, PO ₄ ³⁻ (mg/L)	Fecal Coliform (MPN/100MI)
DENR Standard	6.5-8.5	26-30°C	5	65	50	5	250	7	0.5	100
July 13, 2017	8.3	28	5	193	30	6	2	0.61	<0.01	54x10 ³
August 16, 2017	8.1	28	6	242	10	9	4	0.36	0.07	23x10 ²
Sept. 13, 2017	8.3	28	10	160	15	6	5	0.38	<0.01	33x10 ²

Outlet No.	Tagoloan River Downstream N:- 8181600.634597 E: 11794107.006988									
Date	Ph	Temperature (°C)	BOD (mg/L)	TSS (mg/L)	Color (TCU)	Dissolved Oxygen (mg/L)	Chlorides (mg/L)	Nitrate,N O ₃ (mg/L)	Phosphat es, PO ₄ ³ (mg/L)	Fecal Coliform(MPN /100MI)
DENR Standard	6.5-8.5	26-30°C	5	65	50	5	250	7	0.5	100
July 13, 2017	8.2	30	5	184	30	5	2	0.69	<0.01	92x10 ³
August 16, 2017	8.1	29	3	168	15	9	2	0.03	0.06	330
Sept. 13, 2017	8.4	30	9	144	20	5	3	0.41	0.26	79x10 ³
Outlet No.	Macajalar Bay Station No. 1 N:-8180612.503774 E: 11795600.759068									
Date	Ph	Temperature (°C)	COD (mg/L)	TSS (mg/L)	Color (TCU)	Dissolved Oxygen (mg/L)	Nitrate, No ₃ (mg/L)	Phosphates, PO ₄ ³ (mg/L)	Fecal Coliform (MPN/100MI)	
DENR Standard	6.0-9.0	25-31°C	200	100	150	NA	20	1.0	400	
July 13, 2017	8.1	29	94	104	5	6	2.95	<0.01	16x10 ³	
August 16, 2017	8.2	29	411	43	2	8	0.13	0.05	350	
Sept. 13, 2017	8.2	28	40	67	5	7	0.22	0.11	490	

6.1.4.2 Deepwell

Water quality for Deepwell is also being monitored by SanMartin Steel as this deepwell is used for drinking water. Provided below is the water quality results for December 2019 for bacteriological tests under PNSDW, DOH 2017 and March 2020 for PNSDW, DOH 2017 and AO 2017-10. Analysis showed that results passed the standards.

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

TEST REPORT

Reference No. CD1912-5302
Page 1 of 1

CUSTOMER NAME : SAN MARTIN STEEL INC.
 ADDRESS : PHIVIDE Industrial Estate, Brgy. San Martin, Villanueva, Misamis Oriental
 SAMPLE/S SUBMITTED : WATER
 SAMPLE CODE : CD1912-5302-01
 DATE / TIME SAMPLING : 17 Dec 2019 / 09:30 AM (by: CUSTOMER)
 DATE / TIME RECEIVED : 17 Dec 2019 / 11:45 AM
 DATE / TIME ANALYZED : 17 Dec 2019 / 02:40 PM
 DATE REPORTED : 03 Jan 2020

RESULTS OF ANALYSIS

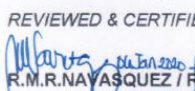
Sample Description	Heterotrophic Plate Count, (CFU) per mL	Total Coliform per 100 mL	<i>E. coli</i> per 100 mL	Conformance to PNSDW **
PRODUCT WATER – FOR DRINKING BRGY. SAN MARTIN VILLANUEVA, MIS. OR.	85	Absent	Absent	PASSED
PNSDW, DOH 2017	< 500	Absent	Absent	-
TEST METHOD	(9215 A-B) Pour Plate	Chromogenic substrate test (Presence-Absence)*		


Note: CFU - Colony Forming Units

* Validated and approved by Department of Health

Ref. : Colilert 18 (IDEXX) Test Kit Procedure
 **Philippine National Standards for Drinking Water, Dept. of Health, 2017

Results are those obtained at time of examination and relate only to the sample/s tested.

REVIEWED & CERTIFIED BY: 
 R.M.R. NAYASQUEZ / R.P. VILLANUEVA
 Laboratory Microbiologist / Medical Technologist
 NRL No. WMLA-16-0416 / PRC Reg. No. 0052989

NOTED BY: 
 M.L.S. MENDOZA
 Laboratory Business Manager
 Chem. Reg. No. 08239




Figure 6.1.4.2.1: Bacteriological water quality results for December 2019 for PNSDW, DOH 2017

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

TEST REPORT

Reference No. CD2003-1260

Page 1 of 1

CUSTOMER NAME	:	SAN MARTIN STEEL INC
ADDRESS	:	Phividec Ind. Estate, Villanueva, Misamis Oriental
SAMPLE/S SUBMITTED	:	WATER
SAMPLE CODE	:	CD2003-1260-01
DATE / TIME SAMPLING	:	16 Mar 2020 / 01:45 PM (by: CUSTOMER)
DATE / TIME RECEIVED	:	16 Mar 2020 / 03:01 PM
DATE / TIME ANALYZED	:	16 Mar 2020 / 05:50 PM
DATE REPORTED	:	23 Mar 2020

RESULTS OF ANALYSIS

SAMPLE DESCRIPTION	Heterotrophic Plate Count, (CFU) per mL	No. of Positive Tube (out of 5 Tubes)	Most Probable Number (MPN) per 100mL	E.coli per 100mL	Conformance to PNSDW **
		Total Coliform	Total Coliform Count		
PRODUCT WATER FOR DRINKING	56	0	Less than 1.1	Absent	PASSED
PNSDW, DOH 2017 AO 2017-10	< 500	0	Less than 1.1	Absent	-
TEST METHOD	(9215 A-B) Pour Plate	(9221 B-C) Multiple Tube Fermentation Technique		(9221 G) Indole	

Note: CFU - Colony Forming Units

 Ref.: APHA – AWWA and WEF 2017. Standard Methods for the Examination of Water and Wastewater, 23rd ed.

** Philippine National Standards for Drinking Water, Dept. of Health, 2017.

Results are those obtained at time of examination and relate only to the sample/s tested.

REVIEWED & CERTIFIED BY:

[Signature] 24 Mar 2020
R.M.R. NAVASQUEZ / R.P. VILLANUEVA, RMT
Laboratory Microbiologist / Medical Technologist
NRL No. WMLA-16-0416 / PRC Reg. No. 0052989

NOTED BY:

[Signature] 24 Mar 2020
M.L.S. MENDOZA, RCh
Laboratory Business Manager
Chem. Reg. No. 08239



Figure 6.1.4.2.2: Bacteriological water quality results for March 2020 for PNSDW, DOH 2017 and AO 2017-10

Provided below is the water quality results for December 2019 for physico-chemical analysis under PNSDW, DOH 2017 and March 2020 for PNSDW, DOH 2017 and AO 2017-10. Analysis showed that results passed the standards.

F.A.S.T. Laboratories – CDO
Lapasan Hi-way corner Camp Alagar Road CDO City

Reference No. **CD1912-5303**

Page 1 of 1

TEST REPORT

CUSTOMER : SAN MARTIN STEEL INC.
ADDRESS : Phividec Industrial Estate Brgy. San Martin, Villanueva, Misamis Oriental
SAMPLE(S) SUBMITTED : WATER
SAMPLE CODE : CD1912-5303-01
DATE / TIME OF SAMPLING : 17 December 2019 / 9:30 AM (By Customer)
DATE / TIME RECEIVED : 17 December 2019 / 11:32 AM
DATE ANALYZED : 17 December 2019 – 11 January 2020
ANALYZED BY : A.T. BACLAO, L.G. DALAGUIT, K.B. QUISIL, J.C. ANTINERO
C.O. PONFERRADA
DATE-REPORTED : 13 January 2020

Parameters	Results	PNSDW DOH, 2017 (maximum)	Test Method
	Product Water		
pH	8.22 @ 21.1 °C	6.5 – 8.5	4500 H ⁺ B. Electrometric Method
Apparent Color, CU	5 @ pH 8.22	10	2120 B. Visual Comparison
Total Suspended Solids, mg/L	Less than 2*	-	2540 D. Gravimetric, Dried @ 103-105°C
Total Dissolved Solids, mg/L	10	600	2540 C. Gravimetry
Turbidity, NTU	0.47	5	2130 B. Nephelometry
Nitrate, mg/L	0.41	50.00	US EPA 352.1 Colorimetric, Brucine
Chlorine Residual as Free Chlorine, mg/L	Less than 0.010**	0.3 min and 1.5 max	Chlorine Test Kit

Note: * – Method Detection Limit ** - Reporting Limit

Reference: APHA-AWWA and WEF 2017. Standard Methods for the Examination of Water and Wastewater, 23rd ed. United States Environmental Protection Agency (USEPA).

Results are those obtained at time of examination and relate only to the sample(s) tested.

CERTIFIED BY:

J.I.M. GEZAR, RCh
Laboratory Supervisor
Chem. Reg. No. 13360

APPROVED BY:

M.L.S. MENDOZA, RCh
Laboratory Business Manager
Chem. Reg. No. 08239



Figure 6.1.4.2.3: Physico-chemical water quality results for December 2019 for PNSDW, DOH 2017

F.A.S.T. Laboratories – CDO
 Lapasan Hi-way corner Camp Alagar Road CDO City

 Reference No. **CD2003-1225**

Page 1 of 1

TEST REPORT

CUSTOMER	: SAN MARTIN STEEL INC.
ADDRESS	: Phivide Industrial Estate Brgy. San Martin, Villanueva, Misamis Oriental
SAMPLE(S) SUBMITTED	: WATER
SAMPLE CODE	: CD2003-1225-01
DATE / TIME OF SAMPLING	: 12 March 2020 / 1:45 PM (By Customer)
DATE / TIME RECEIVED	: 12 March 2020 / 3:23 PM
DATE ANALYZED	: 12 – 27 March 2020
ANALYZED BY	: A.T. BACLAO, J.C. ANTINERO, H.M. PAPELLERAS, C.O. PONFERRADA, L.G. DALAGUIT
DATE REPORTED	: 30 March 2020

Parameters	Results	PNSDW DOH, 2017 (maximum)	Test Method
	Product Water For Drinking		
pH	9.90 @ 21.5 °C	6.5 – 8.5	4500 H ⁺ B. Electrometric Method
Apparent Color, CU	5 @ pH 9.90	10	2120 B. Visual Comparison
Total Suspended Solids, mg/L	Less than 2*	-	2540 D. Gravimetric, Dried @ 103-105°C
Total Dissolved Solids, mg/L	105	600	2540 C. Gravimetry
Turbidity, NTU	0.42	5	2130 B. Nephelometry
Nitrate, mg/L	Less than 0.2*	50.00	US EPA 352.1 Colorimetric, Brucine
Chlorine Residual as Free Chlorine, mg/L	0.010	0.3 min and 1.5 max	Chlorine Test Kit

Note: * – Method Detection Limit

 Reference: APHA-AWWA and WEF 1977. Standard Methods for the Examination of Water and Wastewater, 23rd ed.
 United States Environmental Protection Agency (USEPA).

Results are those obtained at time of examination and relate only to the sample(s) tested.

CERTIFIED BY:

30 Mar 2020

J.S. ANASCO, RCh
 Laboratory Chemist
 Chem. Reg. No. 13329

APPROVED BY:

31 Mar 2020

M.L.S. MENDOZA, RCh
 Laboratory Business Manager
 Chem. Reg. No. 08239



Figure 6.1.4.2.4: Physico-chemical water quality results for March 2020 for PNSDW, DOH 2017 and AO

6.2 Self-Monitoring Plan

Provided in Table 6.3 is the Self-Monitoring Plan as per Annex 2-20 of RPM for DAO 2003-30.
 Below is the definition of EQPL-Environmental Quality Performance Level:

Table 6. 2-1: EQPL Definition

EQPL Level	Description
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.

Provided in Table 6.2.1 is the Environmental Monitoring Plan (EMoP) with Environmental Quality Performance Levels (EQPLs).

Table 6.2.1: SUMMARY OF MONITORING PLAN (EMoP) with ENVIRONMENTAL QUALITY PERFORMANCE LEVELS (EQPLs)

Key Environmental Aspects per Project Phase	Potential Impacts Per Environmental Sector	Parameter to be Monitored	Method	Frequency	Location	Lead Person	Annual Estimated Cost in PhP	EQPL Management Scheme					
								EQPL Range			Management Measure		
								Alert	Action	Limit	Alert	Action	Limit
I. PRE-CONSTRUCTION PHASE: The Pre-construction phase in the EPRMP Report covers activities like planning, securing of ECC Amendment and other permits and procurement of supplies.													
II. CONSTRUCTION PHASE: The project has been constructed and is currently operating.													
Environmental Aspect # 1: The Land: Construction of additional water rain catchment	Increased sediment deposition	Silts in drainage system	Desilting of canals	Quarterly	Construction site	PCO	10,000	Visual observation of silt deposition	Immediate clean-up	Total clean-up	Presence of Complaints	IEC	Regular coordination with stakeholders thru regular IEC
Environmental Aspect # 4: People; equipment optimization and rehabilitation activities	Increase in sound levels from optimization activities	Sound levels	Sound measurements using handheld sound meter	Quarterly	Optimization site	Proponent	To be determined	does not exceed 71.6dB	does not exceed 76.6 dB	does not exceed 81dB	Investigate and identify source of noise	identification of the source of noise and check the attenuation buffer zones and noise attenuation measures	Assess performance of the measures, employ corrective measures and install additional measures if necessary
III. Operations Phase													
Environmental Aspect # 1: The Land - Generation of solid waste	Soil contamination	Heavy metals	TCLP/AAS	Annually	Area near hazwaste storage	PCO	50,000	0.8	0.9	1.0	Investigate source of contamination and implement corrective measures	Investigate and strengthen implementation of measures	Review and implement changes to further mitigation of hazwaste management
Environmental Aspect # 1: The Land	Generation scales	Heavy metals	TCLP/AAS	Annually	Scales storage	PCO		Silt deposition in roadways	silts in run-off	Silts in drainage	Presence of Complaints	IEC	Regular housekeeping
Environmental Aspect # 2: The Water - Use, Operation and Maintenance of Equipment	Water pollution from used oil	BOD ₅	Azide Modification-Dilution Technique (USEPA method 3010)	Quarterly / Per DAO 2003 - 07	Deepwell No. 1	PCO	7,000	5	6	7 as per DAO 2016-08	Review performance	Check oil and water separator regular maintenance	Increase frequency of maintenance schedule
	Water quality (ground water)	BOD ₅	Azide Modification-Dilution Technique	Quarterly / Per DAO 2003 - 07		Project Proponent	10,000	5	6	7	Review performance	Check WWTF	Regular maintenance of WWTF

			(USEPA method 3010)										
		Total Coliform	Multiple tube Fermentation – Method 9221B&E	Quarterly		Project Proponent	10,000	3000	4000	5000	Review performance	Check WWTF	Regular maintenance of WWTF
		Fecal Coliform	Multiple tube Fermentation – Method 9221B&E	Quarterly		Project Proponent		100	150	200	Review performance	Check WWTF	Regular maintenance of WWTF
		Total Suspended Solids (TSS)	Gravimetric (Dried at 103-105° C) (USEPA method 3010)	Quarterly		Project Proponent	10,000	100	120	150	Review performance	Check WWTF	Regular maintenance of WWTF
		pH	pH probe (USEPA method 3010) By electrode	Quarterly		Project Proponent		4.0	5.0	6.0-8.5	Review performance	Check WWTF	Regular maintenance of WWTF
Environmental Aspect # 3: The Air – plant operation	Ambient air pollution: Increase in dust generation	TSP	(S)24 hr High Volume (A)Gravimetric USEPA 40 CFR, Part 50	Quarterly	Existing stations	Proponent through PCO MMT	100,000.00	250 ug/Ncm	275 ug/Ncm	300 ug/Ncm	Immediate repair, conduct regular maintenance	Replacement of parts and conduct regular maintenance	Stop operation
		SO2	(S)24 hr Gas Bubbler (A) Pararosaniline Method (West and Gaeke Method)	Quarterly			Part of Operating Cost	280 ug/Ncm	310 ug/Ncm	340 ug/Ncm			
		NO2	(S)24 hr Gas Bubbler (A) Griess-Saltzman or Chemi luminescence Method	Quarterly			Part of Operating Cost	200 ug/Ncm	220 ug/Ncm	260 ug/Ncm			
		PM10	(A)Gravimetric USEPA 40 CFR, Part 50	Quarterly			Part of Operating Cost	150 ug/Ncm	180 ug/Ncm	200 ug/Ncm	Conduct adjustment of the unit's operation as per operating manual.	Check source	Stop operation until the problem has been resolved
	Stack / Source Emission: monitor	SO2	USEPA Method 5	Annually		Proponent through PCO	Part of Operating Cost	600 ug/Ncm	650 ug/Ncm	700 ug/Ncm	Conduct adjustment	Check the source	Stop operation

	increase in exhaust or SOx and NOx emission	NO2	USEPA Method 7	Annually	Stack of Reheating Furnace		Part of Operating Cost	450 ug/Ncm	470 ug/Ncm	500 ug/Ncm	of the unit's operation as per operating manual.		until the problem has been resolved
		Particulates	USEPA Method 5	Annually			Part of Operating Cost	100 ug/Ncm	120 ug/Ncm	150 ug/Ncm			
		CO	USEPA Method 10	Annually			Part of Operating Cost	450 ug/Ncm	470 ug/Ncm	500 ug/Ncm			
Environmental Aspect # 3: The Air – Operation of Rolling Mill	GHG emission	CO ₂ , CH ₄ , and N ₂ O Emissions based on IPCC 2006 Guidelines and USEPA Procedure	Implementation of Reforestation and Carbon-Sink / GHG reduction program			Proponent	Part of Operating Cost	Unattended reforestation commitment	80% reforestation	60% reforestation	Immediate planting of trees and revegetation	Review reforestation and carbon sink program	Further study or revision of the program
Environmental Aspect # 3: The Air –Operation of equipment and vehicles	Increase in sound levels from operation activities	Sound levels	Sound measurements using handheld sound meter	Quarterly		Proponent	To be determined	does not exceed 71.6dB	does not exceed 76.6 dB	does not exceed 81dB	Investigate and identify source of noise	identification of the source of noise and check buffer zones and noise attenuation measures	Assess performance of the attenuation measures, employ corrective measures and install additional measures if necessary
Environmental Aspect # 4: The People	Traffic congestion	Traffic condition Road Accessibility	Visual: Number of vehicles per report of Receiving Clerk Representation with the LGU regarding road network and its infrastructure plans Traffic Impact Assessment	Daily	Access Road	Project Proponent	P10,000.00	20 minutes traffic	Half hour traffic	1-hour traffic	Deployment of traffic enforcers	Increased deployment of traffic enforcers	Review traffic management program and impact assessment and revise
	Accidents	Number and Nature	Records from Clinics Safety Records	Monthly	NA	Health and Safety	No cost	3	4	5	Evaluation of safety procedures		
IV. ABANDONMENT PHASE													

Environmental Aspect # 1: The Land: oil spill	Soil contamination	Contaminated soil TPH (C6-C36) USEPA priority pollutant metals (Sb, As, Be, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Ti, Zn) VOCs SVOCs	USEPA 8260C USEPA 8015C USEPA 7470A USEPA 6020A USEPA 8260 USEPA 8270	Once before decommissioning	Hazardous Waste Storage Area	PCO	50,000	80 0.8 1.6 40	90 0.9 1.8 45	100 1.0 2.0 50	Investigate source of contamination and implement corrective measures	Investigate and strengthen implementation of measures	Revise measures
Environmental Aspect # 4: The People	Employment	No. of employees from the municipalities employed		Quarterly	Brgy. San Martin	Comrel	150,000.00	80% of workforce from municipality	70% of workforce from municipality	60% of workforce from municipality	Review hiring policy and revise if necessary	Enhance program implementation and skills development	Engage and partner with LGUs and other government agencies for skills development and hiring policy/program implementation
	Livelihood opportunities for local people and entrepreneurs	No. of Programs implemented vis-à-vis SDP	Survey / FGD	Quarterly		Comrel	150,000.00	90% of planned programs implemented	80% of planned programs implemented	70% of planned programs implemented	Revise programs	Enhance program implementation	Consultation with beneficiaries for further program enhancement and engage with other government agencies
	Development of small and medium enterprises like transport, construction and utility services, food services and laundry supplies	Enterprise developed and operating	No of enterprise developed and operating	Annual	Villanueva	Comrel		3	2	0	Review program and development plan	Coordinate with LGU to determine if there are revisions/improvement needed	Revisit policy and implement amendments and enhancements

6.3 Multi-Sectoral Monitoring Framework

Provided below is the list of stakeholder-members of the MMT of the project under DAO 2017-15 and 2018-18.

Table 6.3-1: MMT Composition

Stakeholder-Members
LGU Representatives
• Municipality of Villanueva / MENRO
• Rural Health Office Chief
• Brgy. San Martin Captain
LGU-Accredited Local NGO
2 reps from locally-recognized community leaders
3 reps from government agencies with related mandate on the type of project and impacts during operations

6.3.1 Functions

As an independent entity whose membership represents the stakeholders / public, the MMT is expected to add credibility by being open and transparent in monitoring environmental impacts and compliance with the Philippine EIS System requirements.

The MMT shall have the following specific functions:

- Conduct quarterly ocular site visit to validate the proponent's compliance with the ECC conditions and the EMP and EMoP including the requirement to conduct self-monitoring and submit corresponding reports regularly. The MMT may observe sampling activities conducted by the project proponent.
- Prepare and submit its report to EMB Central Office and EMB Region 4A Office using EMB-prescribed format at least semi-annually not later than July 30 for the first semester report and January 30 for the 2nd semester report
- Institute an environmental emergency and complaints receiving and management mechanism which shall include systems for transmitting recommendations for necessary regulatory action to EMB in a timely manner to prevent adverse environmental impacts.

6.3.2 MMT Formation and Operationalization

After the issuance of ECC, SMSI shall initiate the formation of the MMT based on DAO 2017-15 and relevant ECC condition. A Memorandum Agreement (MOA) between EMB Central Office and CSI based on a pro-forma to be provided by EMB shall be executed with conformity of members of the MMT. The MOA signed by CSI and the new members of the MMT shall be submitted to EMB Central Office for final approval within the deadline specified in the ECC.

A MMT Manual of Operations (MOO) shall be formulated / updated based on the policy updates. The MOO shall guide the MMT in planning its activities.

In the conduct of its quarterly site visit, the MMTs shall implement the usual procedures including a closing meeting where the MMT findings shall be discussed with the representative of the project proponent.

MMTs who do not submit the required reports, those who fail to submit its report before the deadlines or submits incomplete reports for one (1) year shall be suspended until such time that such requirements are complied with.

Individual MMT Members who violate the code of ethics shall be subject to suspension/removal/replacement/ by the chairman of MMT or any other disciplinary action as indicated in the MOO.

6.4 Environmental Guarantee And Monitoring Fund Commitments

SMSI commits to establish an Environmental Monitoring Fund (EMF) and Environmental Guarantee Fund (EGF). The EMF will be exclusively utilized to cover all costs needed for the operation of the MMT. Whereas, the EGF will be used exclusively for the following purposes:

- Immediate rehabilitation of affected areas and the resulting deterioration of environmental quality as a direct consequence of the proposed Project optimization, operation and abandonment;

- Just compensation of parties and communities affected by the negative impacts of the project; and
- Contingency and clean-up activities, environmental enhancement measures, damage prevention programs and social equity measures including the necessary public participation and capability building activities related to the project.

The EGF Trust Fund and EGF Cash Fund shall be replenished to its original amount annually or whenever the amount goes below 50% of the original amount. The EGF Trust Fund shall be renewed upon every expiration. Table 6.4.1 shows the EMF and EGF for the Project.

Table 6.4.1: EMF and EGF for the Project

Type of Fund	Amount (PhP)
EMF based on the activities and programs of the Multi-partite Monitoring Team (MMT), is around PhP300,000.00 The EMF can be replenished once the amount of PhP300,000.00 is less than 50%.	300,000.00
EGF (Trust Fund)	1,000,000.00
EGF (Cash Fund)	500,000.00

The establishment of the appropriate EMF and EGF schemes will be in accordance with the prescribed guidelines and procedures of DENR Administrative Order No. 2017-15. The amount of the EGF will be based on the risk and hazards that will associated with the project's implementation and will be negotiated between SanMartinSteel, Inc. and the DENR-EMB Central office. This amount is based on similar steel mill projects of SteelAsia Group.

The proposed funds are still be subject to adjustments together with MMT members especially during the preparation of the Annual Work and Financial Plan once the MMT is established and will also be subject to regular replenishments as needed.

CHAPTER VII: DECOMMISSIONING/ ABANDONMENT/ REHABILITATION POLICY

The Decommissioning Phase

Decommissioning refers to the permanent stoppage of the plant operations. The relevant aspects, waste generation, issues and built-in measures during this phase will be dependent on the decommissioning plan. The decommissioning / abandonment plan necessarily starts with an Environmental Site Assessment (ESA) taking note in particular of any residual toxic substances especially in the soil.

As a matter of procedure, the Decommissioning shall be subject to submittal of a plan and approval thereof by the Environmental Management Bureau. Third party monitoring of the decommissioning activities for the check and balance may be made by the MMT and the EMB. Unless given clearance after the decommissioning works shall have been completed, the Proponent shall remain legally responsible for any residual impacts on the environmental resources.

On the basis that the economic life of the project is at a minimum of forty (40) years, decommissioning may take place after this period. The protocol for the decommissioning is premature to develop at this early stage but will include among others the following aspects:

In drafting the Decommissioning/Abandonment Plan, following shall be considered:

1. Baseline environmental conditions especially air and water quality.
Any plan shall be accompanied by definite action plans on how to rehabilitate the environmental resources in order to approximate its pre-project state;
2. Existing rehabilitation program and the cumulative accomplishments of the mitigating measures.
The accomplishments will be useful in the determination of the performance gaps which must be given more attention and funding if needed. Also, consideration of these efforts shall be given attention to have continuity and not just disregard them.
3. Issues and concerns, demands, opinions, wishes and suggestions of the local community, workers and local government which may be extracted thru several means of public consultation.
It is best to consider them they will the ones who will be left behind after the life of the Project.
4. Procedures for decommissioning of the equipment which will consider the following:
 - Potential use of the equipment to be decommissioned; i.e. equipment that can be usable by third parties needs to be decommissioned intact.
 - Transportation of equipment and other materials used
 - Alternatives for the future use of the abandoned area
 - Consistency with the long-term zoning and land use development plan
 - Restoration/rehabilitation plan; and
 - Results of the ESA mentioned above.

CHAPTER VIII: INSTITUTIONAL PLAN FOR EMP IMPLEMENTATION

Introduction/Rationale

This section provides the instrument required to establish a proactive institutional requirement to guarantee compliance with environmental regulations and policies and implementation of environmental safeguards and commitments. It is important to set up capable and competent unit/group with properly defined roles in the process of the monitoring and evaluation of post EIA requirements and commitments as well as with other environmental regulations. It is important to identify and provide the group that will implement said requirements for a sustainable project operation.

Function

The Environment Unit/Team is responsible for the environmental performance of the project. It ensures implementation of the environmental safeguards and controls for the project implementation (for all phases of the project) and is responsible for overseeing environmental compliance activities, environmental requirements and regulatory obligations.

Core Function of the team/unit includes the following:

- Systems and Procedures
- Environmental Safeguards and Implementation
- Government Regulatory Compliance
- Environment Health Safety Program and Awareness
- EHS Program Compliance

Set Up

In many cases, the environmental unit leads the post EIA compliance and implementation process in collaboration with the other technical team/groups to provide technical support. Figure 9.1 illustrate the institutional framework. There are no generally applicable, rigid rules, so many variations are possible depending on the personnel capacities and structures.

The Multipartite Monitoring Team (MMT) is also included as part of the EMP implementation mechanism because it has the primary role of monitoring the project's implementation of the committed EMP.

Presented below is the Table of Organization.

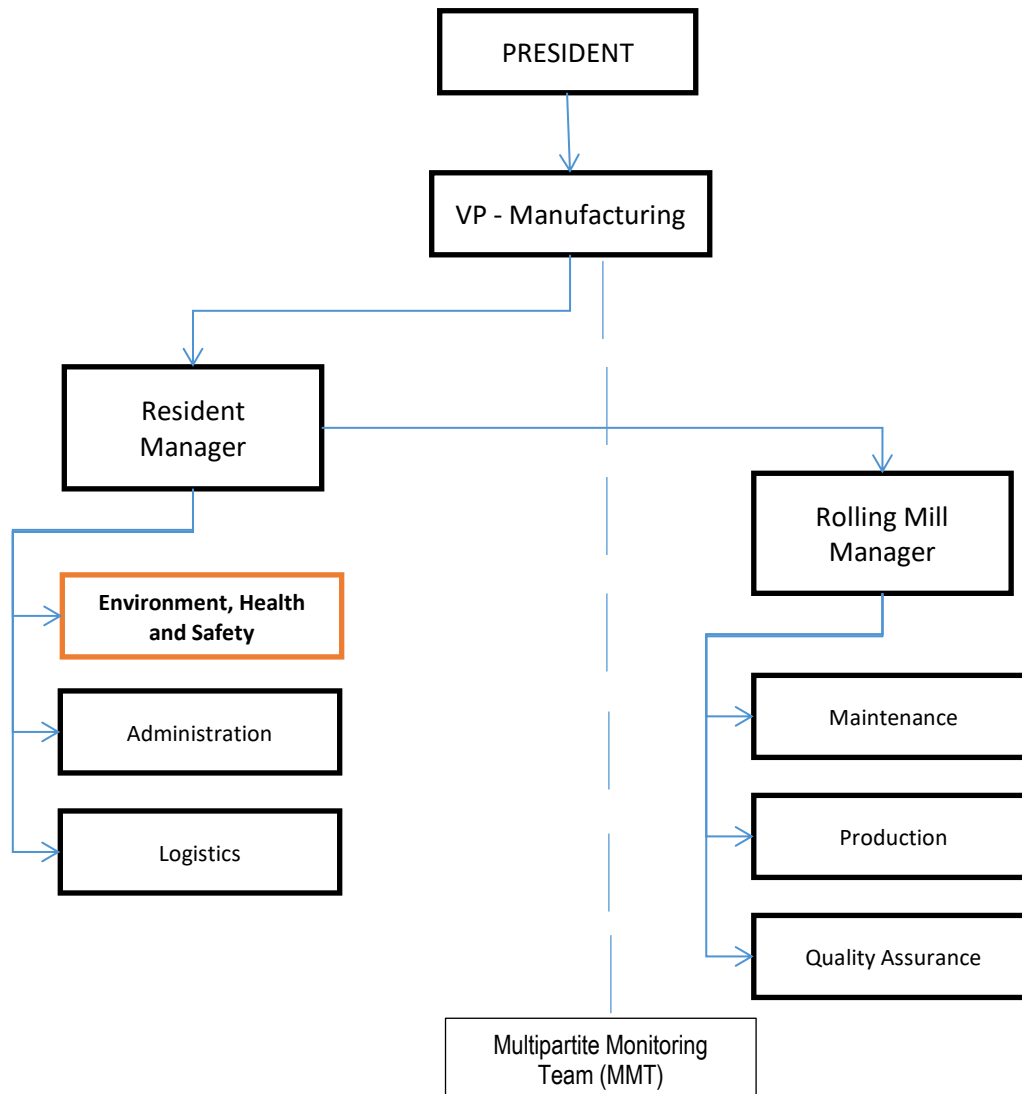


Figure 9. 1: The Initial Organizational Chart/Institutional Plan for EMP Implementation

Roles and Responsibilities

In order to have a better understanding of the roles and responsibilities of the main actors in the institutional framework, below provides a brief explanation of the role of the key personnel, the technical team, and collaborating units/groups.

Key Personnel	Roles and Responsibilities
Pollution Control Officer/ Engineer	Compliance to environmental regulations & standards; maintenance of reports that are submitted to internal and external agencies
Safety Engineer	Responsible for implementation of emergency response procedures, handling of hazardous materials and environmental management systems and requirements of DOLE on occupational safety and health
CSR and SDP personnel	Community relations, design, training and implementation of CSR and SDP programmes

Following are the functions, roles and responsibilities of each departments:

- A. Operations – The operations department is responsible for acquiring the inputs and devising the best plant operations methods so that value adding occurs in the most efficient and effective way. Thus, the role of operations management (and the operations manager) is to ensure a smooth production process that contributes to the output of goods and services of an organization. In additions, following are inherent responsibilities of the Operations Department:
 - Full Plant operations

- Safety and Morale of the Department
- Production / Schedule attainment
- Continuous Improvement
- Leadership and Direction, plant wide
- Customer interface
- Company policy enforcement
- Production start-up / launch

B. Maintenance

This department is in charge for the schedule and regular inspection, maintenance and repair of equipment.

C. Engineering Support

This Department is in charge of the automation control, optimization, safety and testing of necessary support needed by the plant.

D. Admin. And Finance

Administrative and Financial Department is a unit to be assigned with various responsibilities concerning personnel, finance, publications, public relations, conferences, sale of documents and similar administrative functions; in particular:

1. Personnel affairs;
2. Organization of training of officials and supervision of programs established to that effect;
3. General services including the general register of the staff and services;
4. Rendering consultations to other Departments on organizational matters;
5. Preparation of studies on the administrative organization;
6. Maintaining and auditing the accounts of the Company;
7. Supervision of storage and purchasing;
8. Preparation of the budget;
9. Organization of administrative services for conferences and meetings;
10. Maintaining and organization of the library and the archives as well as their use.

Skills and Competency

Selection of competent and effective personnel comprising the environmental unit will be crucial in the institutional or organization building. Qualifications for the members may include the following:

- Understanding of environment management, legal regulatory framework, environmental impact assessment and reporting, and environmental compliance and audit management. Well-versed and familiar with the application of local laws and regulations on Environmental regulatory compliance.
- Experience in integrated environmental assessment
- Good relationship with the environmental regulatory authority
- capacity to dialogue with different stakeholders from both the public and private sector, and ability to build consensus on key environmental issues
- Oral and written communication skills; people skills; project coordination; monitoring and audit; scientific research and development; project planning; policy formulation; and training and facilitation

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CHAPTER X: ANNEXES

ANNEX A:	SEC Registration of San Martin Steel, Inc.
ANNEX B:	Copy of Deed of Sale
ANNEX C:	Copy of Previous ECC and the Transferred ECC
ANNEX D:	Public Participation Documentation D.1 Public Scoping Report D.2 Perception Survey Form
ANNEX E:	Copy of latest CMR and SMR
ANNEX F:	Air Dispersion Modeling Inputs
ANNEX G:	PEMAPS Questionnaire
ANNEX H:	Accountability Statement of Project Proponent
ANNEX I:	Accountability Statement of Preparers
ANNEX J:	Checklist of Must Requirements
ANNEX K:	Certification from PHIVIDEDEC
ANNEX L:	Copy of Permits 1. Permit to Operate 2. Discharge Permit 3. Hazardous Waste Generator ID