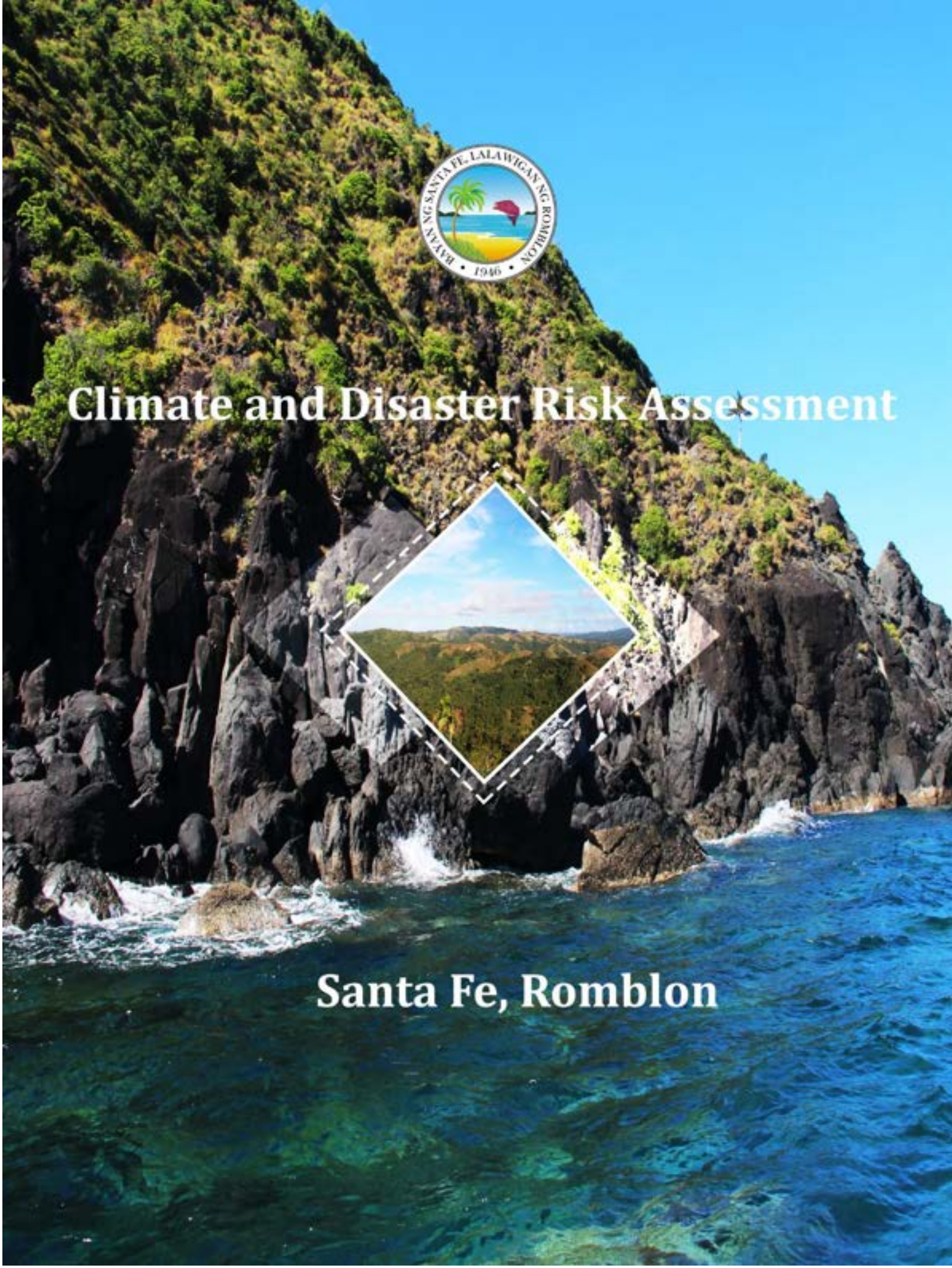


Climate and Disaster Risk Assessment

Santa Fe, Romblon

EXECUTIVE SUMMARY

Climate and Disaster Risk Assessment (CDRA) is an imperative for the development of a local government unit as it determines the level of exposure, vulnerability, and risks of population, urban use areas, natural resources, lifeline utilities, and critical point facilities to disasters. The formulation of CDRA is based on the HLURB Guidebook for mainstreaming climate change and disaster risk in comprehensive land use planning (2015). It provides necessary preparation and recommendation to help the municipality reduce its losses and damage in times of calamities. The technical working group (TWG) conducted a five-step process which involves: 1) collecting hazard and climate change information; 2) scoping of potential impacts: 3) exposure database development; 4) climate and disaster risk assessment, and; 5) identifying decision areas and corresponding policy interventions. It provides necessary preparation and recommendation to help the municipality reduce its losses and damage in times of calamities.

Santa Fe is a fifth class municipality located in the Southern part of Tablas Island in Romblon. Given the data gathered from different national agencies, key informant interviews, and after validation from the key stakeholders, results revealed that the municipality is susceptible to flood, landslide, and tsunami. Flood and landslide are experienced in all barangays while barangays that are prone to tsunami are Canyayo, Agmanic, Tabugon, Poblacion, Pandan, Guinbirayan, and Magsaysay.

Results showed that barangays most at risk in all exposure units for flooding are Pandan and Mat-i followed by Poblacion and Tabugon. Meanwhile, Barangay Pandan, Magsaysay, and Danao Norte have the highest risk to landslide. All aforementioned barangays that are prone to tsunami are low at risk.

Formulated interventions are usually pre-disaster preparations. These includes the construction or expansion of mitigating measures (sea wall, riprap, and flood control), elevation of structures (roads and buildings), conduction of Information Education Campaign (IEC), and strict implementation of national regulations and policies such as the national building code.

ACRONYMS

CCA	Climate Change Adaptation
CCVA	Climate Change Vulnerability Assessment
CLUP	Comprehensive Land Use Plan
CDRA	Climate and Disaster Risk Assessment
DILG	Department of Interior and Local Governance
DOH	Department of Health
DRRM	Disaster Risk Reduction and Management
DSWD	Department of Social Welfare and Development
DJF	December, January, February season
EWS	Early Warning System
GIS	Geographic Information System
GPS	Global Positioning System
HLURB	Housing and Land Use Regulatory Board
IPCC	Intergovernmental Panel on Climate Change
JJA	June, July, August season
LGU	Local Government Unit
MAM	March, April, May season
MDRRMP	Municipal Disaster Risk Reduction and Management Plan
MGB	Mines and Geosciences Bureau
MNAO	Municipal Nutrition Action Officer
MPDC	Municipal Planning and Development Coordinator
MPDO	Municipal Planning and Development Office
MSWDO	Municipal Social Welfare and Development Office
NASA	National Aeronautics and Space Administration
NEDA	National Economic and Development Authority
NOAA	National Oceanic and Atmospheric Administration
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services
PHIVOLCS	Philippine Institute of Volcanology and Seismology
PPDO	Provincial Planning and Development Office
PSA	Philippine Statistics Office
SON	September, October, November season
UNFCC	United Nations Framework on Climate Change
UNISDR	United Nations International Strategy for Disaster Reduction Secretariat

TABLE OF CONTENTS

EXECUTIVE SUMMARY i
ACRONYMS ii
TABLE OF CONTENTS iii
LIST OF FIGURES iv
LIST OF TABLES iv
LIST OF MAPS v
LIST OF ANNEXES vi
INTRODUCTION 1
BRIEF LOCALE OF THE STUDY 2
THE CLIMATE AND DISASTER RISK ASSESSMENT (CDRA) [1] 4
A. CLIMATE CHANGE AND VULNERABILITY ASSESMENT 8
a. Climate Change Projections 8
b. Climate Impact Change Diagram 13
c. Disaster Risk Assessment 24
B. EXPOSURE AND RISK TO HAZARDS 30
i. POPULATION 30
ii. NATURAL RESOURCE-BASED PRODUCTION AREAS 48
iii. URBAN USE AREAS 66
iv. LIFELINE UTILITIES 87
v. CRITICAL POINT FACILITIES 121
SUMMARY AND CONCLUSION 139
APPENDICES 139

LIST OF FIGURES

Figure 1. Integration of CDRA to the CLUP and the steps to CDRA. 5
Figure 2. Projected Change in Seasonal Temperature Under Medium-Range Scenario 10
Figure 3. Projected Change in Seasonal Rainfall Under Medium-Range Scenario 10
Figure 4. Impacts of Climate Change to Forest Ecosystem in Santa Fe, Romblon. 14
Figure 5. Impacts of Climate Change to Coastal Ecosystems in Santa Fe, Romblon 16
Figure 6. Impacts of Climate Change to Agriculture Ecosystems in Santa Fe, Romblon 18
Figure 7. Impacts of Climate Change to Built-Up Areas in Santa Fe, Romblon 20

LIST OF TABLES

Table 1. Likelihood of occurrence and severity of consequence scores and categories. 7
Table 2. Climate Projections Under Medium-Range Emission Scenario. 9
Table 3. Summary of projected changes in climate variables and potential affected exposure units 11
Table 4. Summary of the climate impact chains of the five exposure elements 21
Table 5. History of Previous Disasters 25
Table 6. Hazard inventory matrix 26
Table 7. Summary Matrix for Population 43
Table 8. Flood Risk Percentage of Natural Resources per Barangay 52
Table 9. Landslide Risk Percentage of Natural Resources per Barangay 52
Table 10. Tsunami Risk Percentage of Natural Resources per Barangay 55
Table 11. Summary Matrix for Natural Resource-Based Production Areas 59
Table 12. Flood Risk Percentage of Urban Use Areas per Classification 67
Table 13. Landslide Risk Percentage of Urban Use Areas per Classification 71
Table 14. Tsunami Risk Percentage of Urban Use Areas per Classification 74
Table 15. Summary Matrix for Urban Use Areas 78
Table 16. Summary Matrix for Lifeline Utilities 106
Table 17. Summary Matrix for Critical Point Facilities 133

LIST OF MAPS

Base Map of Santa Fe, Romblon
Flood Susceptibility Map of Santa Fe, Romblon
Landslide Susceptibility Map of Santa Fe, Romblon
Tsunami Susceptibility Map of Santa Fe, Romblon
Population Map of Santa Fe, Romblon
Population Exposure to Flood Map of Santa Fe, Romblon
Population Risk to Flood Map of Santa Fe, Romblon
Population Exposure to Landslide Map of Santa Fe, Romblon
Population Risk to Landslide Map of Santa Fe, Romblon
Population Exposure to Tsunami Map of Santa Fe, Romblon
Population Risk to Tsunami Map of Santa Fe, Romblon
Natural Resource-Based Production Areas Map of Santa Fe, Romblon
Natural Resource-Based Production Areas Exposure to Flood Map of Santa Fe, Romblon
Natural Resource-Based Production Areas Risk to Flood Map of Santa Fe, Romblon
Natural Resource-Based Production Areas Exposure to Landslide Map of Santa Fe, Romblon
Natural Resource-Based Production Areas Risk to Landslide Map of Santa Fe, Romblon
Natural Resource-Based Production Areas Exposure to Tsunami Map of Santa Fe, Romblon
Natural Resource-Based Production Areas Risk to Tsunami Map of Santa Fe, Romblon
Urban Use Areas Map of Santa Fe, Romblon
Urban Use Areas Exposure to Flood Map of Santa Fe, Romblon
Urban Use Areas Risk to Flood Map of Santa Fe, Romblon
Urban Use Areas Exposure to Landslide Map of Santa Fe, Romblon
Urban Use Areas Risk to Landslide Map of Santa Fe, Romblon
Urban Use Areas Exposure to Tsunami Map of Santa Fe, Romblon
Urban Use Areas Risk to Tsunami Map of Santa Fe, Romblon
Lifeline Utilities Map of Santa Fe, Romblon
Lifeline Utilities Exposure to Flood Map of Santa Fe, Romblon
Lifeline Utilities Risk to Flood Map of Santa Fe, Romblon
Lifeline Utilities Exposure to Landslide Map of Santa Fe, Romblon
Lifeline Utilities Risk to Landslide Map of Santa Fe, Romblon
Lifeline Utilities Exposure to Tsunami Map of Santa Fe, Romblon
Lifeline Utilities Risk to Tsunami Map of Santa Fe, Romblon
Lifeline Utilities Map (Electric Posts) of Santa Fe, Romblon
Lifeline Utilities (Electric Posts) Exposure to Flood Map of Santa Fe, Romblon
Lifeline Utilities (Electric Posts) Exposure to Landslide Map of Santa Fe, Romblon
Lifeline Utilities (Electric Posts) Exposure to Tsunami Map of Santa Fe, Romblon
Lifeline Utilities (Electric Posts) Risk to Flood Map of Santa Fe, Romblon
Lifeline Utilities (Electric Posts) Risk to Landslide Map of Santa Fe, Romblon
Lifeline Utilities (Electric Posts) Risk to Tsunami Map of Santa Fe, Romblon
Critical Point Facilities of Santa Fe, Romblon
Critical Point Facilities Exposure to Flood Map of Santa Fe, Romblon
Critical Point Facilities Risk to Flood Map of Santa Fe, Romblon
Critical Point Facilities Exposure to Landslide Map of Santa Fe, Romblon
Critical Point Facilities Risk to Landslide Map of Santa Fe, Romblon
Critical Point Facilities Exposure to Tsunami Map of Santa Fe, Romblon
Critical Point Facilities Risk to Tsunami Map of Santa Fe, Romblon

LIST OF ANNEXES

Population Severity of Consequence Score Matrix..... 139
Natural Resource-Based Production Areas Severity of Consequence Score Matrix 141
Urban Used Areas Severity of Consequence Score Matrix..... 144
Lifeline Utilities Severity of Consequence Score Matrix 147
Critical Point Facilities Severity of Consequence Score Matrix..... 148
Population Risk Table (flood)..... 150
Population Risk Table (landslide)..... 151
Population Risk Table (tsunami)..... 152
Natural Resource-Based Production Areas Risk Table (flood) 153
Natural Resource-Based Production Areas Risk Table (landslide)..... 155
Natural Resource-Based Production Areas Risk Table (tsunami) 159
Urban Use Areas Risk Table (flood)..... 159
Urban Use Areas Risk Table (landslide) 161
Urban Use Areas Risk Table (tsunami)..... 163
Lifeline Utilities Risk Table (flood) 164
Lifeline Utilities Risk Table (landslide)..... 167
Lifeline Utilities Risk Table (tsunami) 170
Critical Point Facilities Risk Table (flood) 170
Critical Point Facilities Risk Table (landslide) 172
Critical Point Facilities Risk Table (tsunami) 176
Population Exposure and Risk Database 177
Natural Resource-Based Production Areas Exposure and Risk Database 179
Urban Use Areas Exposure and Risk Database..... 183
Lifeline Utilities Exposure and Risk Database..... 185
Critical point Facilities Exposure and Risk Database..... 189

INTRODUCTION

In 2017, the United Nations University's Institute for Environment and Human Security revealed that Philippines ranked third next to Vanuatu and Tonga on the worlds risk of disaster in consequence of extreme natural events report out of 171 countries and also ranked third on the World Risk Index's list of countries with the greatest exposure to natural disasters on a score of 52.46 percent.

The Province of Romblon, due to its geographic location, is considered as one of the most disaster-prone areas in the Philippines. The province is exposed to hazards such as flooding, landslide, and earthquakes that cause damages to properties as well as to human lives. Flooding, caused by typhoons and by *Habagat* season as well, is the most frequent hazard felt by the constituents. Without proper hazard mitigations, low lying areas are exposed to flooding especially areas that are near river delta and low lying coastal areas.

Furthermore, the existence of fault line in the Island of Tablas threatens the municipalities in the island as it has made them more susceptible to hazards like earthquake and tsunami. Mainstreaming climate and disaster risk preparation lies on its adverse impacts that are already experienced which may intensify exponentially over time if nothing is done to mitigate greenhouse gases level.

The Municipality of Santa Fe is undeniably exposed to hazard felt mostly on wet seasons. Several typhoons have affected the municipality in all sector where casualties are reported to be highest on the agricultural sector which further affects the local economy known as the municipality is greatly dependent on agriculture.

The municipality's topography is generally rolling to hill with a slope of 18-30 percent. The steep juncture is vulnerable to heavy precipitation which can cause liquefaction and volatile movements. The adverse climate change impacts due to the temperature and precipitation changes also necessitates the stakeholders to design interventions that are effective, efficient, and sustainable.

The Supplemental Guidelines on Mainstreaming Climate and Disaster Risks is being pursued because of its goal of sustainable development. It is meant to mainstream both disaster risk reduction and climate change adaptation into Comprehensive Land Use Plan to prepare a risk-sensitive land use plans and ensure policy coherence and effective use of resources (HLURB, 2014). The results of CDRA integrated into plans will create a safer and resilient human settlements corresponding to Sustainable Development Goal 11.

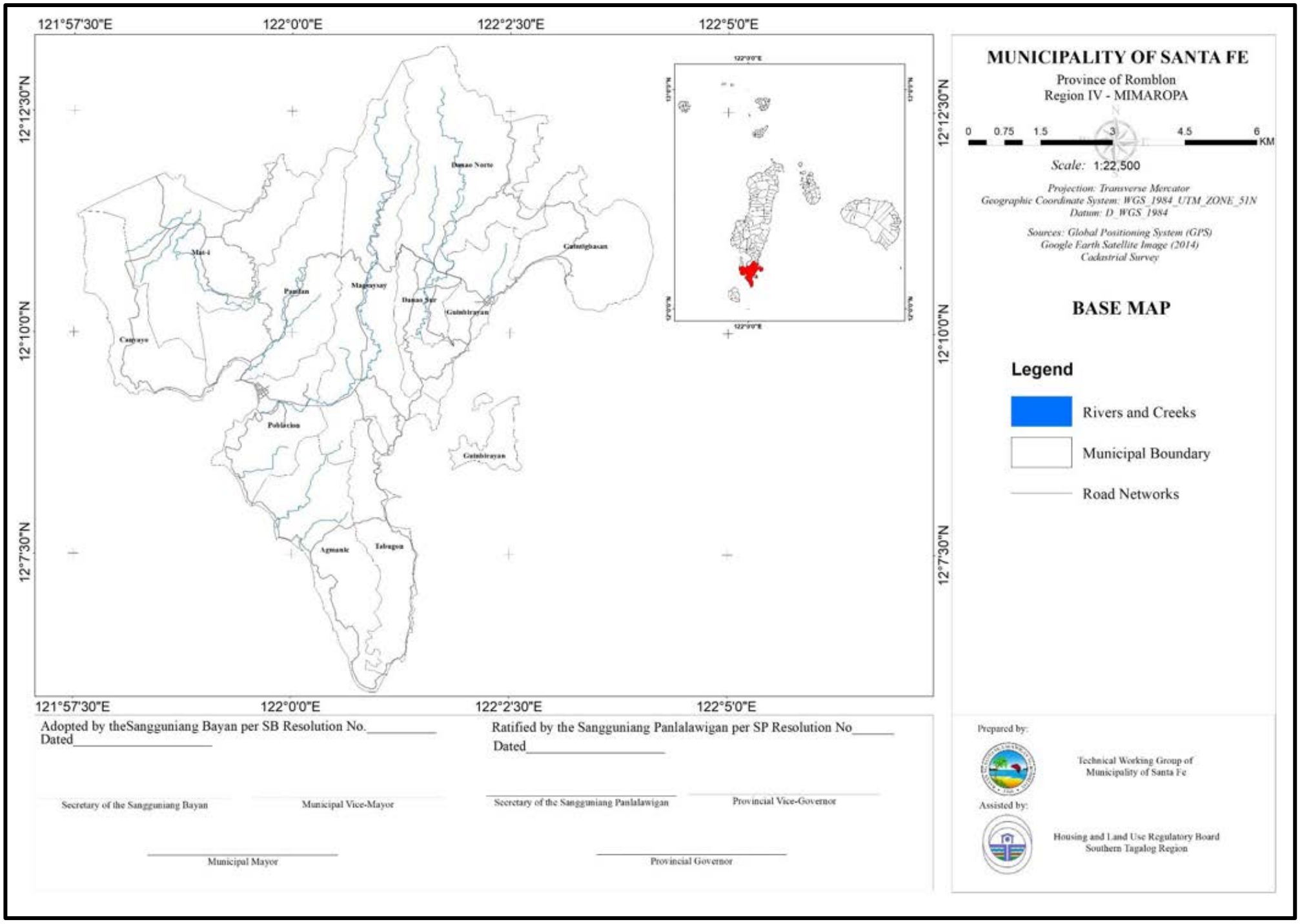
BRIEF LOCALE OF THE STUDY

Santa Fe is a peninsular town on the southernmost part of Tablas Island, Province of Romblon. It is geographically located at coordinates 12'9' latitude and 121`59` longitude and is bounded on the northwestern side by the Municipality of Looc, on the northeastern side by Alcantara, on the west by Tablas Strait and Santa Fe Bay, on the eastern and southern side by Sibuyan Sea and Guinbirayan Bay. It is approximately 51 kilometers away from Odiongan, Romblon which is the growth center in the Island of Tablas. From Manila, the municipality can be reached via air vessel which lands in Tugdan Airport, 20 minutes away from the municipality.

Santa Fe is one of the 17 coastal municipalities of Romblon province. It is composed of 11 barangays; only one of which is not coastal. Barangay Poblacion and Guinbirayan are considered urban while the remaining nine barangays are considered rural. Among the barangays, Magsaysay has the largest area and Danao Sur has the smallest. As of 2015 census by PSA, it has a population of 16,098 and 3,711 households with a population growth rate of 0.50. Unhan/ taga-unhan or inunhan, is the native tongue of the municipality's inhabitants.

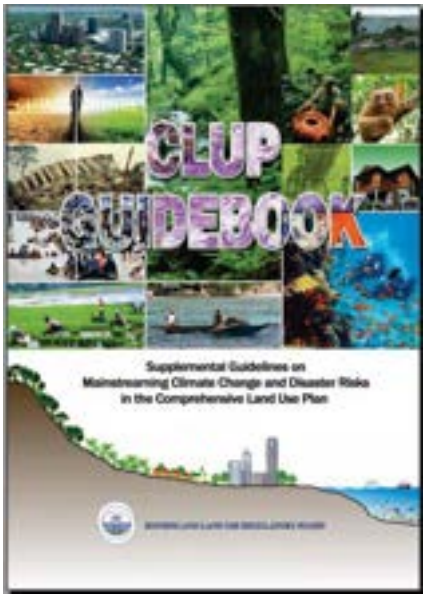
The municipality of Santa Fe has a total land area of 7,309.3417 hectares. 6,098.159 hectares 83.43 percent of Santa Fe's land area is devoted to agriculture. Coconut comprises the largest share of the agricultural sector of the municipality (2,181 hectares) and it is dominantly grown in all barangays. In order to optimize production, intercropping under coconut plantation is a common practice among farmers. The fully irrigated rice fields cover 55.40 hectares, rain-fed rice fields cover 266.65 hectares and pastureland or grassland covers 729.26 hectares. Timberland accounts for 1.98%. The uncultivated agricultural lands cover an area of 43.2%. Fruit trees, vegetables, banana, root crops and livestock are usually planted and raised throughout the municipality. Majority of the land is classified as alienable and disposable. Only few parts of land in *Barangays* Guinbirayan, Guintigbasan, Pandan, Mat-i, Poblacion, and Agmanic are classified as a forest reserve.

Santa Fe's coast is blessed to house one of the most endangered species in the world, the sea turtles or pawikan. According to EPAFI (Environmental Protection of Asia Inc.), out of the five (5) endangered species of sea turtle, the coast of Santa Fe is a favorite nesting place of three (3) endangered species of marine turtles, which include the ridley, green-sea turtle, hawksbill, and the most common sea turtle, the olive ridley. Based from the PDPFP 2010-2040, n 2012, the Municipality ranked second on the widest coastal areas foreshore with 46.80 kilometers after San Agustin with 78.59 kilometers.



Map 1. Base Map of Santa Fe, Romblon

THE CLIMATE AND DISASTER RISK ASSESSMENT (CDRA) [1]



The Climate Change Commission (CCC) and the Housing and Land Use Regulatory Board (HLURB) formulated the Supplemental Guidelines as an annex to the 2014 Comprehensive Land Use Plan (CLUP) Guidebooks of HLURB. Local governments shall refer to the Supplemental Guidelines in the preparation of their risk-sensitive land use plans. The Supplemental Guidelines provides a step-by-step process on assessing the climate and disaster risks of a locality. Risk information coming from this analysis will form part of the basis for the optimum allocation of land for various uses, taking into account the locational and sectoral constraints posed by natural hazards and the potential impacts of climate change.

Policy Context

The 2009 Climate Change Act and the 2010 National Disaster Risk Reduction and Management Law provide the fundamental frameworks for key actions toward improving governance and participation, nancing, capacity and development as well as addressing critical hazard challenges, specically those which are becoming more frequent and intense due to climate change.

The National Climate Change Action Plan and the National Disaster Risk Reduction and Management Plan have been adopted to dene priority areas for interventions toward achieving reduction in climate and disaster risks and adaptation to climate change. At the subnational level, Local Disaster Risk Reduction and Management Plans (LDRRMPs) are prepared to dene the local agenda for preparedness, prevention and mitigation, response, and recovery and rehabilitation. The Local Climate Change Action Plans (LCAAPs) denes the local agenda for anticipating potential impacts of climate change to important vulnerable sectors, and local initiatives that will contribute to the global efforts to mitigate atmospheric greenhouse gases levels.

In the process, there is substantially reducing resources for disaster response and post disaster recovery and rehabilitation.

Through the CLUP, risks and vulnerabilities can be assessed in detail at the city/municipal and barangay levels; national and sub-national DRR-CCA strategic priorities can be localized and integrated into the land use plan; development and use of properties, structures, and resources at the parcel level can be regulated through zoning; local governments can identify and implement local legislations to support land use policies related to the reduction of risks and vulnerabilities; and local stakeholders can be engaged to identify socially acceptable policy and program interventions to address DRR-CCA related concerns and issues.

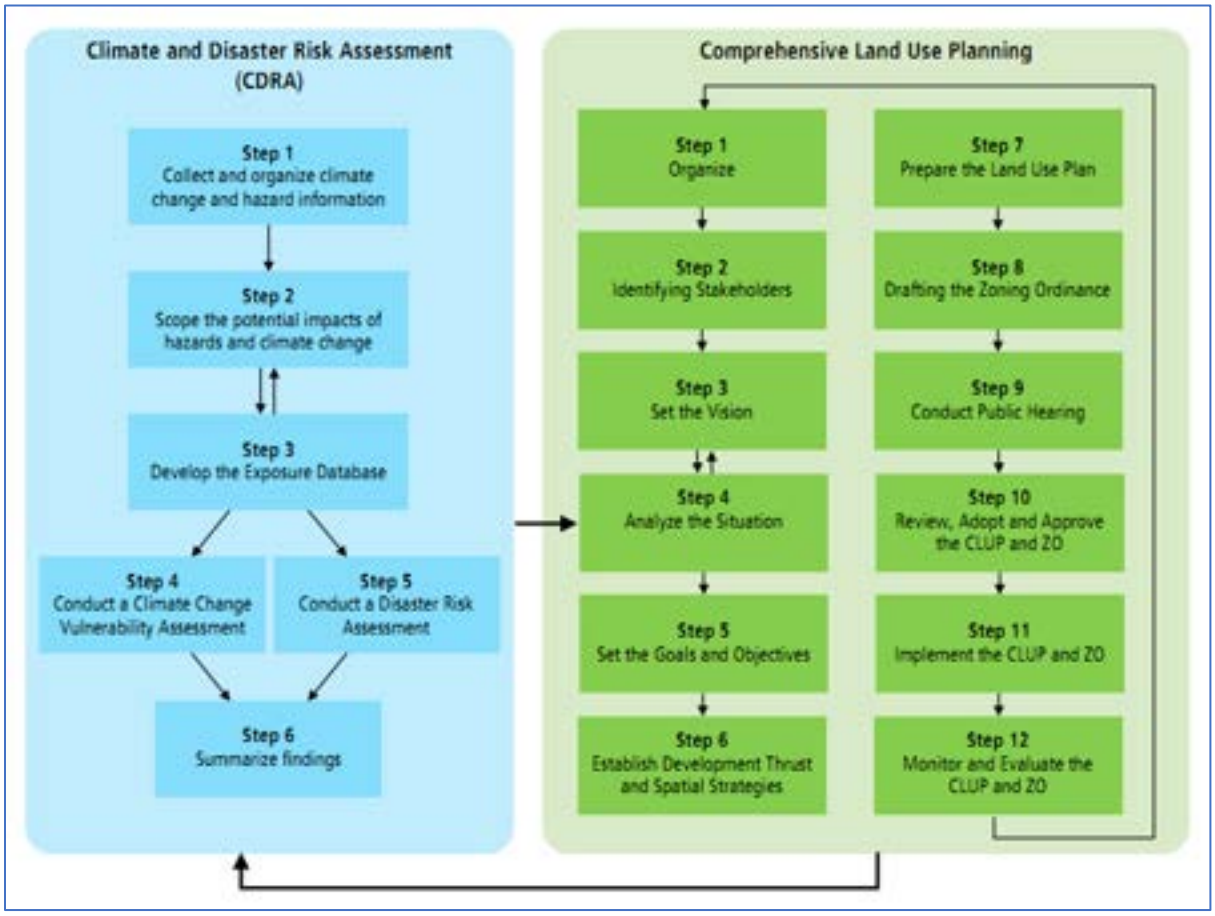


Figure 1. Integration of CDRA to the CLUP and the steps to CDRA.

Benefits of Mainstreaming

Climate and disaster risk assessment provides LGUs the necessary planning information to supplement the CLUP process. The climate and disaster risk assessment seeks to establish a deeper understanding of natural hazards (frequency of occurrence and magnitude) and climate change impacts that may affect the local territory; the vulnerabilities of the various exposed elements; and the magnitude of risks involved in order to identify the pressing development challenges, problems, issues, and concerns so the proper interventions for mitigation and adaption can be translated into the various aspects of the CLUP. Understanding the potential risks and the vulnerabilities allow decision-makers and stakeholders to make informed and meaningful decisions in goal formulation,

strategy generation, and land use policy formulation and development. The integration of climate and disaster risks in the CLUP and Zoning Ordinance (ZO) formulation will allow local government units to:

- Better understand natural hazards and climate change and how these would likely alter the development path of the locality;
- Understand risks posed by natural hazards and climate change on exposed areas, sectors and communities by analyzing exposure, vulnerabilities, and adaptive capacities;
- Identify priority decision areas and development challenges posed by climate change and natural hazards;
- Determine realistic projections on demand and supply of land for settlements, production, protection, and infrastructure development given the impacts of climate change and natural hazards, and existing risks and vulnerabilities;
- Incorporate spatial development goals, objectives and targets to reduce risks and vulnerabilities;
- Make informed decisions to effectively address risks and vulnerabilities by weighing alternative spatial strategies, land use allocation, and zoning regulations;
- Identify appropriate risk reduction and climate change adaptation and mitigation measures as inputs to the comprehensive development planning and investment programming.

Climate and Disaster Risk Assessment (CDRA) Process

The climate and disaster risk assessment (CDRA) intends to determine the level of risks and vulnerabilities of areas and sectors in the municipality/city to climate related hazards and potential impacts of climate change and facilitate the identication of priority decision areas where the various interventions can be implemented. The CDRA involves six steps namely:

1. Collect and organize climate change and hazard information - involves the gathering of climate change information and characterizing hazards that may affect the locality.
2. Scope the potential impacts of hazards and climate change - identifying key areas or sectors that may be affected by climate change and natural hazards and determining likely impacts (direct and indirect);
3. Develop the exposure database - gathering baseline map and attribute data on exposure, vulnerability/ sensitivity and adaptive capacity as basis for the Climate Change Vulnerability Assessment (CCVA) and Disaster Risk Assessment (DRA).
4. Conduct a CCVA - identication of vulnerable areas and sectors by analysing exposure, sensitivity and adaptive capacity to the various climate stimuli.
5. Conduct a DRA - identication of risk areas by analyzing hazard, exposure and vulnerability.
6. Summarize ndings - identication of priority decision areas/sectors based on the combined level of risks and vulnerabilities, identication of risk management options, climate change adaptation and mitigation options.

Risk Estimation

Estimate the risks for the various exposure units. Risk is operationalized using the function:

Risk = Likelihood of Occurrence x Severity of Consequence

The risk estimation for the various exposure units involves three major steps namely:
1. Computation of the risk score

2. Reclassifying risk scores into risk categories
3. Preparation of risk maps

The resulting risk score/categories, and risk maps will provide a qualitative index of the various location of high risk areas in the locality. Using the computed risk score/s, reclassify them into risk categories using the Risk Score Matrix below (refer to Table 2). Risk scores reflect three possible scenarios:

High Risk Areas - Areas, zones or sectors may be considered "high risk" if hazard events have very high to moderate severity of consequence, given the scale of exposure, vulnerability to the potential impacts of the hazards, and the level of adaptive capacity to endure direct and indirect impacts of the hazard and likelihood of occurrence ranging from frequent to improbable events. The range of risk score for this scenario is 12 to 24.

Moderate Risk - Areas, zones or sectors may be considered a "moderate risk" if the likelihood of occurrence of a hazard event is improbable to rare with a very high to moderate severity of consequence. These may also pertain to areas where the severity of consequence is "moderate to minor" but with a likelihood of occurrence that is frequent. The range of risk score for this scenario is 3 to <14.

Low Risk - Areas, zones or sectors may be considered "low risk" for very rare hazard events with very high to high severity of consequences. It may also pertain to moderate to low severity of consequence from an occasional to a very rare event. Risk scores for this scenario is <7.

Table 1. Likelihood of occurrence and severity of consequence scores and categories.

Indicative Likelihood of Occurence	Likelihood of Occurrence	Severity of Consequence Score			
		Very High 4	High 3	Moderate 2	Low 1
Frequent (1-3 years)	6	24	18	12	6
Moderate (4-10 years)	5	20	15	10	5
Occasional Slight Chance (11-30 years)	4	16	12	8	4
Improbable (31-100 years)	3	12	9	6	3
Rare (101-200 years)	2	8	6	4	2
Very Rare (>200 years)	1	4	3	2	1

HIGH RISK AREAS
MODERATE RISK AREAS
LOW RISK AREAS

[1] Supplemental Guidelines on Mainstreaming Climate and Disaster Risk Assessment in the Comprehensive Land Use Plan promulgated by the Housing and Land Use Regulatory Board (2014)

RESULTS AND DISCUSSION

This section is divided into two (2) parts — Climate Change Vulnerability Assessment (CCVA) and Disaster Risk Assessment (DRA). CCVA discussed the effects of climate projections on forest, coastal, agriculture, and urban areas of Santa Fe while DRA discussed the exposure and risks to flood and landslide of the five (5) exposure units. Decision areas were identified and policy interventions were recommended thereafter.

A. CLIMATE CHANGE AND VULNERABILITY ASSESMENT

a. Climate Change Projections

PAGASA used three (3) climate scenarios to project climate change in the Philippines (high, medium, and low range scenarios) and used three (3) climate variables (minimum temperature, maximum temperature, and precipitation). The medium-range emissions scenario is proposed to be used for climate and disaster risk assessment since it considers past emissions.
The PAGASA report (2011) includes climate change projections in the provincial level. It contains climate variables on the baseline period from 1971-2000 and the projected changes from the baseline values for two time frames—2020 and 2050, covering seasonal rainfall change, seasonal temperature change, frequency of extreme rainfall events, frequency of days with temperatures exceeding 35 ◦ C, and frequency of dry days or days with rainfall less than 2.5mm.
In addition to that, climate variables are divided into seasons: (1) the DJF (December, January, February or northeast monsoon locally known as *"amihan"*) season; (2) the MAM (March, April, May or summer) season; (3) JJA (June, July, August or southwest monsoon locally known as *"habagat"*) season; and (4) SON (September, October, November or transition from southwest to northeast monsoon) season.

Generally, the climate change projections of PAGASA showed that there will be increases in the seasonal temperature and seasonal rainfall change of the municipality in all months from the observed baseline (1971-2000) to years 2020 and 2050. The extreme events considered by PAGASA, the number of dry days with temperature greater than 35 ◦ C and number of days with rainfall greater than 200 mm, is also projected to increase in the years to come. The number of dry days is projected to decrease from 7, 628 during the observed baseline down to 6,125 and 5,663 in years 2020 and 2050, respectively.
These changes in temperature and rainfall have significant effects on different ecosystems of Santa Fe. Four (4) major ecosystems were considered to cover from ridge to reef, namely forest, agriculture, coastal, and urban.

Climate is the most important physical aspect of project implementation and it is dependent in the land characteristics of the municipality.

Under the Corona's classification of climate in the Philippines, the province of Romblon falls under Type III which is considered by no pronounced wet and dry seasons from June to November and sometimes December and from January to May respectively. Areas are partly sheltered from the northeast monsoon and trade winds open to the southeast monsoon or at least to frequent storms.

Temperature:
Minimum and Maximum temperature ranges from 20^{0}C during the monthly of February when the Siberian wind is blowing to 35^{0}C at day time for the month of May when summer seasons is at its peak.

Relatively Humidity:
Monthly average relative humidity ranges from 75 percent during the month of April or May to 84 percent during December.

Rainfall:
As per rainfall analysis that was presented using the means and the 75% probability analysis it is more reliable and safe from the risk of not implementing projects and crop less due to drought. This shows that the Island is generally wet from the middle of June to November when the southwest monsoon is preponderant and dry during the rest of the year. Annual rainfall varies, from 1-2000 to 1-750mm. Refer to table PN-06 for information on Climate Projection under medium-range scenarios.

Table 2. Climate Projections Under Medium-Range Emission Scenario.

Climate Variable	Observed Baseline (1971-2000)				2020 (2006-2035)				2050 (2036-2065)			
Season	**DJF**	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**	**SON**	**DJF**	**MAM**	**JJA**	**SON**
Seasonal Temperature Increases(◦C)	26.3	28.5	28.1	27.7	27.1	29.6	29.0	28.5	28.1	30.7	30.0	29.4
Seasonal Rainfall Change (mm)	357	224.0	652.9	778.0	389.1	224.4	833.1	953.8	473.4	282.9	1,085.1	1,072.9
No. of Days w/ Tmax >35 ◦C	59				235				756			
No. of Dry Days	7,628				6,125				5,663			
No. of Days w/ Rainfall 200 mm	4				11				20			

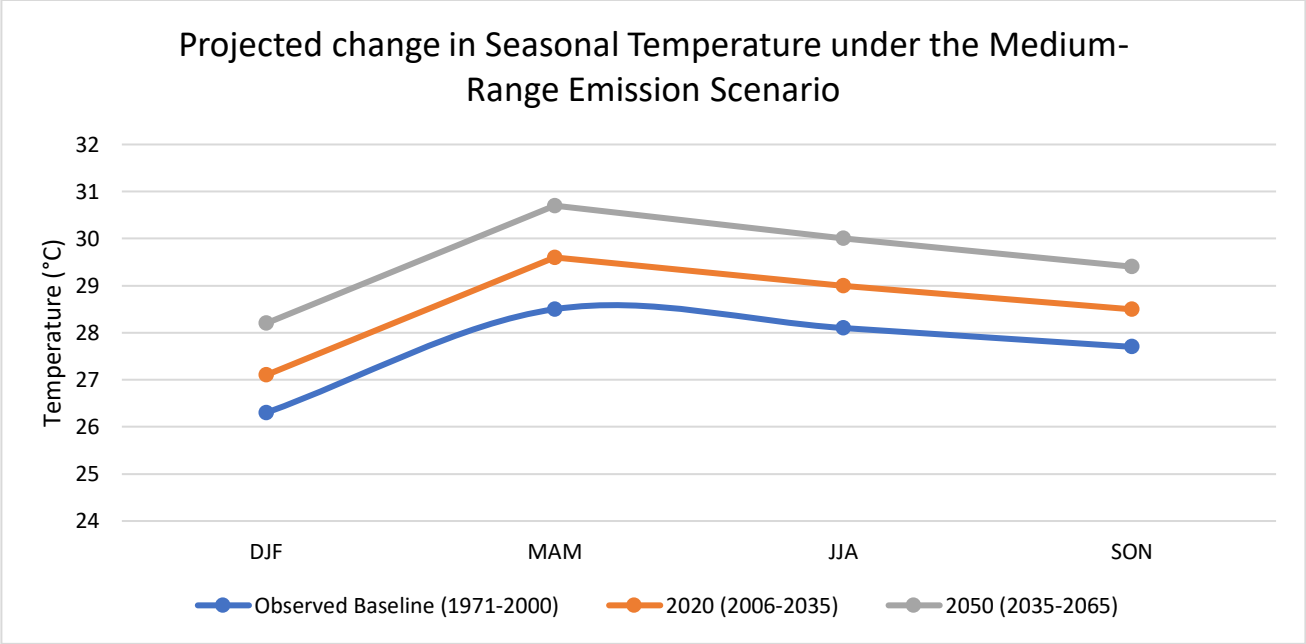


Figure 2. Projected Change in Seasonal Temperature Under Medium-Range Scenario

Source: *Philippine Atmospheric Geophysical and Astronomical Services (2011)*

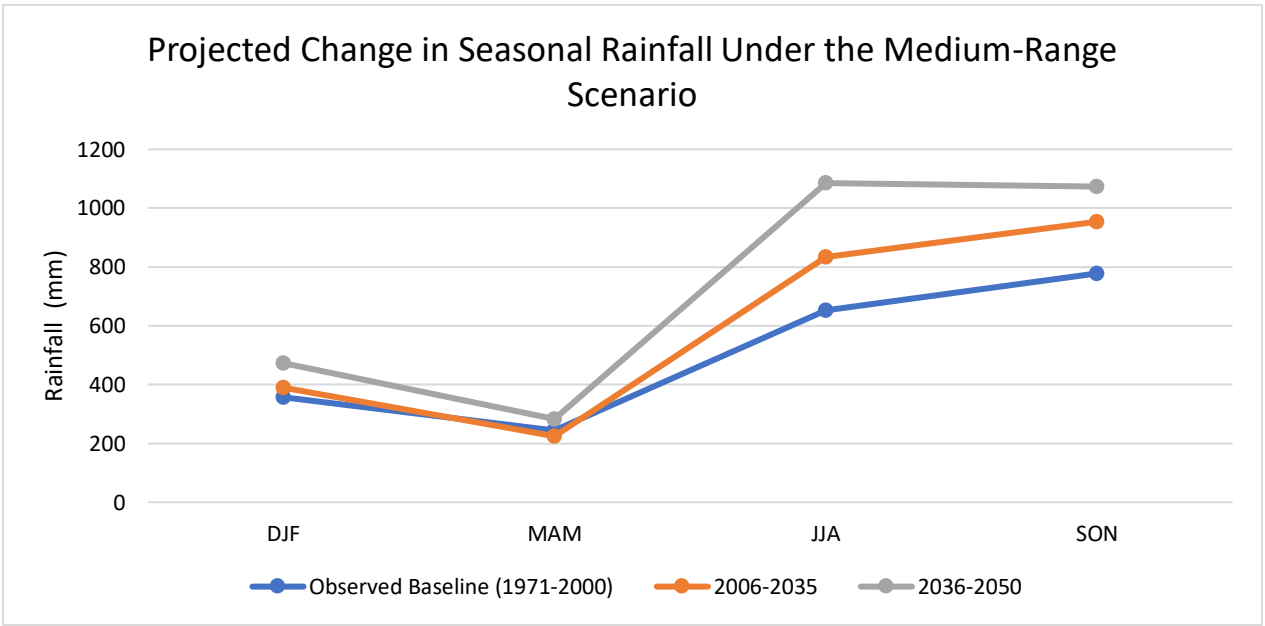


Figure 3. Projected Change in Seasonal Rainfall Under Medium-Range Scenario

Source: *Philippine Atmospheric Geophysical and Astronomical Services (2011)*

Table 3. Summary of projected changes in climate variables and potential affected exposure units.

CLIMATE VARIABLE	OBSERVED BASELINE	SPECIFIC CHANGE EXPECTED AND REFERENCE PERIOD	GENERAL CHANGES EXPECTED IN CLIMATE VARIABLES	INFORMATION ABOUT PATTERNS OF CHANGE
Temperature	❖ 26.3^{0}C every DJF ❖ 28.5^{0}C every MAM ❖ 28.1^{0}C every JJA 27.7^{0}C every SON	❖ 27.1^{0}C by 2020 and 28.1^{0}C by 2050 during DJF ❖ 29.7^{0}C by 2020 and 30.7^{0}C by 2050 during MAM ❖ 29^{0}C by 2020 and 30^{0}C by 2050 during JJA 28.5^{0}C by 2020 and 29.4^{0}C by 2050 during SON	Increasing temperature for all seasons expected in 2020 & 2050.	Increasing temperature for all seasons expected in 2020 & 2050.
Rainfall	❖ 357.0 during DJF ❖ 224.0 during MAM ❖ 652.9 during JJA 778.0 during SON	❖ 366 mm by 2020 and 389.6 mm during 2050 during DJF ❖ 224.4 mm by 2020 and 282.9 mm by 2050 during MAM ❖ 833.1 mm by 2020 and 1,085.1 mm by 2050 during JJA 953.8 mm by 2020 and 1, 072.9 mm by 2050 during SON	❖ Decreasing in rainfall by 2020 and increasing by 2050 during DJF ❖ Decreasing in rainfall by 2020 and 2050 by MAM ❖ Increasing in rainfall by 2020 and 2050 by JJA Increasing in rainfall by 2020 and 2050 by SON	❖ Decreasing in rainfall by 2020 and increasing by 2050 during DJF ❖ Decreasing in rainfall by 2020 and 2050 by MAM ❖ Increasing in rainfall by 2020 and 2050 by JJA ❖ Increasing in rainfall by 2020 and 2050 by

CLIMATE VARIABLE	OBSERVED BASELINE	SPECIFIC CHANGE EXPECTED AND REFERENCE PERIOD	GENERAL CHANGES EXPECTED IN CLIMATE VARIABLES	INFORMATION ABOUT PATTERNS OF CHANGE
Number of hot days	59 days	❖ 235 days exceeding 35^0C in 2020 756 days exceeding 35^0C in 2050	Increasing number of fish holidays (exceeding 35^0C)	Increasing number of fish holidays (exceeding 35^0C)
Number of dry days	7, 628 days	❖ 6, 125 days with <2.5 mm of rain in 2020 5, 663 days with <2.5mm of rain in 2050	Decreasing number of dry days (<2.5mm of rain)	Decreasing number of dry days (<2.5mm of rain)
Extreme daily rainfall events	4 days	❖ 11 days with rainfall 7200mm in 2020 20 days with rainfall 7200mm in 2050	Heavy daily rainfall >200mm increasing in 2020 and 2050	Heavy daily rainfall >200mm increasing in 2020 and 2050

Source: Philippine Atmospheric Geophysical and Astronomical Services (2011)

b. Climate Impact Change Diagram

I. FOREST ECOSYSTEM

Climate plays an important role in forest health as it influences the structure and function of forest ecosystems. A changing climate may worsen the threats to forests. As shown in figure 2, increase in temperature may result to decrease in water table as well as pest and disease outbreak. Climate change may alter the intensity and frequency of forest disturbances such as insect outbreaks and invasive species (EPA, 2017).

Disturbances such as insect pests, pathogens, and forest fires are enhanced by moisture stress and drought (Moore, et al. 2008). It is also mentioned that warmer temperatures have resulted in range expansions of pests. In addition to that, with the pests' short generation times, high mobility and high reproductive rates, it is expected that they may respond more quickly to climate change than long-lived organisms. Insect outbreaks often defoliate, weaken, and kill trees, thus, leading to increased health risk in flora and fauna and eventual loss of endemic species.

As mentioned above, increase in temperature may also likely to cause decrease in water table, thus, causing drought and low aquifer recharge. Changes both in temperature and precipitation may strongly affect moisture availability in forests. Increase in temperature may also lead to increase in water losses through evaporation and evapotranspiration which will also lead to reduced water use efficiency of plants (Mortsch, 2006).

This may then lead to withering of trees and decreased forest productivity. According to Moore, et al., forests with decreased productivity due to drought will likely face further decreases in productivity. Decrease in forest productivity may result to reduced forest ecosystem services which may imply increase in social and environmental vulnerabilities such as loss of income, increase in poverty incidence, and increase in social issues.

According to IPCC (2007), more rain can be expected in areas in the equatorial belt (humid tropics). Increase in rainfall in forest ecosystem may lead to increased soil moisture (Parr, et al., 2016) and overflowing river systems in forests.

While increased soil moisture may result to landslide then land degradation and soon after to eventual deterioration of forest cover, overflowing river systems will lead to soil erosion causing topsoil removal which may then cause decrease in soil fertility. Decrease in soil fertility may lead to decrease in forest productivity. Decrease in forest productivity may lead to reduced ecosystem services, eventual loss of income that may lead to increase in poverty incidence and social issues.

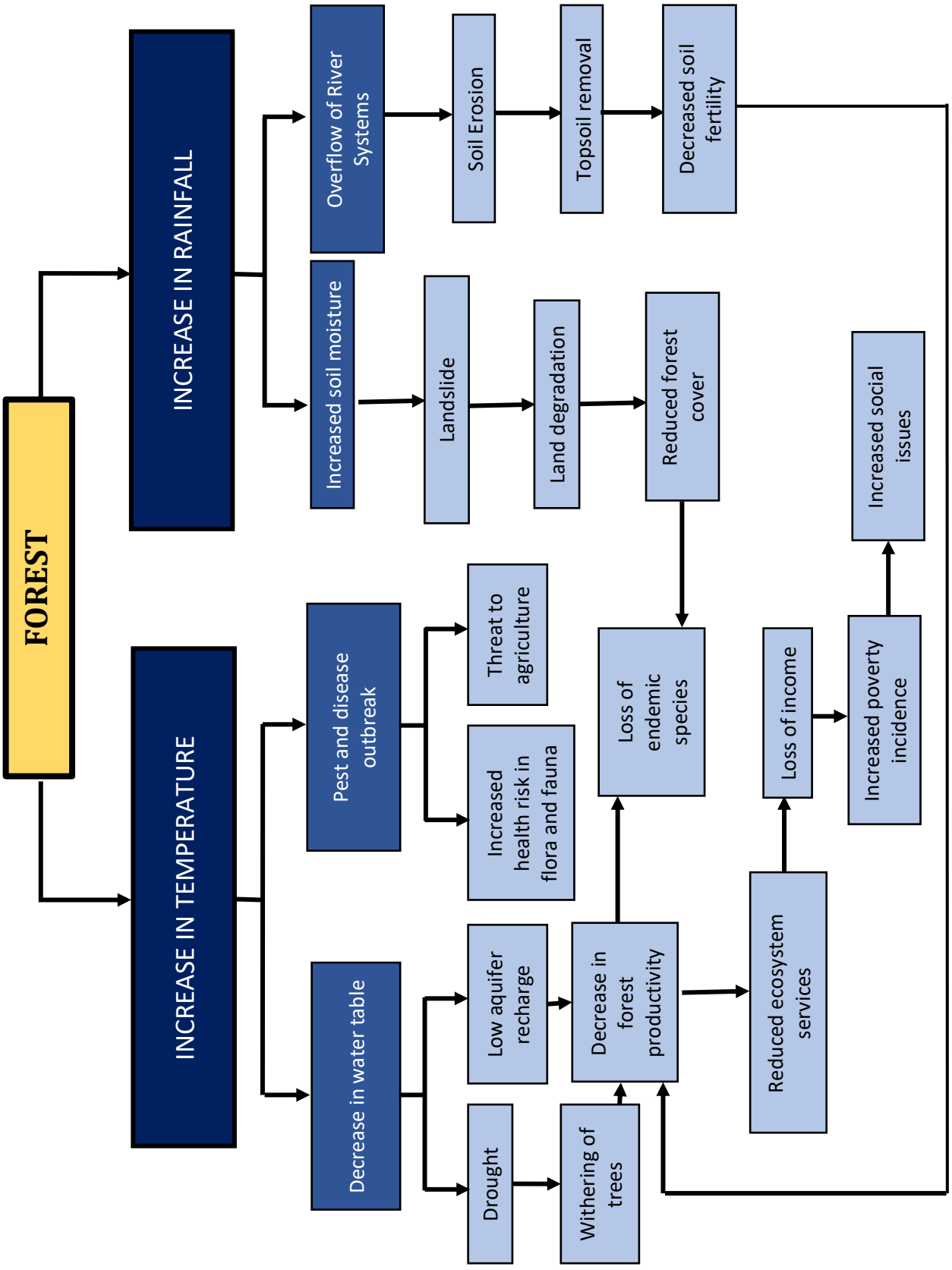


Figure 4. Impacts of Climate Change to Forest Ecosystem in Santa Fe, Romblon.

II. COASTAL AREAS

Climate impacts also play an important role in coastal ecosystem of Santa Fe. Increase in temperatures in coastal ecosystem may cause heat stress to plant and animals which may affect their growth, reproduction, evolution and survival (Paice & Chambers, 2016). Plants and animals survive within temperatures that they can tolerate, thus, increase in temperatures may lead to animals shifting southwards as a response to the temperature increase. As a result, artisanal fisherman may find it difficult to catch fish for a living, thus resulting to reduced marine productivity, decreased food supply, and loss of livelihood.

In addition to that, there may be loss or migration of marine species due to heat stress and spread of invasive alien species. Furthermore, occurrence of coral bleaching may also increase due to rising temperatures. Coral growth and distribution is restricted by limitations of temperature and ocean acidification resulting from climate change. Bleached corals are more vulnerable to damage or further destruction of marine habitats that may possibly be intensified by increase and frequency of extreme weather events (Paice & Chambers, 2016). Due to ocean acidification, carbonate-dependent organisms such as coral communities may no longer produce calcium carbonate at rates that are sufficient for maintaining coral reef structures that serve as fish habitats (BIMP-EAGA, 2015). This is a big threat to coastal and marine resources as it may cause loss or migration of endemic marine species, reduced marine productivity, and eventual loss of livelihood.

Another impact of climate change to coastal ecosystem is increase in rainfall. Increase in rainfall in Santa Fe causes inundating large portion of land and beaches, inundation of coastal settlements and wetlands, uproots and drowns newly planted and young mangroves, and eutrophication of marine habitats. Sea level rise caused by increase in rainfall may cause low-lying areas to experience increased levels of inundation and saline intrusion into coastal waterways and water tables (BIMP-EAGA, 2015). It will also continue to affect coastal communities by exacerbating erosion leading to loss of land and coastal industries (Paice & Chambers, 2016), thus, causing interruption of economic activities and destruction of coastal settlements. Destruction of coastal settlements may result to possible relocation of coastal settlements which may cause loss of livelihood to those residing in coastal areas.

As climate change strengthens the hydrological cycle, eutrophication is a serious problem widely expected to intensify. Eutrophication in coastal waters is caused by nitrogen input from river runoff. Expected changes in precipitation patterns are seen to cause large increases in nitrogen fluxes by the end of the century, which may especially exacerbate eutrophication in India, China, and Southeast Asia (Sinha, et al. 2017). In effect, marine and water resources are susceptible to contamination resulting to destruction of marine habitats and loss of endemic marine species, thus, leading to eventual loss of livelihood.

The poorest and the marginalized who are most susceptible to risks may suffer most from biggest impacts of climate change. The interconnectedness of risk posed by climate change and disasters with poverty reduction, social protection, and sustainable development makes a strong case for the need for adaptive, inclusive, equitable, risk sensitive, and climate and disaster resilient development (UNDP, et al. 2015).

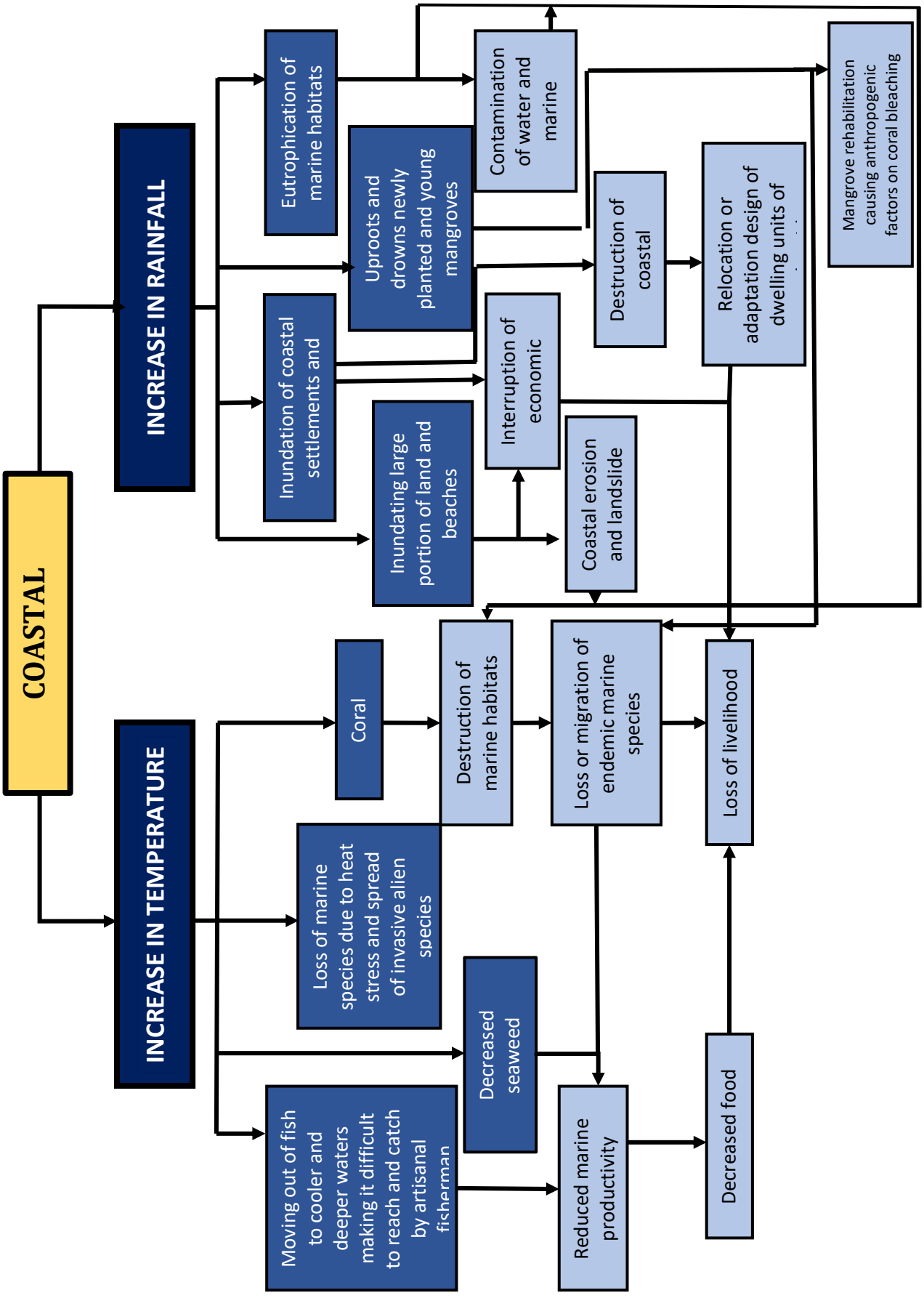


Figure 5. Impacts of Climate Change to Coastal Ecosystems in Santa Fe, Romblon

III. AGRICULTURE ECOSYSTEM

Agriculture is a climate-sensitive ecosystem where most municipality, such as Santa Fe, is greatly dependent. In order for the municipality to suffice food security and employment which agriculture offers, strategic methods on how to mitigate the effects of climate change on agriculture ecosystem must be devised.

With the data given, it is important for the municipality to identify all the effects of climate change. The two most evident factor affecting agriculture is the El Niño Southern Oscillation (ENSO) and La Niña which, through time, is worsened by increasing temperature and precipitation. The increase in temperature results to the continuous increase of heat waves which exacerbates direct stress on the production of crops, livestock, poultry, and forestry. This directly affects the water table which becomes less with the heat. Reduced water availability for crop plants, animals, and also human may require increased extractions from water sources such as rivers, reservoirs, and groundwater with consequent effects on water quality, stream ecosystems, and human health (Backlund, P. et al, 2008). An insufficient water supply in the water table may cause drought on irrigation, change on the soil moisture, and water scarcity for livestock and poultry which has higher water demand during dry season. Failure to provide water for livestock and poultry as the body heat increases may lead to occurrence of animal stress and stroke for some w1hich may cause animal fatality. Soil on the other hand, becomes arid with insufficient moisture in it. Consequently, crop withering and stagnant crop growth may also occur. The hot temperature may also result to pest and disease outbreak from forests and crop production areas.

Fishing is another sector of agriculture where the constituents critically depends to. The municipal sea waters serve as a niche for various marine species which the municipality could be proud of. Climate change may put these treasures at stake. The increasing temperature will greatly affect marine species especially the poikilothermal fishes which follow the specific temperature. With the sea waters getting hotter, these species may migrate or find water areas with lower water temperature.

Likewise, the increase of precipitation may result to flooding. Landslide may be experienced in the forest areas, as well as soil erosion which usually happens on the low-lying areas. Both landslide and soil erosion cause denitrification of soil which is the removal or nitrates or nitrites in the soil. Due to this, the nutrients from the soil decreases which is a determining factor of plant growth. Sedimentation and siltation of waterways may also occur which blocks the flow of water or makes the water ways shallower as experienced in Catolog River, Atik River, and in Pandan River. Another result of increased precipitation is the submersion of crops and the drowning of livestock and poultry animals.

Sea level rise as a result of the climate change is also felt in the municipality. The two fundamental factors that causes sea level rise, according to the National Research Council (2010), are thermal expansion as the ocean water basin upon heat absorption and the added water from land based sources such as glaciers, ice sheets, and other small sources. Subsequently, excess salt water from the average sea level intrudes the fresh waters, including the drinking water sources and fish ponds. All of which may result to decrease on agricultural production and further leads to decrease income of agriculture dependents. The poor are less capable to have assets that are needed to prepare or recover for disasters (Morrow, 1999; Cutter et al, 2003; Flanagan, 2011).

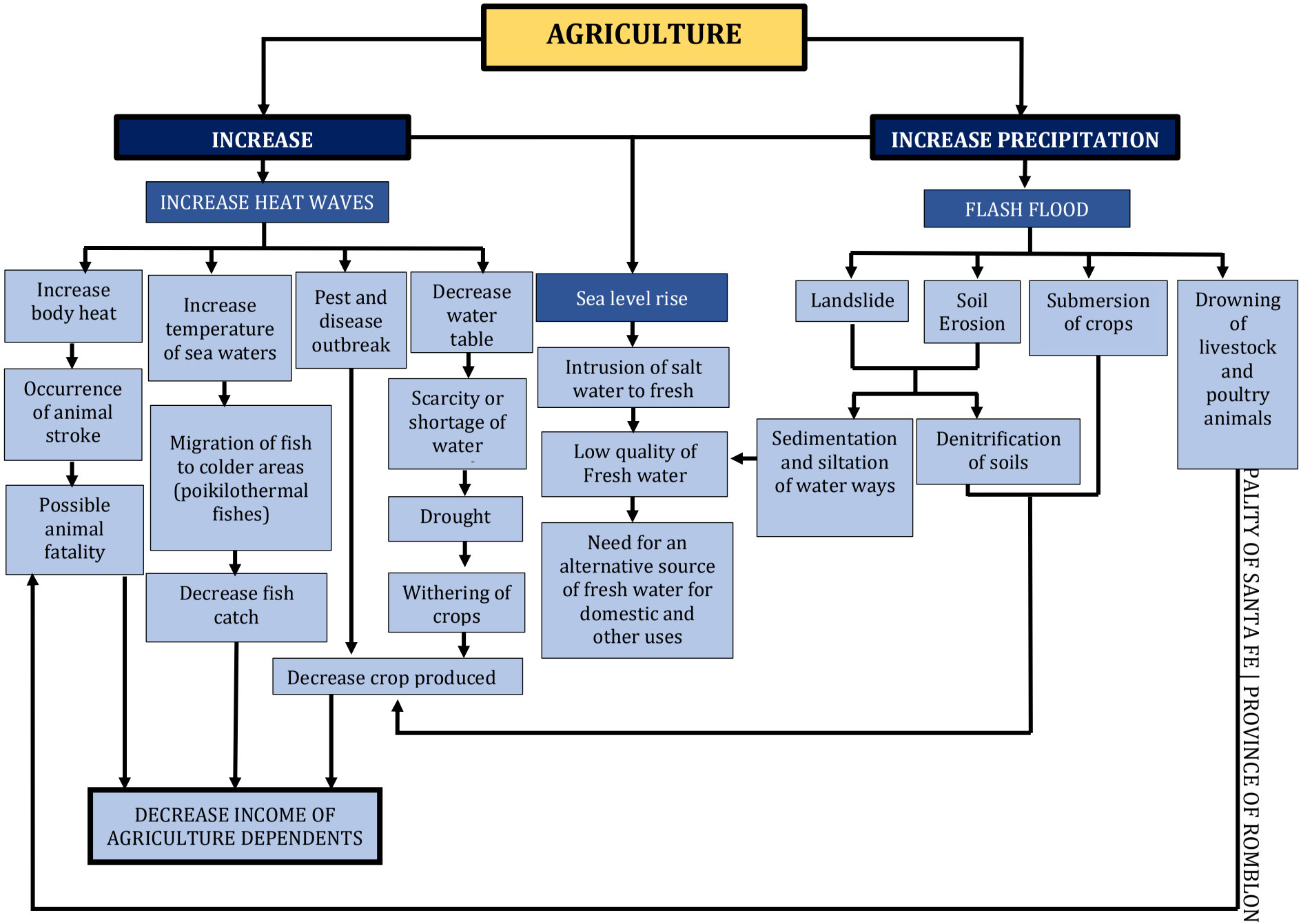


Figure 6. Impacts of Climate Change to Agriculture Ecosystems in Santa Fe, Romblon

IV. BUILT-UP AREAS

Built-up area is another vital ecosystem that is severely affected by climate change. It directly affects the population particularly on sectors of settlement and health. Gradual increase in temperature and increase in precipitation results to ecosystem imbalance where human life depends. Among the population, the young and old dependent including the person with disability are the most vulnerable to climate change that must be prioritized on disasters and on the impacts of climate change.

The increase in temperature poses the risks of heat stress and body heat. Due to severe heat stress, water based and vector borne diseases such as diarrhea and malaria may become epidemic. Disease outbreak may cause increase on the number of morbidity and mortality cases which subsequently requires enough health services due to the increase of health demands such as health professionals, medicines, vaccines, and facilities. Another effect of heat stress may be the decrease on the water table level or the water reserve. Consequently, the decrease on the water table may result to decrease of safe water supply used for domestic and agricultural purposes. Climate change threatens to increase the variability of water supply, shifting and intensifying the extremes, thereby, introducing greater uncertainty in water quantity and quality (BIMP EAGA, 2015). Unsafe as well as insufficient drinking water may increase malnutrition rate.

The abnormal increase on the number of dry days assimilated with high temperature not only leads to food insecurity as mentioned in agriculture. According to the UN-HABITAT (2004), drought on agriculture puts pressure on the urban areas not only on food security but also in the changes on livelihood/income sources and settlement patterns thus, rural to urban migration may escalate. On human, the high temperature increases the demands of basic needs such as water and electricity. Human tend to drink more water, to avoid dehydration, and to take bath more often to alter body heat which increases human risk to heart attack and heat stroke thus, imposes higher electric bills and health maintenance costs.

Similarly, the increasing precipitation days and strength proffers complications on human survival. Flooding is the most prominent effect of rainfall induced by extreme events such as typhoon. Built-up areas along the coast, which are numerous in the municipality may experience loss or damage on structures. Infrastructures located in the low-lying areas may experience submersion and damage while structures on high elevation may be affected by landslide with the soil having too much moisture thus, eventually results to damage. Mobile homes, settlements outside the urban areas, are seen as the vulnerable areas as these may not be usually accessible to transportation services, according to Morrow (1999), Cutter et al (2003), and Flanagan et al (2004). As a result, a need to retrofit or to relocate may happen which may alter the daily activities of affected constituents. Due to the proximity of the constituents to their respective established livelihood activity, relocation may require them to alter their economic activities. Damage or loss of structures may also result to a halt on the services provided. Road blockage, for example, may be possible which may impede or decelerate the flow of goods and services. Thus, interventions to mitigate the risks posed by climate change on the built-up areas are vital.

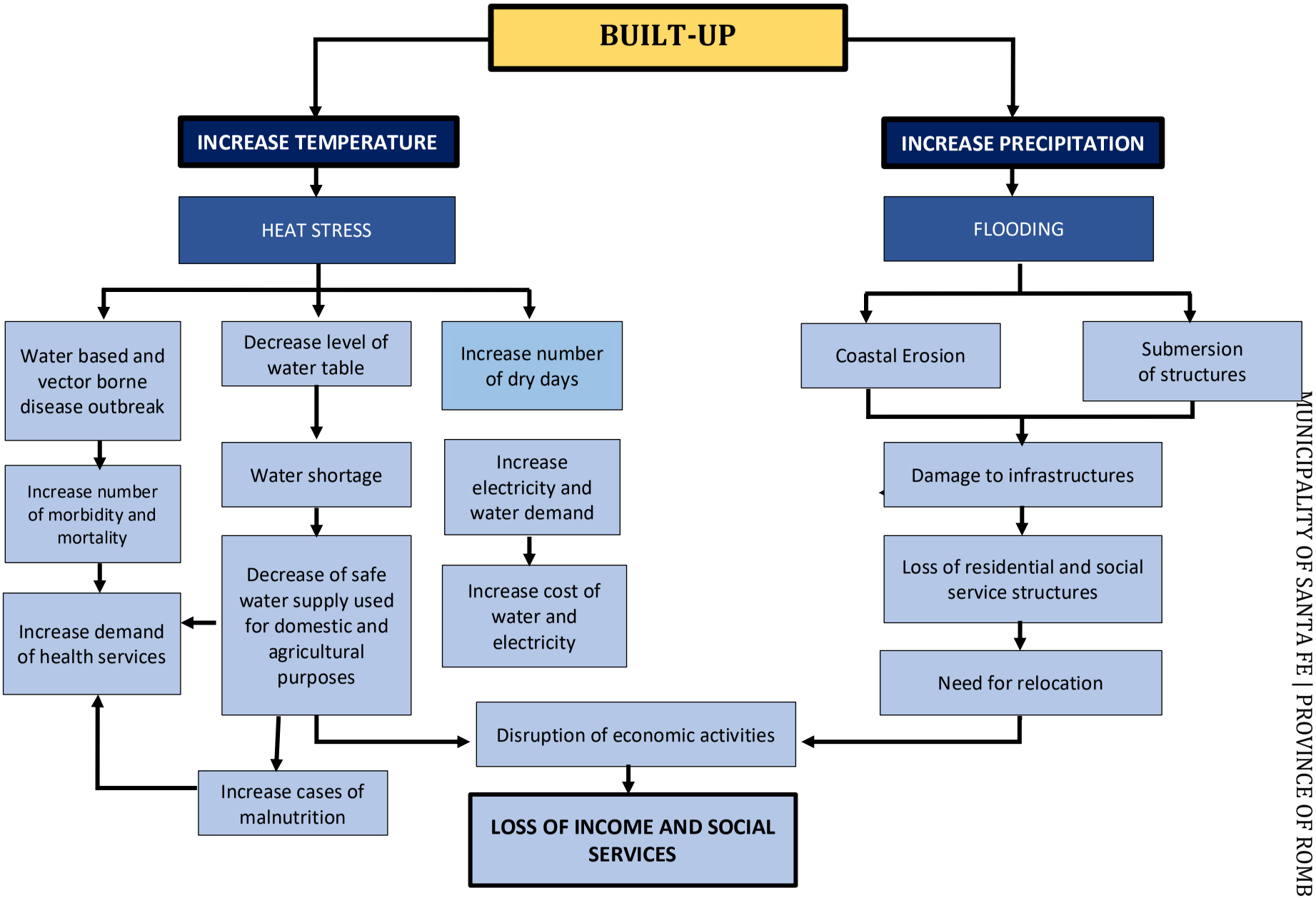


Figure 7. Impacts of Climate Change to Built-Up Areas in Santa Fe, Romblon

Table 4. Summary of the climate impact chains of the five exposure elements

CLIMATE VARIABLE	GENERAL CHANGES IN CLIMATE VARIABLES	INFORMATION ABOUT PATTERN OF CHANGE	POSSIBLE EFFECTS TO EXPOSURE UNITS				
			POPULATION	URBAN USE AREAS	NATURAL RESOURCE-BASED PRODUCTION	LIFELINE UTILITIES	CRITICAL POINT FACILITIES
Rainfall	• Decrease in rainfall by 2020 and increasing by 2050 during DJF • Decrease in rainfall by 2020 and 2050 by MAM • Increase in rainfall by 2020 and 2050 by JJA Increase in rainfall by 2020 and 2050 by SON	• Reduction in rainfall during summer of 2020 & 2050 • Increase in rainfall during Habagat of 2020 & 2050 • Increase in rainfall during Amihan (SON) in 2020 & 2050 Wetter Amihan months in DJF in 2020 and 2050	• Prevalence of waterborne and vector-borne diseases due to flooding. • Decrease in income of farming dependent households due to flooding and landslide.	•Damage or loss of property due to flooding or landslide •Disruption of economic and social services. Prevalence of vermins and pests.	• Reduced yield due to drought, flooding and erosion. • Lower income from production-dependent livelihood. • Decrease in forest cover due to landslide and flash floods. • Mangrove degradation due to storm surge caused by frequent typhoons. Eutrophication from run-off due to flooding will lessen crop and cause fish kill.	Disruption of power and water supply •Inaccessible roads and bridges	Damaged government and health services due to flooding •Disruption of communication services due to rainfall •Damages to different critical infrastructures •Higher demand for evacuation centers
Number of Hot Days	• Increase number of hot days (exceeding 35^0C)	Significant increase in the number of hot days expected in 2020 and 2050	• Increase health risks such as diseases and discomfort.	• Higher carbon emissions due to increase in energy demand Possible water shortage due to increase in demand	• Low crop yield due to drought and incidence of pest and diseases outbreak. • Forest cover loss due to forest fires • Coral bleaching, ocean acidification and loss of fish habitat.	•Higher demand for water and power supply •Poor roads resulting to road accidents and delay of different goods and services while vehicular traffic jams will lead to more fuel consumption in addition to huge time loss.	•Higher demand for health facilities

CLIMATE VARIABLE	GENERAL CHANGES IN CLIMATE VARIABLES	INFORMATION ABOUT PATTERN OF CHANGE	POSSIBLE EFFECTS TO EXPOSURE UNITS				
			POPULATION	URBAN USE AREAS	NATURAL RESOURCE-BASED PRODUCTION	LIFELINE UTILITIES	CRITICAL POINT FACILITIES
Number of Dry Days	• 7, 057 days with <2.5 mm of rain in 2020 6, 902 days with <2.5mm of rain in 2050	Decrease number of dry days (<2.5mm of rain)	• Prevalence of water-borne and vector-borne diseases due to flooding. • Possible loss of lives due to flooding and landslide. Decrease in income of farming-dependent households due to flooding and landslide.	• Disruption of economic and social service • Damage or loss of property due to flooding or landslide Prevalence of vermins and pest	• Mangrove degradation due to storm surge caused by frequent typhoons • Reduced yield due to flooding Decrease in forest cover due to erosion and	Inaccessibility of roads and bridges due to flooding •Development of cracks within a short period after road construction. •Higher temperatures combined with increased solar radiation may also reduce the life of asphalt road surfaces	Higher demand for health facilities •Delay in the provision of health and social services due to higher demand to these services
Extreme Daily Rainfall Events	• Heavy daily rainfall >200mm increasing in 2020 and 2050	More extreme daily rainfall expected (>200mm) in 2020 and 2050	• Prevalence of waterborne and vector-borne diseases due to flooding • Possible loss of lives due to landslide and storm surge • Decrease in income of farming- and fishing-dependent households due to flooding	• Damage or loss of property due to flooding or landslide. • Disruption of economic and social service. • Prevalence of vermins and pests. Water contamination	• Reduced yield due to flooding or landslide • Decrease in forest cover due to landslide and flash floods • Mangrove degradation due to storm surge caused by frequent typhoons • Siltation of rivers and estuaries which results to decrease of marine species and decrease in income eventually.	Disruption of power and water supply •Roads and bridges can be inaccessible due to flooding	Disruption of government and health services due to flooding •Disruption of communication services due to rainfall •Damages to different critical infrastructures •Higher demand for evacuation centers

CLIMATE VARIABLE	GENERAL CHANGES IN CLIMATE VARIABLES	INFORMATION ABOUT PATTERN OF CHANGE	POSSIBLE EFFECTS TO EXPOSURE UNITS				
			POPULATION	URBAN USE AREAS	NATURAL RESOURCE-BASED PRODUCTION	LIFELINE UTILITIES	CRITICAL POINT FACILITIES
Sea Level Rise		• Increase in sea level	• Displacement of coastal communities leading to loss of livelihood. Decrease in income of farming- and fishing- dependent households due to coastal flooding, erosion, storm surge and the likes.	• Damage of properties and displacement of coastal communities. Salt intrusion on water facilities.	• Salt water intrusion to farmlands and freshwater resources. Decrease in coastal biodiversity due to habitat destruction.	•Roads located near coastal areas can be submerged and be inaccessible •Contamination of water supply due to salt water intrusion	•Disruption of services of facilities near the coast

c. Disaster Risk Assessment

This part focuses on the assessment of natural hazards experienced by Santa Fe, flood and landslide. Vulnerability and adaptive capacities of five (5) exposure units — population, natural resources, urban use, critical point facilities, and lifeline utilities — are also included here.

History of Previous Disasters

The history of previous disasters experienced by Santa Fe is shown in table 5. The municipality is exposed to various hydro-meteorological hazards and geological hazards.

HYDROMETEOROLOGICAL HAZARDS

There were five (5) typhoons that hit the municipality from the year 1984 to year 2016. Super Typhoon Nitang entered the area of responsibility on September 3, 1984 with a peak intensity of 75 kilometers per hour (kph) and made landfall on September 6, 1984 with 275 kph peak intensity. 6,000 people or 1,200 families were affected. The typhoon left 20 houses and 70 houses totally and partially damaged, respectively, leaving a total cost of damages of ₱3,800,000.00. During that time, the municipality was still unable to protect the populace to any disaster due to absence of disaster preparedness and mitigation programs, thus, causing higher damages to property and human lives. Typhoon Ruping, the second typhoon that hit the municipality, entered on November 14, 1990 with 150 kph peak intensity. The typhoon left one (1) person dead and total damage to agriculture amounting to ₱30,000.00.

The third typhoon was Typhoon Senyang which entered the municipality on December 10, 2006 with a peak intensity of 155 kph. 10,000 people from 815 families were affected and 12 people were reported injured. It also left 212 houses totally damaged and 530 houses partially damaged with total cost of damages to infrastructure, agriculture, institutional, private, and commercial establishments amounting to ₱17,000,000.00.

On June 23, 2008, the fourth typhoon, Typhoon Frank, entered the municipality with a peak intensity of 170 kph. The total cost of damages to agriculture amounted to approximately ₱500,000 and no further damages were recorded.

The fifth typhoon that entered the municipality was Super Typhoon Yolanda which made landfall on November 7-8, 2013. It had a peak intensity of 315 kph. Despite leaving about 14,000 people from 550 families affected, it was observed that the total cost of damages to infrastructure amounting to ₱300,000.00 was minimal. Among the previous disasters, only typhoons had made record in this municipality.

GEOLOGICAL HAZARDS

Geologic hazards are those that originate from internal earth processes such as earthquakes, volcanic activity and emissions, landslides, and tsunamis. These events involve energy transformation of masses or soil, rocks, lithosphere, and water in various combinations and conditions. All types of geologic hazard occur in the Philippines, except for geologic hazards involving glaciers and snowfall (Geologic Hazards in the Philippines; A Definition and an Overview, 2016). A fault line traversing Tablas Island and the presence of a trench in nearby Mindoro Island could also trigger a geologic

hazard that could affect the province especially the nearby island. Because of this fault line, Santa Fe is susceptible to landslide, earthquake, and tsunami; however, landslides that are experienced by the municipality are caused by hydro-meteorological factors.

Table 5. History of Previous Disasters

Hazard Events and Description	Affected Barangays	No. of casualties (Number of Individuals)			NO. of Affected		No. of houses damaged		Damage to properties in Philippine Pesos (PHP)					Source of Information
		Dead	Injured	Missing	Persons	Families	Totally	Partially	Infrastructure	Agriculture	Insitutional	Private/ Commercial	Total	
Nitang (Sept. 3-6, 1984) @ 275kph peak intensity	All barangays	0	0	0	6,000	1,200	20	70	2,000,000.00	1,000,000.00	500,000.00	300,000.00	3,800,000.00	**Rapid Disaster Needs Assessment Report**
Frank (June 23, 2008) @ 170kph peak intensity	All barangays	0	0	0	0	0	0	0	0	500,000.00	0	0	500,000.00	
Ruping (Nov. 14, 1990) @150kph peak intensity	All barangays	1	0	0	0	0	0	0	0	30,000.00	0	0	30,000.00	
Senyang (Dec. 10, 2006) @ 155km/h peak intensity	All barangays	0	12	0	10,000	815	212	530	100,000.00	2,500,000.00	3,000,000	3,000,000	170,000.00	
Super Typhoon Yolanda (Nov. 7-8, 2013) @ 315km/h peak intensity	All barangays	0	0	0	14,000	550	0	15	300,000.00	-	0	0	300,000.00	

Hazard Susceptibility

The municipality of Santa Fe is susceptible to hydro-meteorological hazards such as storm surge, sea level rise, rain-induced landslides, and flood, and geological hazards such as earthquake and tsunami. However, only flood and rain-induced landslide were considered in this study. About 7.3894 percent of Santa Fe's land area are susceptible to flood while 88.1192 percent are susceptible to landslide.

Table 6. Hazard inventory matrix

BARANGAY	FLOOD	LANDSLIDE	TSUNAMI
AGMANIC	✓	✓	✓
CANYAYO	✓	✓	✓
DANAO NORTE	✓	✓	
DANAO SUR	✓	✓	
GUINBIRAYAN	✓	✓	✓
GUINTIGBASAN	✓	✓	
MAGSAYSAY	✓	✓	✓
MAT-I	✓	✓	
PANDAN	✓	✓	✓
POBLACION	✓	✓	✓
TABUGON	✓	✓	✓

Flood Susceptibility

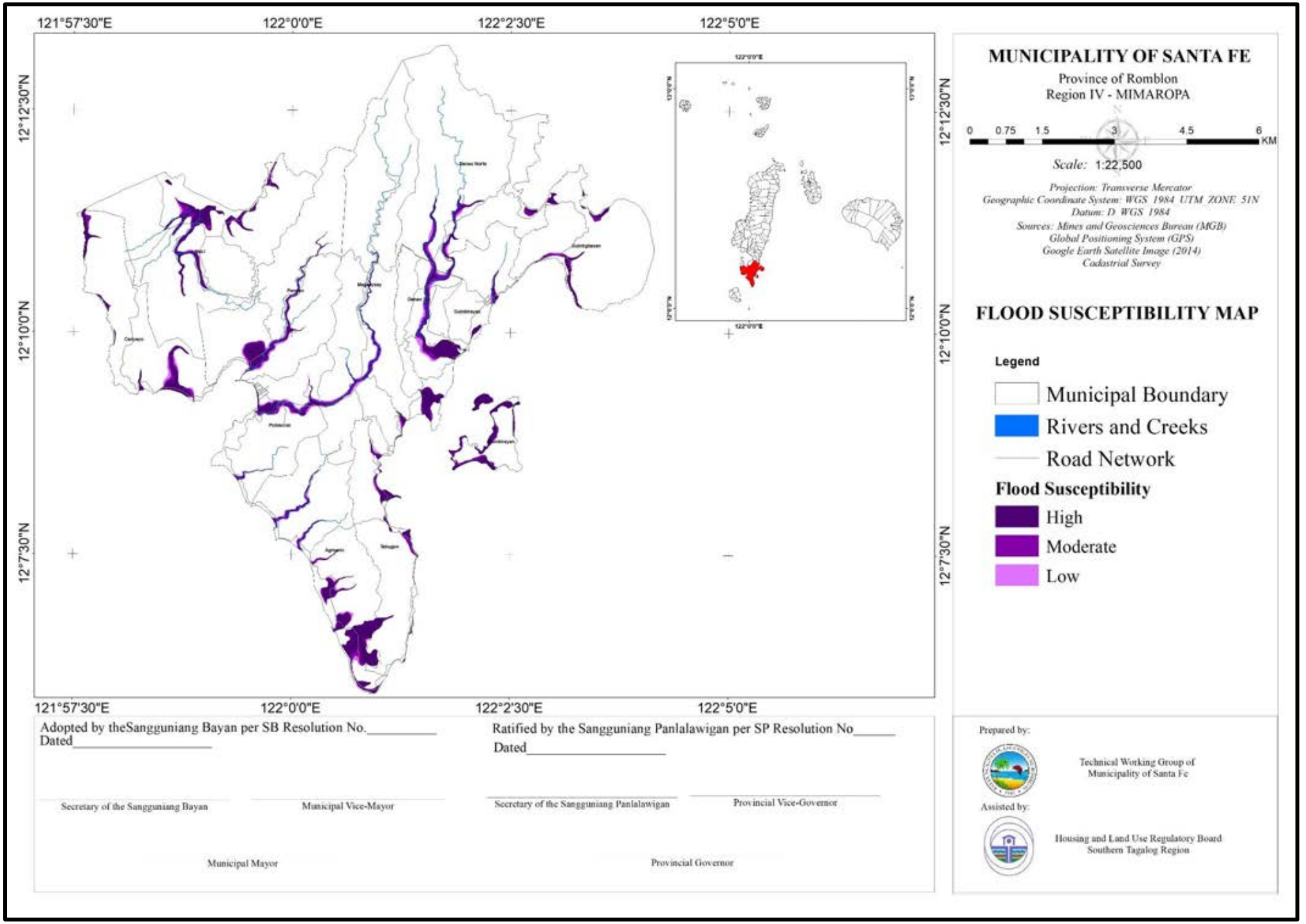
Flood is commonly experienced in Santa Fe as it is one of the municipalities in the province noted to have substantial levels to undulating low lying areas in Tablas Island. According to maps of MGB, 485.772418 hectares or 7.5597 percent of Santa Fe are susceptible to flood. About 338.662686 hectares is highly susceptible, 99.130689 hectares is moderately susceptible, and 47.979043 hectares has low susceptibility to flood.

Landslide Susceptibility

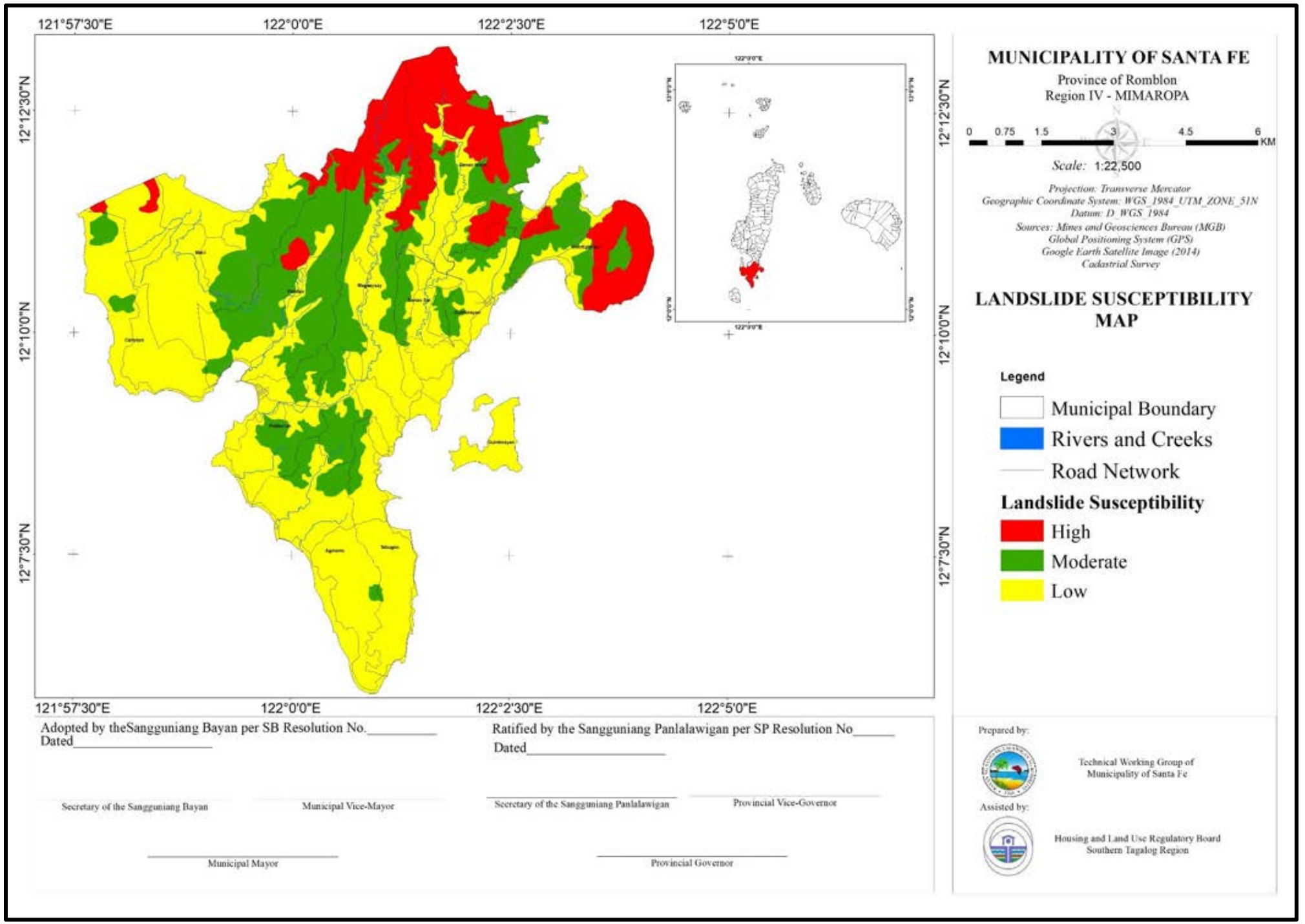
Areas affected with movements of earth's mass and those near fault line are more susceptible to landslide. Landslides can be caused by heavy rains, earthquakes, tremors, and deforestation. Rain-induced landslides are experienced in Santa Fe. According to maps of MGB, about 6,424.84332 or 99.98 percent are susceptible to landslide. About 960.36575 hectares is highly susceptible to landslide, 1,868.35805 hectares is moderately susceptible, and 3,596.11952 hectares has low susceptibility to landslide. According to TWG, landslides in the municipality are experienced during heavy downpour and in areas with on-going riprap construction.

Tsunami Susceptibility

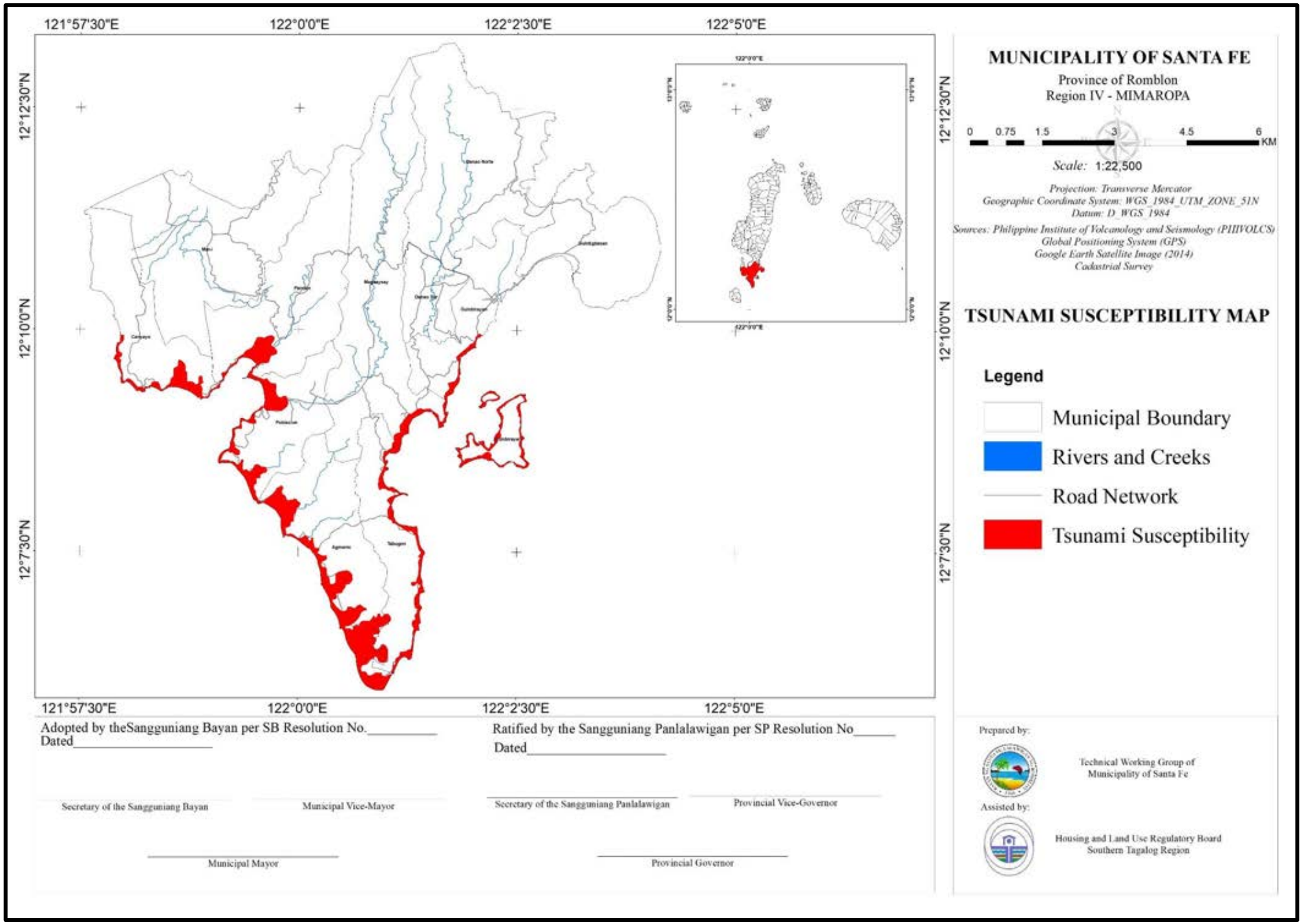
Tsunami prone barangays are Agmanic, Canyayo, Guinbirayan, Magsaysay, Pandan, Poblacion, and Tabugon. A total area of 399.163178 hectares is susceptible to tsunami based from the tsunami hazard map released by Philippine Institute of Volcanology and Seismology (PHIVOLCS). The hazard has never occurred in the municipality but, due to the susceptibility, it is important for the municipality to be prepared.



Map 2. Flood Susceptibility Map of Santa Fe, Romblon



Map 3. Landslide Susceptibility Map of Santa Fe, Romblon



Map 4. Tsunami Susceptibility Map of Santa Fe, Romblon

B. EXPOSURE AND RISK TO HAZARDS

i. POPULATION

Population exposure shall indicate the spatial location and the number of potentially-affected persons as well as the demographic characteristics of local inhabitants that shall be used in analyzing the sensitivity, vulnerability, and adaptive capacity. In developing the exposure data base, the 2016 population record from Community-Based Monitoring System (CBMS) was used. According to the record, there is a total population of 14,777 in 3,387 households. Unfortunately, 59.70% of the total population belong to the poverty threshold. In addition to that, 49.54% are living in makeshift houses while 2.36% are informal settlers. Furthermore, the percentage of young and old dependents, or those aged younger than 15 years and older than 65 years, is 25.68%. Lastly, malnourished individuals and persons with disabilities are to 2.41% and 1.38%, respectively. Given these vulnerabilities, the need to reduce the exposure and risk to hazards of population must be given necessary attention.

There is high percentage of population who are living below the poverty threshold in the municipality. Barangay Canyayo has the highest percentage with 87.32% followed by Pandan (69.37%) and Mat-i (68.16). Barangay Agmanic has the lowest percentage with 46.06%.
Barangay Poblacion has the highest percentage of informal settlers with 5.61%, followed by Barangays Canyayo and Guinbirayan with 4.58% and 3.05%, respectively. Barangay Magsaysay has the lowest percentage with 0.33%.

Barangay Canyayo (59.37%), along with barangays Danao Norte (56.52%), Pandan (54.93%), Guintigbasan (53.41%), Agmanic (53.33%), and Mat-i (51.43%), were found to have high percentage of population living in dwelling units with walls made from light materials. Barangay Danao Sur has the lowest percentage with 35.26%.

Barangay Agmanic was found to have highest percentage of malnourished individuals with 4.17% of their population. It is followed by barangays Magsaysay (3.85), Tabugon (3.60%), Danao Norte (3.37%), and Guintigbasan (3.06%). Barangay Mat-i was found to have lowest percentage of malnourished individuals.

Barangay Agmanic was found to also have the highest percentage of people with disabilities. It is followed by Mat-I (1.84%), Guinbirayan (1.78%), and Guintigbasan (1.58%). Barangay Canyayo has the lowest percentage of persons with disabilities.

Young (<15 years of age) and old (>65 years of age) dependents are also considered in vulnerability of population. Barangay Danao Norte was found to have the highest percentage of young and old dependents with 29.78%. It is followed by Guinbirayan, Magsaysay, and Poblacion with 28.38%, 27.60%, and 26.19%, respectively. Barangay Canyayo has the lowest percentage of young and old dependents.

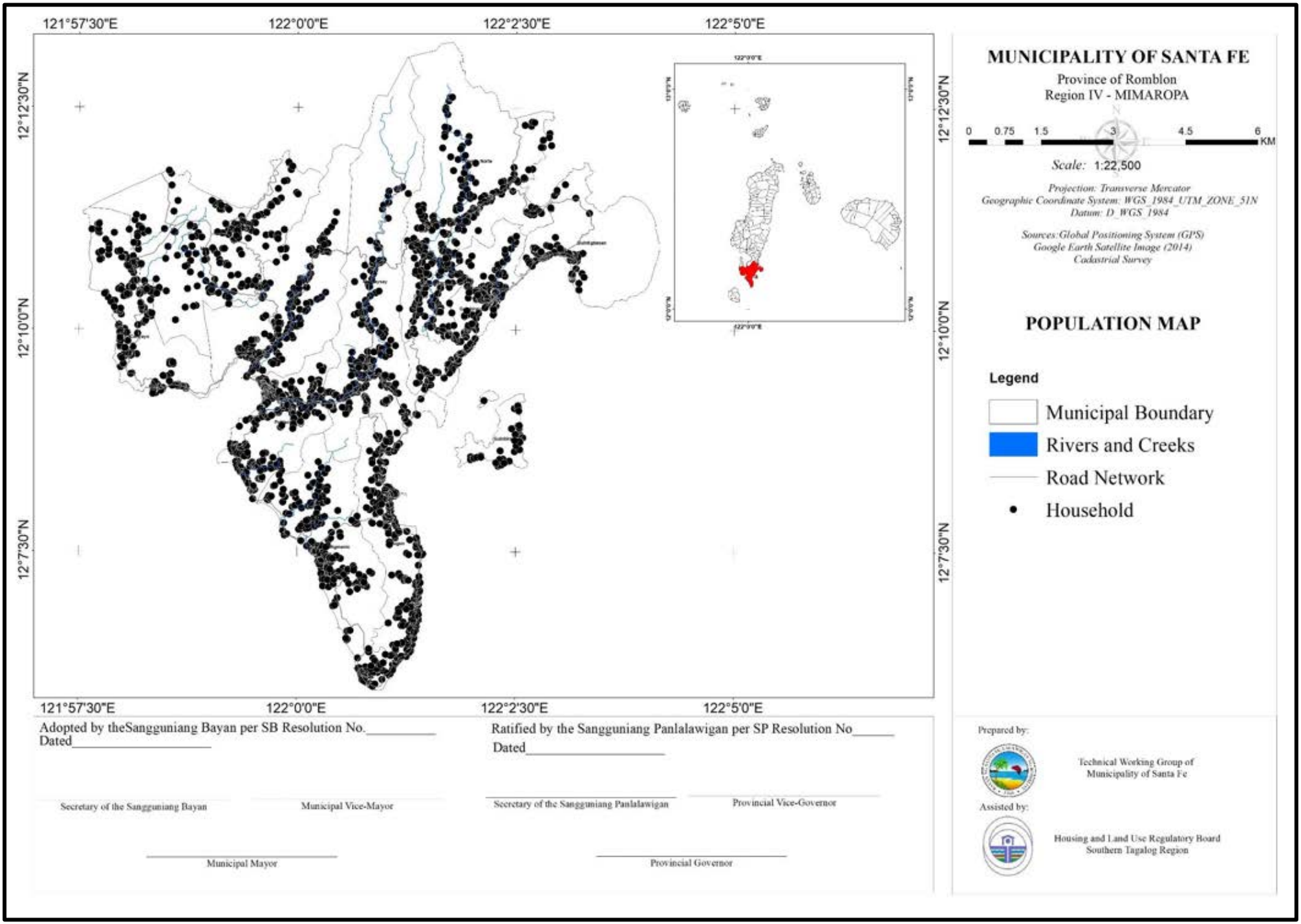
Households with access to financial assistance and to infrastructure-related mitigation measures (IRMM) such as evacuation centers, riprap, and sea walls, amount to more than 10 percent but less than 20 percent of the affected households. Pantawid Pamilyang Pilipino Program (4Ps), Aid to Individuals in Crisis Situations (AICS), and financial assistance to victims of disasters are being implemented. Different facilities like schools, barangay halls, (covered) courts, and churches in each barangay can be utilized as evacuation centers except to facilities that are exposed to hazards. Not

more than 20 percent of the affected households have the capacity and willingness to retrofit and relocate. Households with access to climate, climate change, and hazards-related information in affected areas only amount to five (5) to 10 percent. Furthermore, the local government of Santa Fe has moderate capacity to invest in risk management and climate change adaptation or mitigation projects. Given the vulnerabilities, adaptive capacities must be improved to reduce the negative impacts of climate change.

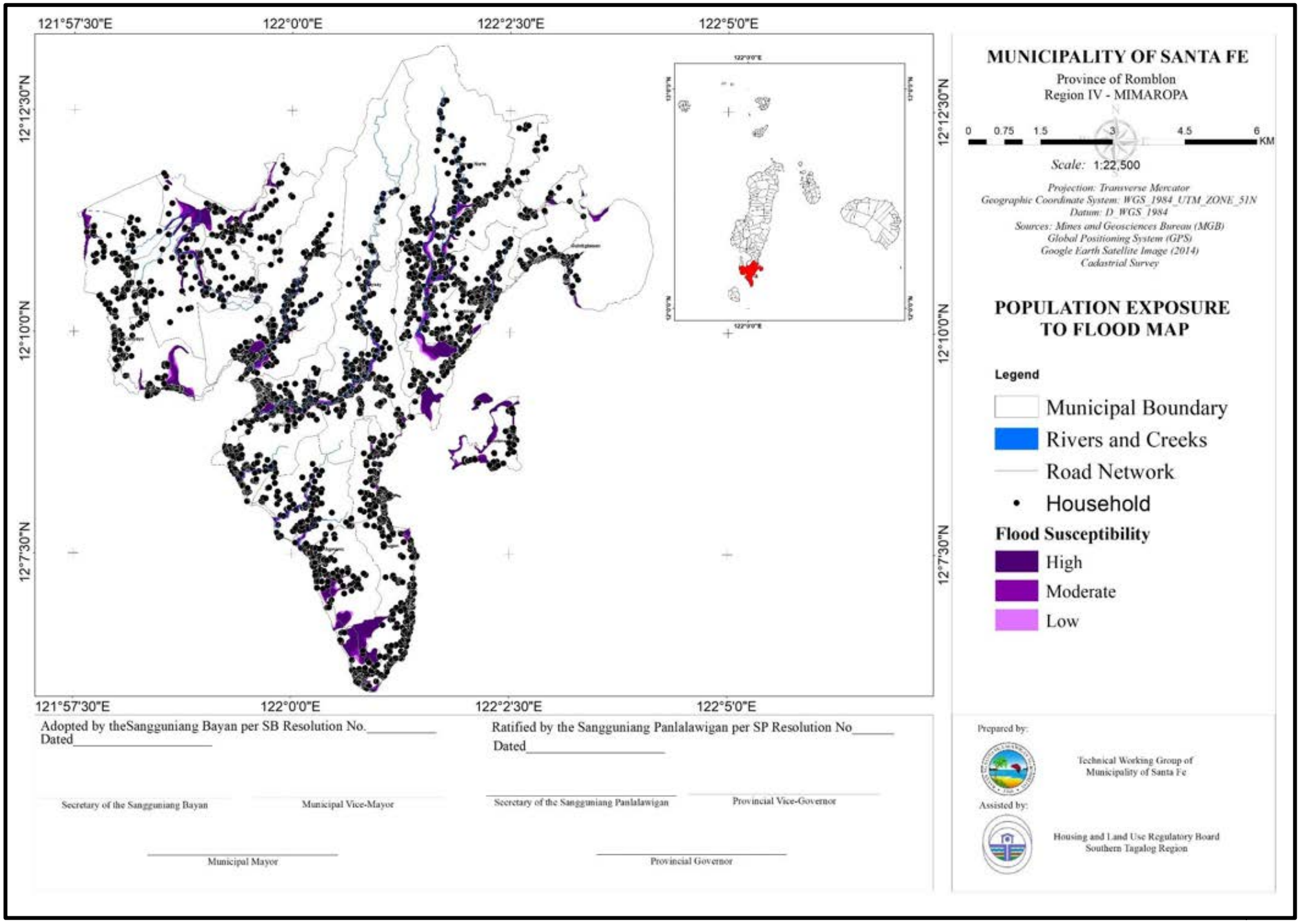
Flood Exposure and Risk

All barangays of Santa Fe have population exposed to flood. These areas with population exposed to flood are low-lying and located near creeks or river systems. The percent exposure of population to hazards are: Agmanic (34.85%), Canyayo (30.56%), Danao Norte (13.36%), Danao Sur (2.48%), Guinbirayan (32.84%), Guintigbasan (40.31%), Magsaysay (11.01%), Mat-i (20.32%), Pandan (85.62%), Poblacion (59.16%), and Tabugon (77.06%).

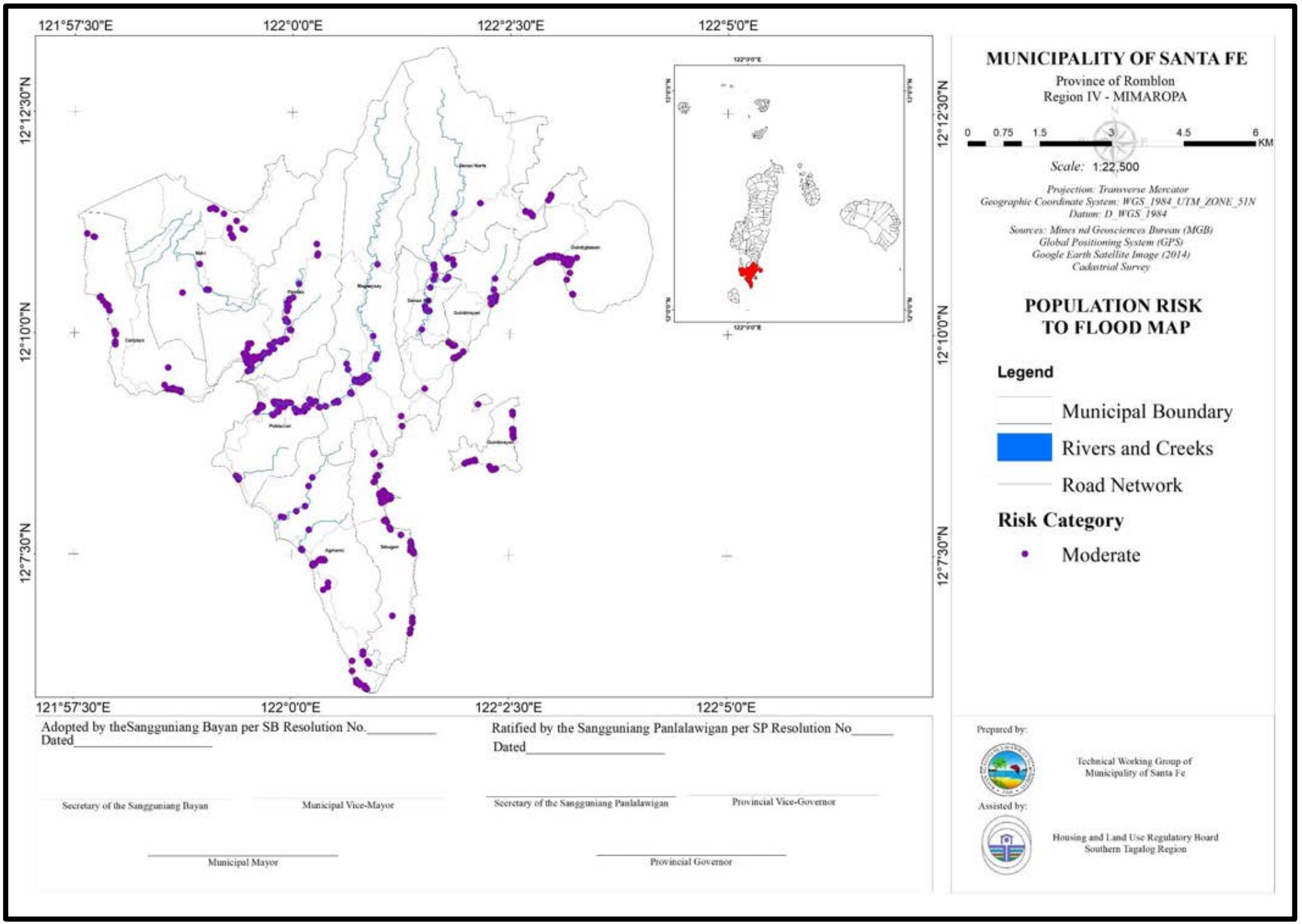
The population exposed to flood in 11 barangays are categorized with moderate risk to flood. Barangays Pandan, Poblacion, and Tabugon were identified to have highest percentage of population at moderate risk to flood with 85.62%, 59.16%, and 77.06%, respectively. Furthermore, barangay Danao Sur has the lowest percentage of population at moderate risk to flood with only 2.48%.



Map 5. Population Map of Santa Fe, Romblon



Map 6. Population Exposure to Flood Map of Santa Fe, Romblon



Map 7. Population Risk to Flood Map of Santa Fe, Romblon

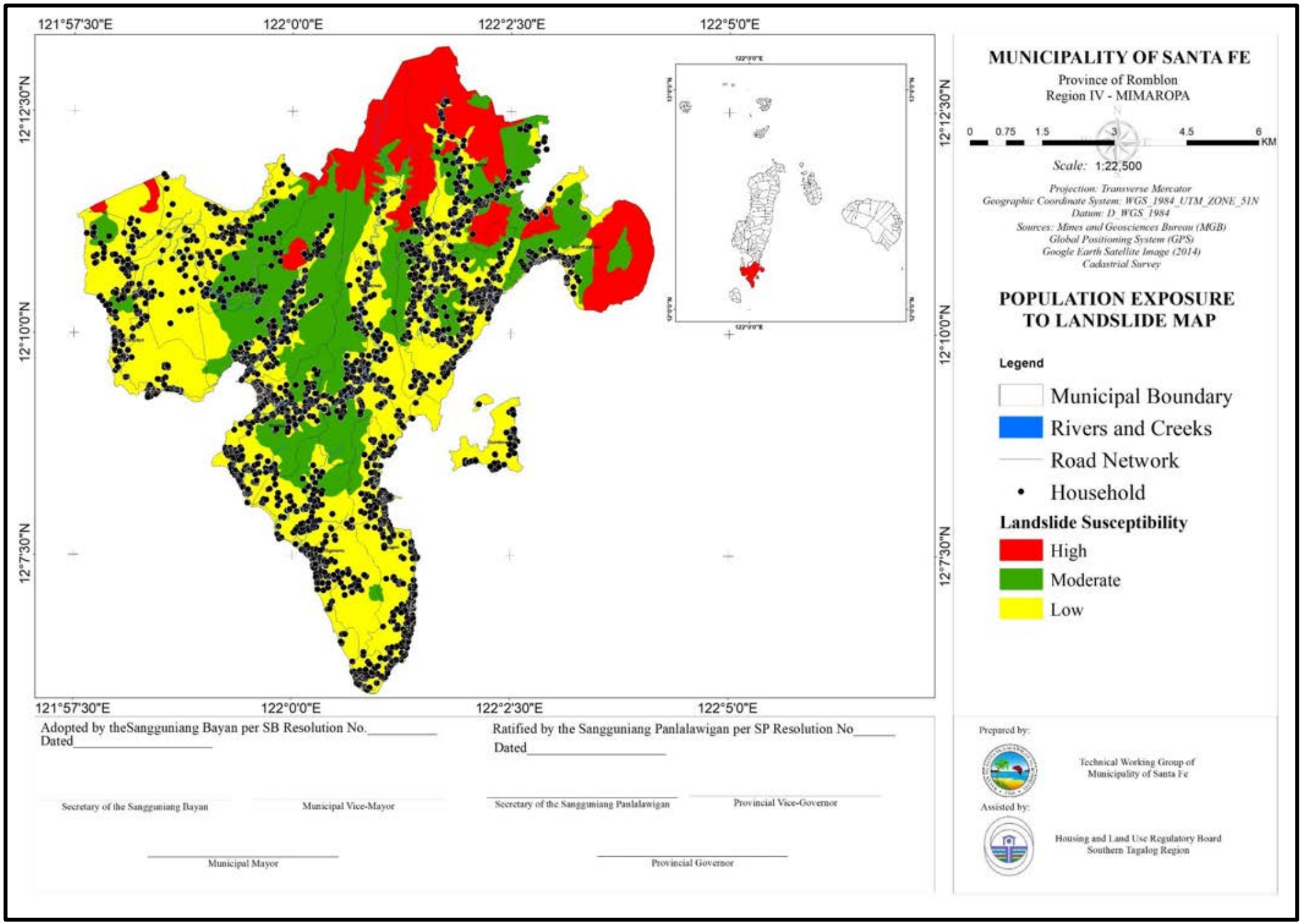
Landslide Exposure and Risk

All 11 barangays of Santa Fe have population exposed to landslide. This can be attributed to the geophysical environment of the municipality having hills and mountain ridges that divided each barangay.

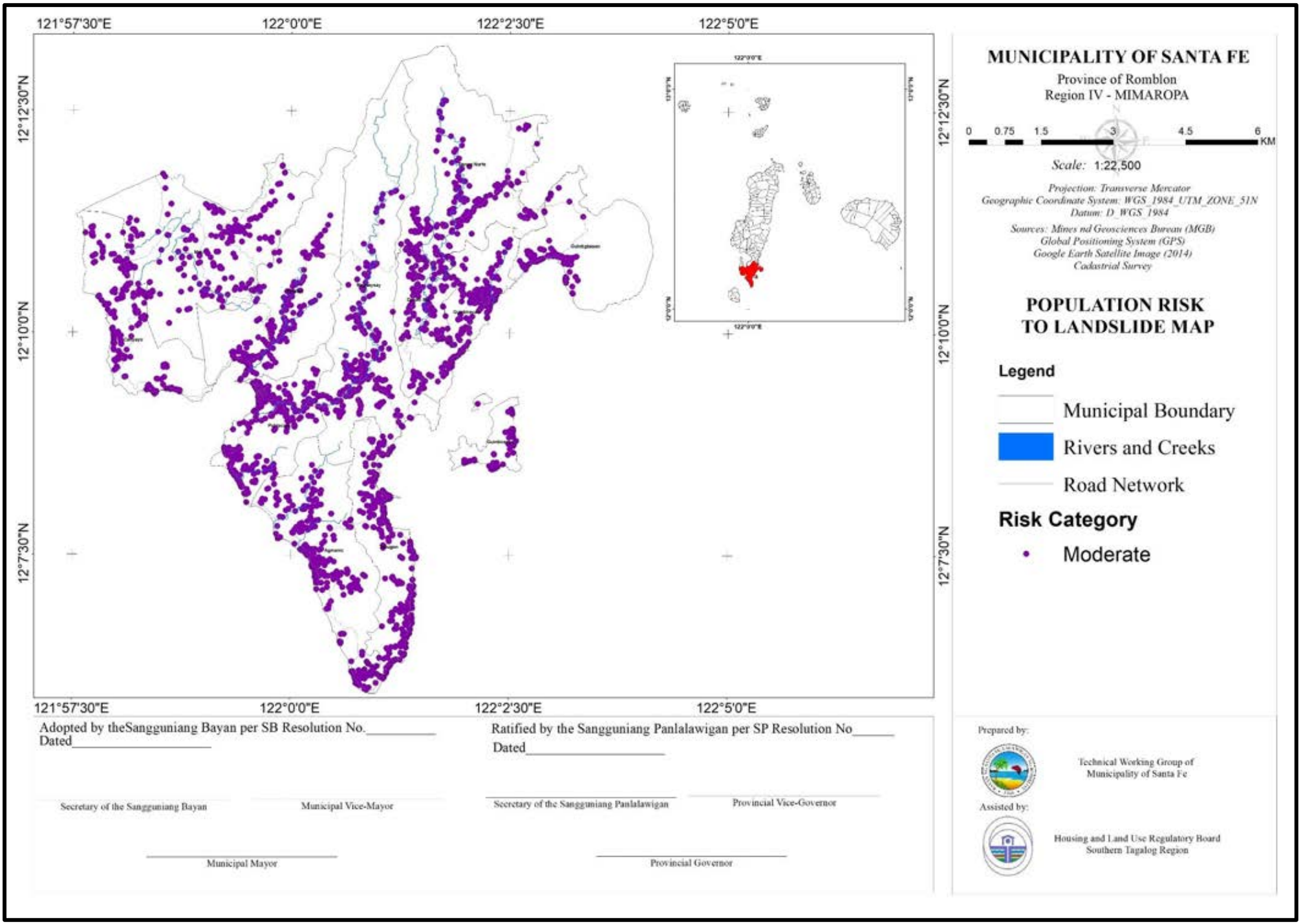
The population with low susceptibility to landslide are: Agmanic (100%), Canyayo (82%), Danao Norte (87%), Danao Sur (96%), Guinbirayan (98%), Guintigbasan (80%), Magsaysay (58%), Mat-i (87%), Pandan (73%), Poblacion (99%), and Tabugon (100%).

Furthermore, barangays whose population have moderate susceptibility to landslide are Canyayo (20%), Danao Norte (13%), Danao Sur (4%), Guinbirayan (2%), Guintigbasan (20%), Magsaysay (42%), Mat-i (13%), Pandan (20%), and Poblacion (1%).

In addition to that, only barangay Pandan with seven percent (7%) of its population is exposed to high susceptibility to landslide. These barangays were all categorized with moderate risk to landslide.



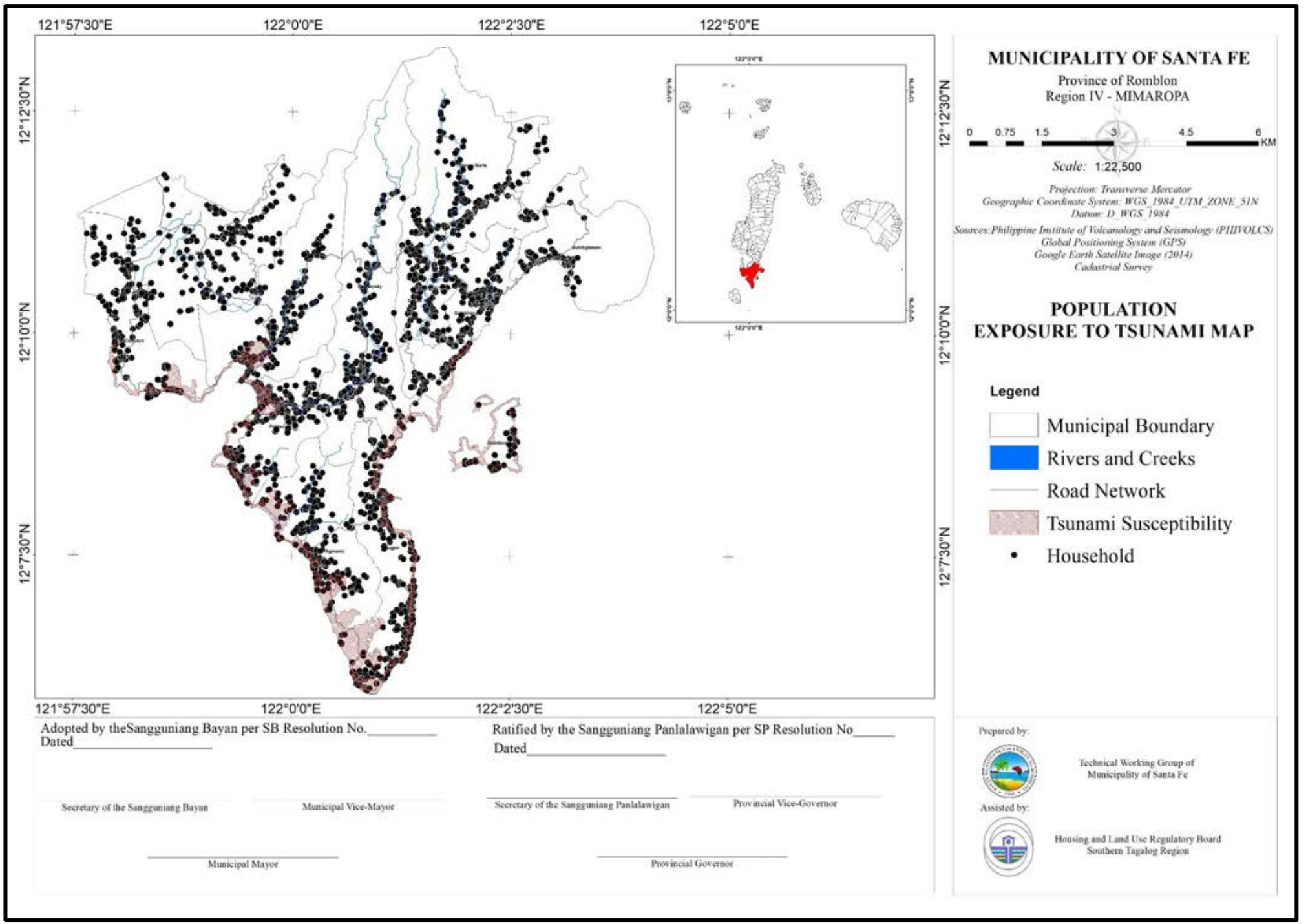
Map 8. Population Exposure to Landslide Map of Santa Fe, Romblon



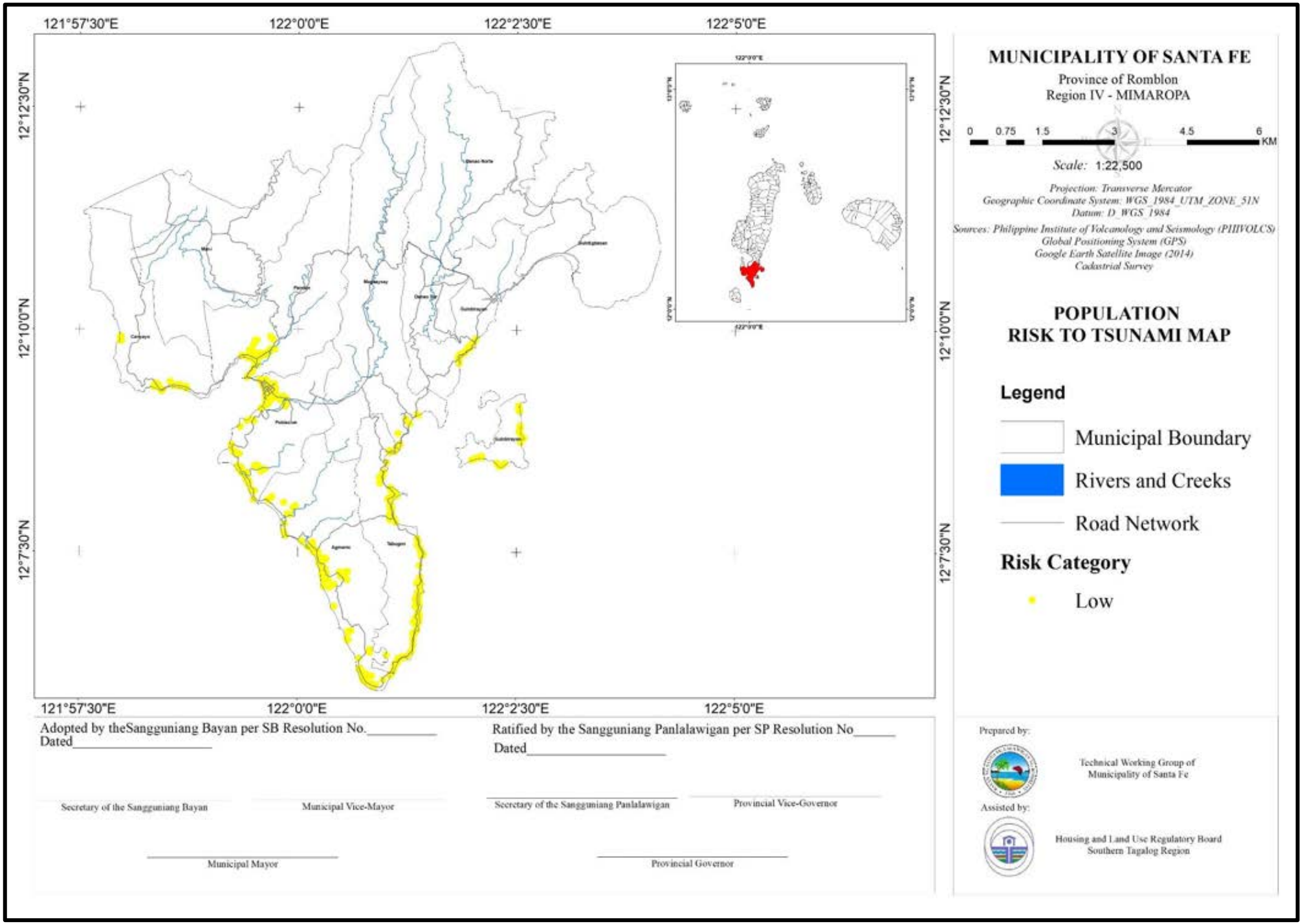
Map 9. Population Risk to Landslide Map of Santa Fe, Romblon

Tsunami Exposure and Risk

Five (5) barangays are exposed to tsunami namely Agmanic, Guinbirayan, Pandan, Poblacion, and Tabugon. The total population exposed to tsunami is 1,926 people. Poblacion has the highest number of population exposed to tsunami with 760 people followed by Pandan with 529 people. Barangays with least number of population exposed to tsunami are Guinbirayan and Tabugon with 69 and 85, respectively. Agmanic has 482 people exposed to tsunami. All of these barangays are at low risk to tsunami.



Map 10. Population Exposure to Tsunami Map of Santa Fe, Romblon



Map 11. Population Risk to Tsunami Map of Santa Fe, Romblon

Decision Areas and Policy Interventions

The formulated policy intervention and the identified priority decision areas for population are shown in Table 1. Policy interventions are formulated to mitigate the negative impacts of climate change to population of the municipality and the areas that are most vulnerable to hazards were prioritized to lessen the damages to property and lives.

Based on the population risk to hazards, the identified priority decision areas for flood include Pandan, Tabugon, Poblacion, Magsaysay, and Mat-i. Although the population for each barangay have moderate risk to flood, the population in the identified decision areas have higher sensitivity to hazards and have higher population at moderate risk to flood. Although barangay Danao Sur is not a coastal barangay, it was observed by the community that when heavy rain occurs, the water does not subside quickly because of absence of water spillways such as creeks or river systems. For Magsaysay and Poblacion, the flood is caused by overflowing of Catolog River.

For landslide, all barangays are categorized with moderate risk. The decision areas are barangays Magsaysay, Pandan, Canyayo, and Danao Norte. These areas are identified to have higher sensitivity to landslide and have higher population at moderate risk to landslide. The identified decision areas will be prioritized with the formulated policy interventions that aim to mitigate the negative impacts of climate change to population.

The formulated policy interventions for the identified decision areas include identification of safe housing and relocation sites. According to CBMS 2016, about 2.36% of the total population are informal settlers and about 49.52% are living in makeshift houses. It is recommended to establish relocation sites or safe housing to relocate, in times of disaster, those who are more vulnerable to hazards especially those living in Barangays Poblacion, Pandan, and Tabugon which have higher percentages of informal settlers and living in makeshift houses. It is therefore advantageous to propose a shelter assistance program and technical assistance to address these vulnerabilities.

According to CBMS 2016, about 59.70% of the total population are living below the poverty threshold. To lessen the number of population living below the poverty threshold, it is recommended to promote provision of sustainable and resilient livelihood. The livelihood to be developed and improved shall focus more on agricultural production such as vegetable production and seaweed processing. Providing jobs for the poor is necessary to reduce the incidence of poverty and make communities less vulnerable or sensitive to hazards.

Furthermore, it is also recommended to increase awareness of people on hazards and risk by conducting information dissemination through IEC on hazards, risks, and adaptive capacities for the people to understand the risk in their respective areas. In addition, it is also necessary to promote readiness of people and increase their capacity by informing them to prepare emergency kits with medicine and food. For the people to be more ready in case of disaster and to increase the community's capacity, it is also recommended to conduct an emergency or safety drill not just in schools. It is important that the whole municipality take part in the drills.

On the other hand, to lessen prevalence of malnutrition and to lessen negative impacts of disaster to people with disabilities, prioritizing health programs in barangays with high prevalence of malnutrition and people with disabilities is encouraged. It is also recommended to train eligible response team to rescue in times of disasters. It is important that the rescuers are eligible to conduct

rescue missions to lessen further risk or loss of lives. Mobility in rescue missions is important, thus, procurement of emergency vehicles is highly recommended to be able to transport people to safe places or to evacuation areas in times of disaster.

Table 7. Summary Matrix for Population

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
AGMANIC	• 34.86% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • 1.52% of the barangay population are informal settlers. • 53% are living in dwelling units made from light materials. • 26% of the population are young and old dependents. • Among all barangays, Agmanic has the highest percentage of persons with disabilities with two percent (2%). • 46.06% live below the poverty threshold. • Agmanic also has highest percentage of malnourished individuals with 4.17%.	• Significant number of households are living in dwelling units made from light materials, thus, making the population more sensitive; destruction of houses is bound to happen. • A large percentage of the population is living below the poverty threshold, thus, requiring larger fund for post-disaster from the government. • Extra effort must be exerted by rescuers since there is a large number of young and old dependents and malnourished individuals. • Water contamination is possible during flooding, hence, water borne diseases is highly possible. • Early warning systems are greatest defense against loss of life.	• **Identification of safe housing and relocation sites**: (1) establish relocation sites or safe housing to relocate those living in makeshift houses or those who are informal settlers, especially in Barangays Poblacion, Pandan, and Tabugon which have higher percentages of informal settlers and population living in makeshift houses and; (2) provide technical assistance to retrofit houses of those living in makeshift houses especially those who are living in high risk areas in barangays Canyayo and Pandan. • **Provision of sustainable and resilient livelihood:** (1) provide sustainable livelihood or jobs for the poor to reduce the incidence of poverty
CANYAYO	• 30.55% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 0.58% are informal settlers. • 59.37% are living in dwelling units made from light materials. • 21% of the population are young and old dependents. • 0.60% are persons with disabilities • 87.32% are living below the poverty threshold, highest among all barangays. • 0.95% are malnourished individuals.		
DANAO NORTE	• 13.35% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 0.40% are informal settlers. • 56.52% are living in dwelling units made from light materials. • 29.78% of the population are young and old dependents. • 1.46% are persons with disabilities.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• 66.01% are living below the poverty threshold, highest among all barangays. • 3.37% are malnourished individuals.		and make communities less vulnerable or sensitive to hazards; (2) capacitate or empower skills enhancement for poor **Increase awareness of the people on hazards and risk:** (1) continuing information dissemination through IEC on hazards, risks, and safety for people to understand the risk in their areas; (2) promote readiness of people and increase their capacity by informing them to prepare emergency kits with medicine and food and; (3) conduct an emergency or safety drill for the whole municipality, not just schools, to increase the community's capacity.
DANAO SUR	• 2.49% of population is at moderate risk to flood • 100% of population is ate moderate risk to flood • Approximately 1.16% are informal settlers. • 35.26% are living in dwelling units made from light materials. • 22.19% of the population are young and old dependents. • 1.40% are persons with disabilities • 50.29% are living below the poverty threshold • 2.02% are malnourished individuals.		
GUINBIRAYAN	• 32.83% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 3.05% of the barangay population are informal settlers. • 40.20% are living in dwelling units made from light materials. • 28.38% of the population are young and old dependents. • 1.78% are persons with disabilities. • 50.89% live below the poverty threshold. • 3.06% are malnourished individuals.		
GUINTIGBASAN	• 40.31% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 2.84% of the barangay population are informal settlers. • 53.41% are living in dwelling units made from light materials.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• 28.38% of the population are young and old dependents. • 1.78% are persons with disabilities. • 50.89% live below the poverty threshold. • 3.06% are malnourished individuals.		
GUINTIGBASAN	• 40.31% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 2.84% of the barangay population are informal settlers. • 53.41% are living in dwelling units made from light materials. • 24.21% of the population are young and old dependents. • 1.58% are persons with disabilities. • 53.41% live below the poverty threshold. • 2.47% are malnourished individuals.		
MAGSAYSAY	• 11.01% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 0.33% of the barangay population are informal settlers. • 40.13% are living in dwelling units made from light materials. • 27.60% of the population are young and old dependents. • 1.29% are persons with disabilities. • 55.92% live below the poverty threshold. • 3.85% are malnourished individuals.		
MAT-I	• 20.32% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• Approximately 1.63% of the barangay population are informal settlers. • 51.43% are living in dwelling units made from light materials. • 24.66% of the population are young and old dependents. • 1.84% are persons with disabilities. • 68.16% live below the poverty threshold. • 0.78% are malnourished individuals.		
PANDAN	• 85.62% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 4.58% of the barangay population are informal settlers. • 54.93% are living in dwelling units made from light materials. • 24.94% of the population are young and old dependents. • 0.70% are persons with disabilities. • 69.37% live below the poverty threshold. • 1.14% are malnourished individuals.		
POBLACION	• 59.15% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 5.61% of the barangay population are informal settlers. • 48.44% are living in dwelling units made from light materials. • 26.19% of the population are young and old dependents. • 1.54% are persons with disabilities. • 57.80% live below the poverty threshold. • 0.98% are malnourished individuals.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
TABUGON	• 77.05% of population is at moderate risk to flood • 100% of population is at moderate risk to landslide • Approximately 2% of the barangay population are informal settlers. • 49.13% are living in dwelling units made from light materials. • 25.58% of the population are young and old dependents. • 1.30% are persons with disabilities. • 51.12% live below the poverty threshold. • 3.60% are malnourished individuals.		

ii. NATURAL RESOURCE-BASED PRODUCTION AREAS

Natural resource-based production areas refer to the land parcels used for agricultural production. In the Municipality of Santa Fe, these are categorized into areas devoted for the production of crops, livestock and poultry raising, marine production, and forest production. The municipality exports some of its agricultural products to neighboring cities and municipalities such as Looc, Panay Island, and Lucena, to name a few. Among the agricultural products, the municipality is best known for its sea weed production where it exports dry and fresh products nationally.

Exposure can be expressed in terms of type of resource (i.e. rice, corn, fish, timber or non-timber forest resource) or by area in terms of hectares and replacement cost (cost of replanting for crops or restocking for fisheries). Sensitivity/vulnerability and adaptive indicators pertain to current production practices (with emphasis on use of hazard resistant varieties and/or climate adapted production techniques), access to infrastructure (i.e. irrigation, water impoundment, flood control) and climate/hazard information, presence or use of risk transfer instruments and access to extension services.

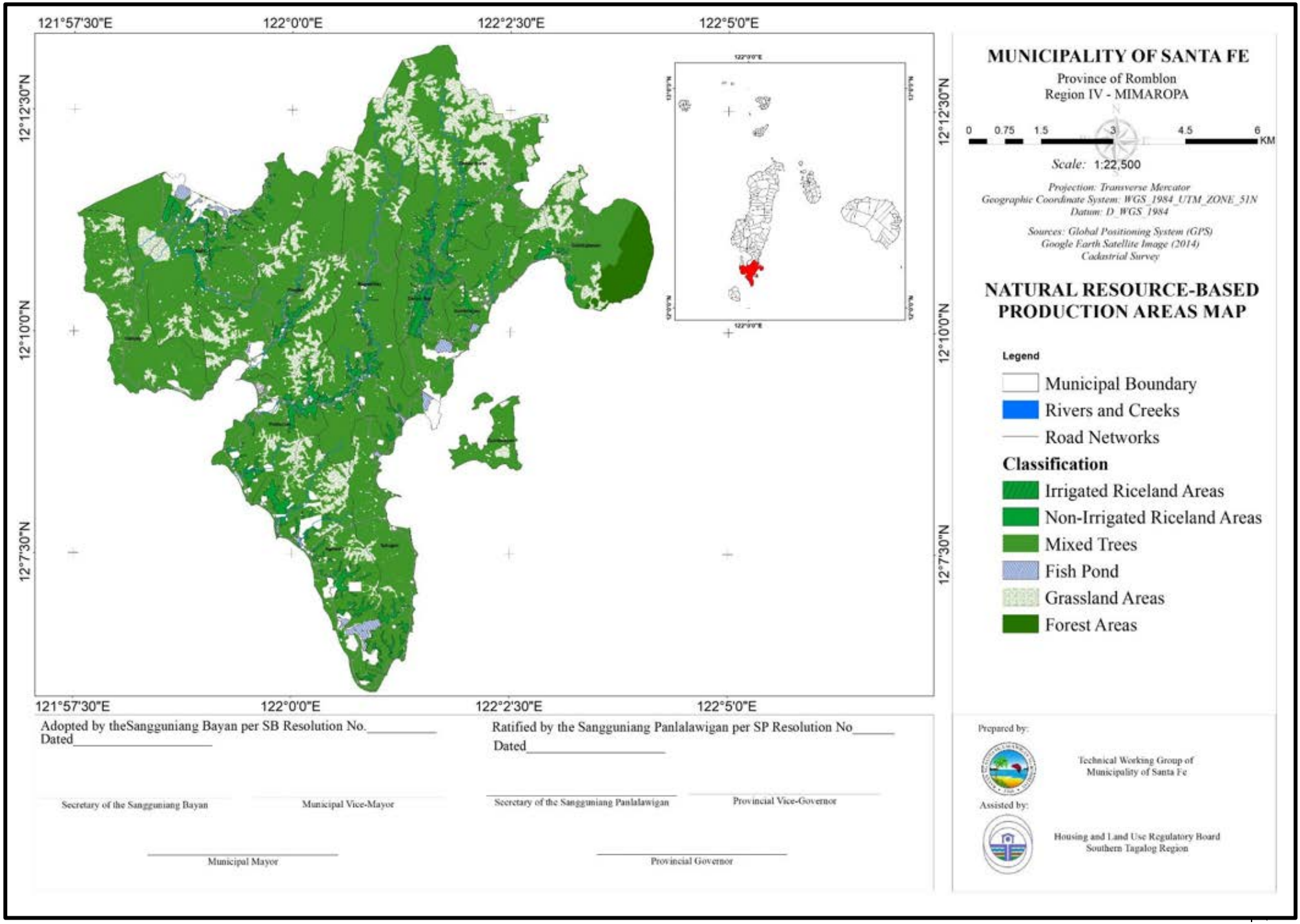
Based from the existing land use derived from the google satellite image 2014, the municipality's natural resource-based production areas are categorized into rice production areas (irrigated and rain fed), mixed trees where fruit bearing trees such as coconut, mango, and banana are usually intercropped, forest areas, grass lands which serves as the pasture area for livestock production, and fish ponds. The total area devoted for agricultural production is 6,088. 515343 hectares.

Irrigation is a farming method wherein controlled amounts of water are collected, stored, and distributed to crops. This is useful during summer time where water is usually insufficient. Out of 11 barangays, five has plantation that is covered by national irrigation systems namely Pandan, Poblacion, Magsaysay, Danao Sur, and Guinbirayan. There are four irrigation systems but only two of these are operational which are located in Barangay Magsaysay and Danao Sur. Percentage of dependent households that are engaged in sustainable production techniques such as integrated farming and organic farming ranges from 10 to 20 percent per barangay, Magsaysay having the highest percentage among the barangays.

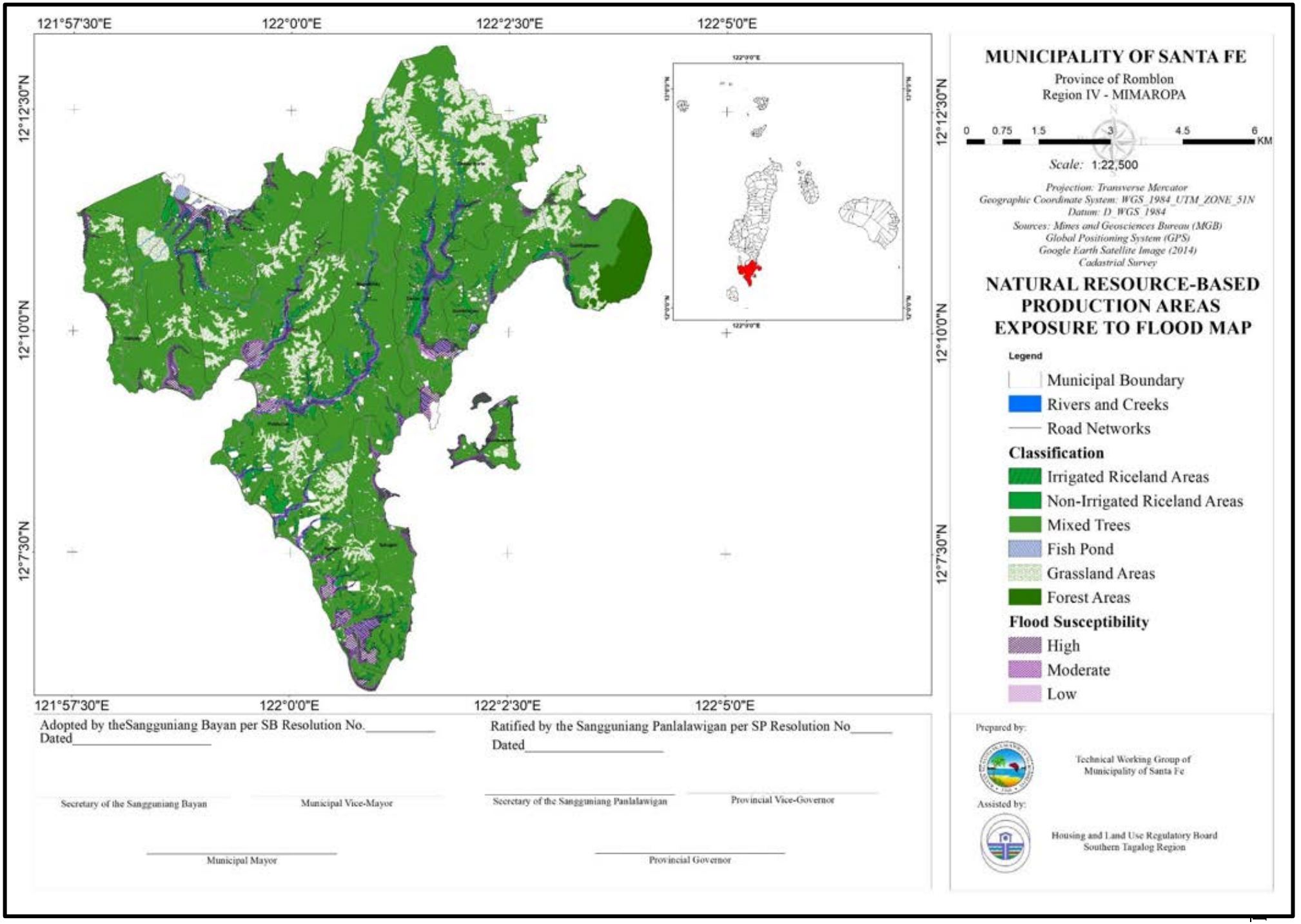
Natural resource-based production areas are located along the coast that allows it to be covered with hazard mitigating measures or structures such as sea wall or shore protections. Crop insurance is not yet mainstreamed in the municipality. Farmers with affected crops during calamities are helped by the Municipal Agriculture Office (MAO) where they prioritize crops that are vital in the municipality-i.e. rice. Population engaged in production who are aware of the natural hazards associated with climate change or those that attended the climate field school.

Flood Exposure and Risk

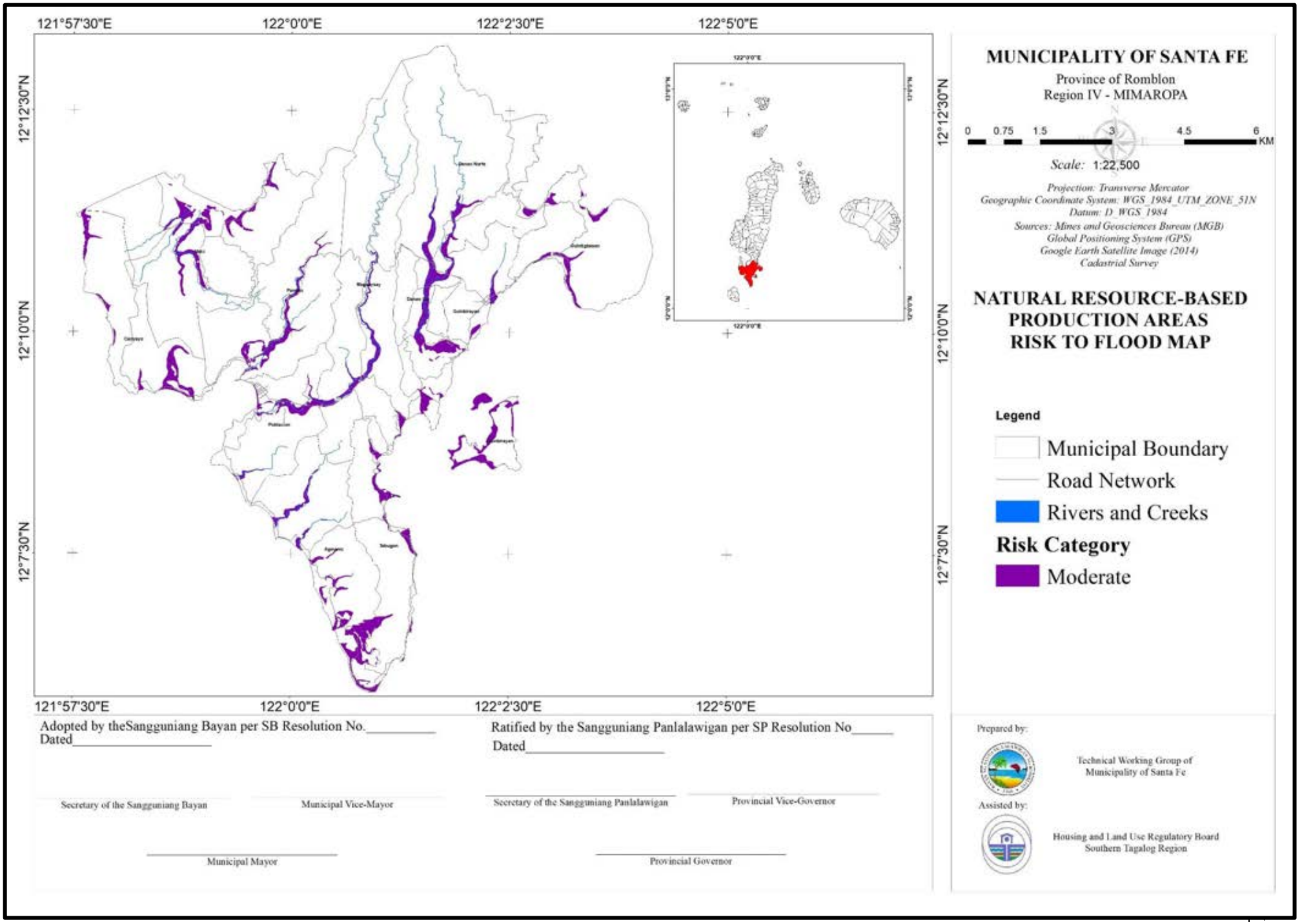
All barangays of the municipality have production areas that are susceptible to flooding. Of the 6,088.515343 hectares, 364. 03397 hectares or 5.98 percent of the agriculture production areas are susceptible to flooding. 237.616064 hectares or 3.90 percent is highly susceptible, 84.096606 hectares or 1.38 percent is moderately susceptible, and 42.321322 hectares or 0.70 percent are lowly susceptible, based from the flood map released by Mines and Geosciences Bureau (MGB) in 2016. Results of the disaster risk assessment showed that all of the areas susceptible to flooding are moderate at risk. Flood occurrence is likely to repeat affecting the production areas every three to ten years for flood not exceeding 1 meter while 30 to 100 years for flood with depth of above one meter. Estimated affected value totals to Php 31,861,376.06.



Map 12. Natural Resource-Based Production Areas Map of Santa Fe, Romblon



Map 13. Natural Resource-Based Production Areas Exposure to Flood Map of Santa Fe, Romblon



Map 14. Natural Resource-Based Production Areas Risk to Flood Map of Santa Fe, Romblon

Table 8. Flood Risk Percentage of Natural Resources per Barangay

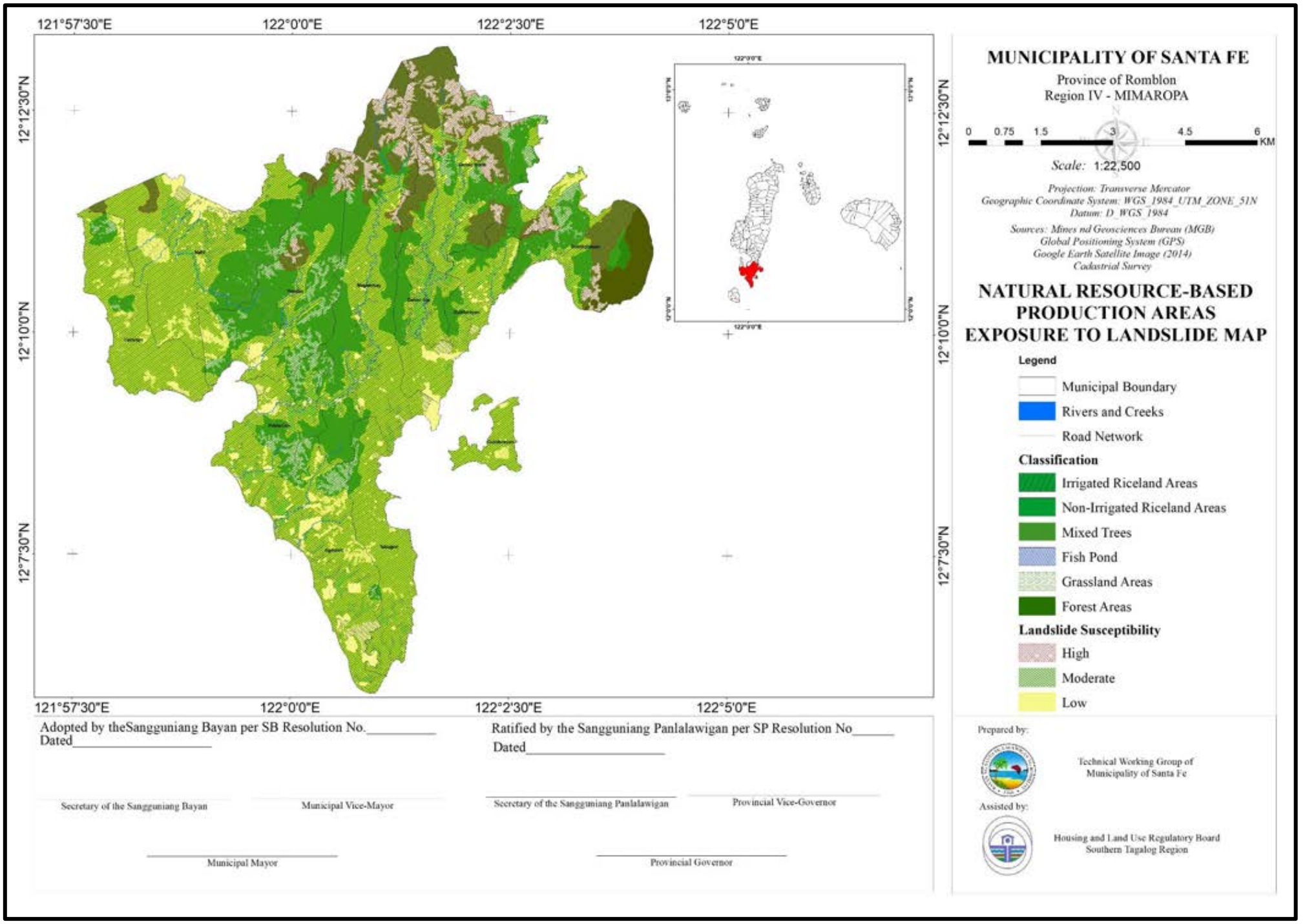
BARANGAY	DOMINANT UTILIZATION				
	IRRIGATED RICE FIELD	RAINFED RICE FIELD	MIXED TREES	GRASSLANDS	FISH PONDS
AGMANIC		10.80%	9.17%		92.97%
CANYAYO			8.67%	0.03%	
DANAO NORTE		38.34%	2.15%		
DANAO SUR	33.88%	3.13%	8.51%		
GUINBIRAYAN	1.14E-02	8.28%	11.94%		87.20%
GUINTIGBASAN		31.34%	5.53%		
MAGSAYSAY	17.73%	7.16%	2.66%		99.88%
MAT-I		23.40%	4.91%	0.89%	9.58%
PANDAN	12.80%	45.82%	4.22%		100.00%
POBLACION	25.08%	19.56%	4.03%		84.42%
TABUGON		8.41%	5.50%		90.82%

Landslide Exposure and Risk

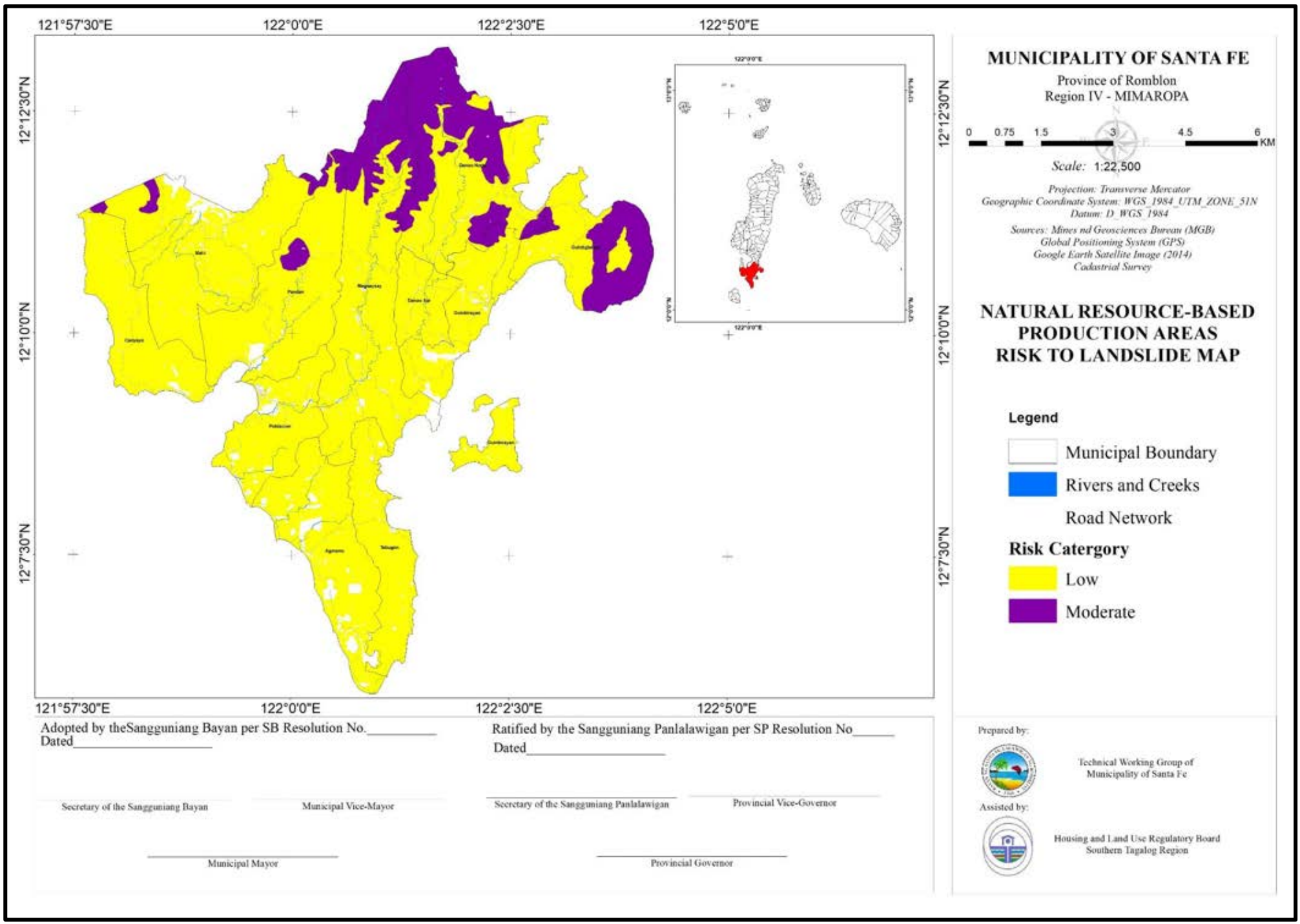
Based from the landslide susceptibility map released by MGB in 2016, about 6,087.73499 hectares or 99.99 percent of the natural resource based production areas are susceptible to landslide where in 958.23942 hectares (15.74 percent) are highly susceptible, 1,842.57814 hectares (30.26 percent) is moderately susceptible, and 3,286.91743 hectares (53.99 percent) is lowly susceptible to landslide. Risk categories of the susceptible areas are categorized to low and moderate risk as affected by the improbable to rare likelihood of occurrence. Moderate risk areas total to 958.23942 hectares or 15.74 percent while areas that are low risk totals to 5,129.49557 hectares or 84.25 percent of the production areas. Expected barangay loss on the areas at risk extents Php 299,074,108.70.

Table 9. Landslide Risk Percentage of Natural Resources per Barangay

BARANGAY	DOMINANT UTILIZATION					
	IRRIGATED RICE FIELD	RAINFED RICE FIELD	MIXED TREES	GRASS LANDS	FISH PONDS	FOREST
AGMANIC		100%	100%	100%	100%	
CANYAYO			100%	100%		
DANAO NORTE		100%	100%	100%		
DANAO SUR	100%	100%	100%			
GUINBIRAYAN	100%	100%	100%	100%	100%	
GUINTIGBASAN		100%	100%	100%		100%
MAGSAYSAY	100%	100%	100%	100%	100%	
MAT-I		100%	100%	100%	100%	
PANDAN	100%	100%	100%	100%	100%	
POBLACION	100%	100%	100%	100%	100%	
TABUGON		100%	100%	100%	100%	



Map 15. Natural Resource-Based Production Areas Exposure to Landslide Map of Santa Fe, Romblon



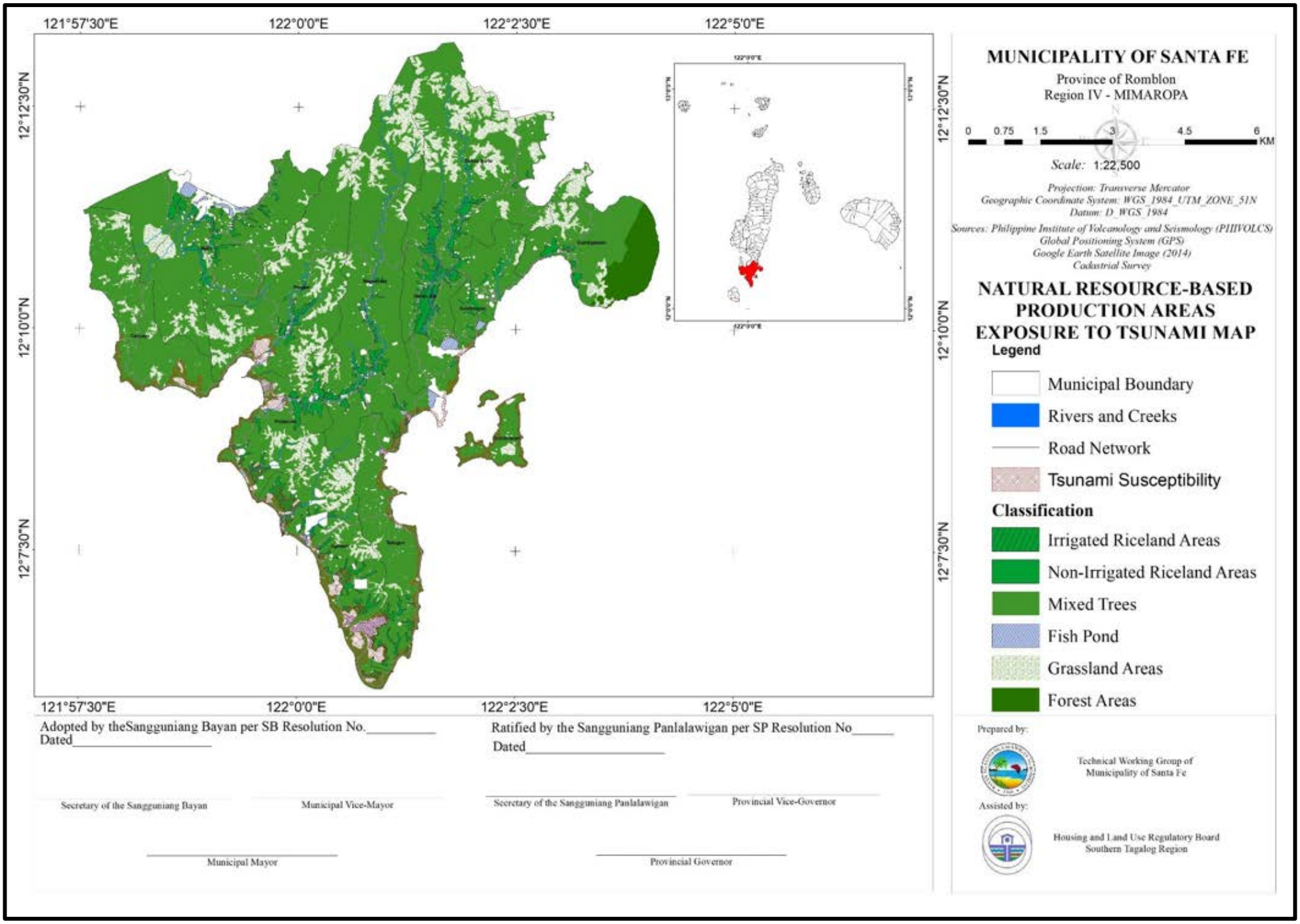
Map 16. Natural Resource-Based Production Areas Risk to Landslide Map of Santa Fe, Romblon

Tsunami Exposure and Risk

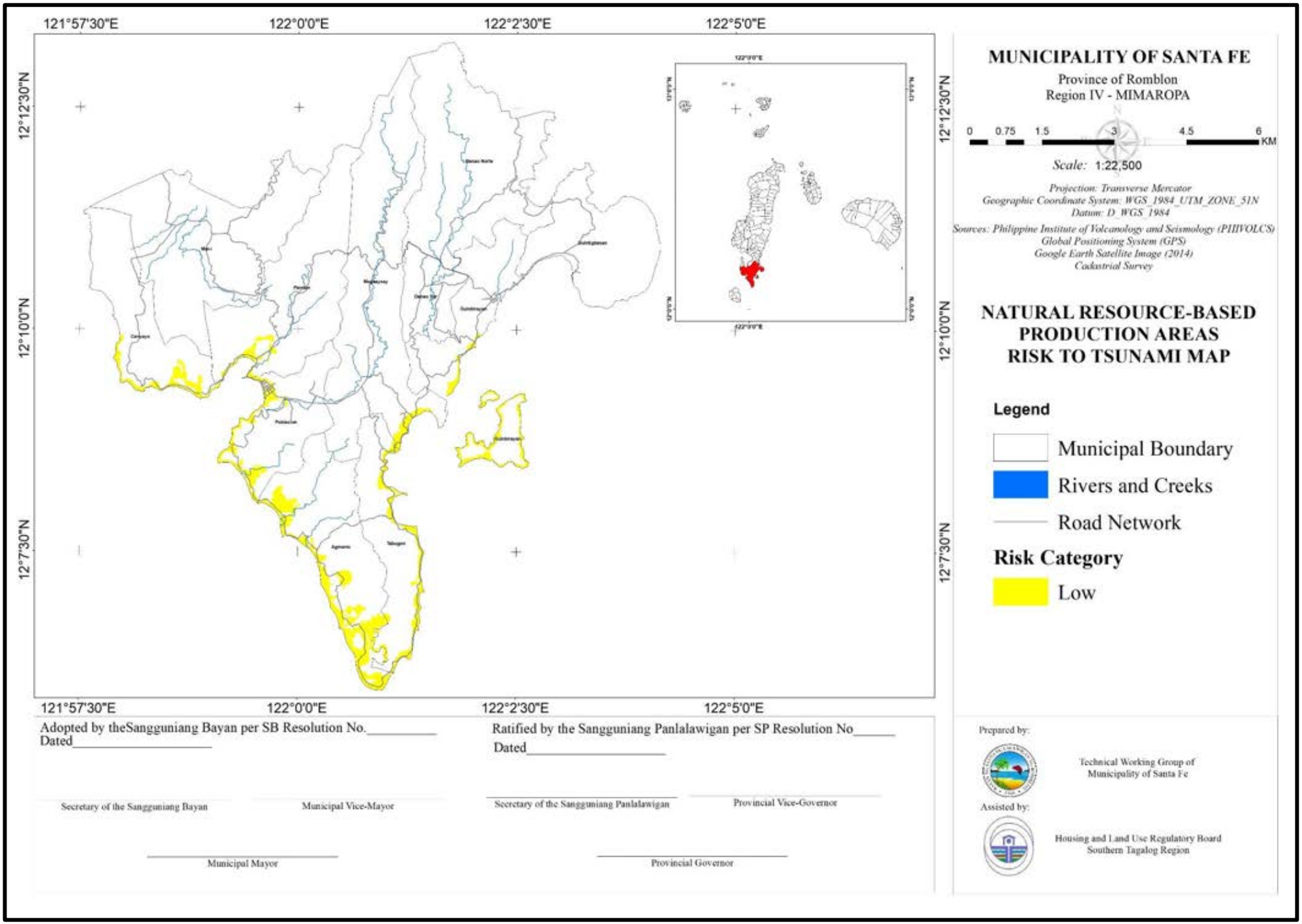
Barangays with natural resource based production areas that are prone to tsunami are Agmanic, Canyayo, Guinbirayan, Magsaysay, Pandan, Poblacion, and Tabugon. Following the map released by PhiVolcs, a total of 307.985193 hectares or 5.06 percent of the production areas are prone to tsunami. These areas however are categorized as low risk as affected by rare likelihood of occurrence score since the municipality has not yet experienced this occurrence. Expected total loss is Php 23,549,964.91. shown in Table 10 is the proportion of the natural resources for every dominant utilization per barangay.

Table 10. Tsunami Risk Percentage of Natural Resources per Barangay

BARANGAY	DOMINANT UTILIZATION			
	RAINFED RICE FIELD	MIXED TREES	GRASSLANDS	FISH PONDS
AGMANIC	44.88%	21.13%		95.58%
CANYAYO		8.32%	0.09%	
GUINBIRAYAN		10.54%		
MAGSAYSAY	9.41%	1.42%		15.50%
PANDAN		2.71%		99.74%
POBLACION	18.15%	11.53%		57.54%
TABUGON	19.48%	12.67%		51.29%



Map 17. Natural Resource-Based Production Areas Exposure to Tsunami Map of Santa Fe, Romblon



Map 18. Natural Resource-Based Production Areas Risk to Tsunami Map of Santa Fe, Romblon

Decision Areas and Policy Interventions

The exposure, sensitivity, and the adaptive capacity per barangay were considered by the TWG in identifying the decision areas. For flood, five barangays were chosen to be prioritized namely, Pandan, Mat-I, Danao Norte, Agmanic, and Guinbirayan. For landslide, Danao Norte, Guintigbasan, Magsaysay, and Pandan are the barangays chosen as decision areas. Meanwhile, decision areas for tsunami are Poblacion, Agmanic, Pandan, and Canyayo. Particularly rice fields (irrigated and rainfed) are chosen to be given primacy in times of disaster to avoid intensification of rice insufficiency.

In mitigating the climate change impacts affecting the natural resource based production areas, mitigation measures were formulated by the TWG which are usually pre-disaster. The primary intervention proposed is the construction of flood protection measures such to protect the natural resources which will also benefit other elements. Crop insurance, a post disaster economic protection that allows immediate recovery in times of hazards, needs to be familiarized by the agriculture dependents thru conducting Information Education Campaign (IEC) per barangay. One of the problems encountered by the agriculture dependents is lack of post-harvest facilities particularly equipment used in drying products. Former drying pavements were converted to basketball courts or plazas. An alternative facility for drying is located in Barangay Magsaysay, far from rice fields. It was managed by the Palate-Maambong Multi-Purpose Cooperative which led to mismanagement when the cooperative disbanded. Aside from that, it has a capacity of 120 cavans per batch which is too large for local farmers. Conveyed interventions to avoid disruption of production cycle is recruitment of someone to work as a maintenance on the mechanical dryer, to purchase mechanical dryers with 20/20 capacity which will be situated on barangay cluster basis. Another problem that needs urgent solution is the cropping season. Harvesting falls during the rainy seasons. Cropping is on months of October to January due to absence of water for irrigation thus, make plants smaller. This can be resolved through provision of reservoir to be used for second cropping. Promoting sustainable production technique is also seen as an intervention. Production of organic crops and native chicken is planned to be implemented by the Municipal Agriculturist Office.

Table 11. Summary Matrix for Natural Resource-Based Production Areas

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
AGMANIC	▪ 26 individuals attended the climate field school ▪ 15% of the farming families use sustainable production technique ▪ 65% of the farmers have access to hazard information ▪ 8% of the production areas have flood infrastructure coverage ▪ 56% of farming families have access to early warning system **FLOOD** ▪ 57.97 hectares devoted for agriculture: rainfed rice fields (5.68 hectares), mixed crops (33.42 hectares), and fish ponds (18.87 hectares) is moderate risk to flood ▪ Php 9,144,388.44 is the estimated potential	❖ Loss of livelihood or source of income for agriculture dependent population ❖ Narrow coverage of hazard mitigating measure means high vulnerability of farmlands to hazards which may lead to destruction of crops ❖ Low property insurance which may impede farmer's recovery on loss ❖ No alternative source of income for some due to low percentage of farmers with alternative livelihood ❖ Loss of food supply from the affected areas when hit by hazards	**Enforcement of agricultural insurance** ▪ Conducting IEC to familiarize dependents on the importance of having crop insurance. **Additional various and hazard-resistant seedlings** ▪ Provide seedlings for higher crop yield regardless of season. **Mainstream farmers' and fishermen's associations, organizations, and cooperatives** ▪ Establish and strengthen people's organizations to improve communication and management between the farmers and concerned agricultural institutions on programs related to agriculture.
CANYAYO	▪ 17 individuals attended the climate field school ▪ 12% of the farming families use sustainable production technique ▪ 43% of the farmers have access to hazard information ▪ 6% of the production areas have flood infrastructure coverage ▪ 45% of farming families have access to early warning system **FLOOD** ▪ 33.88 hectare devoted for mixed crops and grasslands is moderate risk to flood ▪ Php 1,693,732.06 is the estimated potential loss for flood		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	LANDSLIDE • 0.11 hectare of mixed crops is moderate risk Php 5,640.5 is the estimated potential loss for areas with moderate risk	❖ vulnerable crops produced due to low percentage of farmers who attended climate field school	**Additional climate-resilient measures and ecosystem-based adaptation measures** ▪ Build slope protection, sea wall, flood control, mangroves, and trees along natural resource-production areas that will serve as protection against hazards. **Additional irrigation systems.** ▪ Construct more irrigation infrastructures to resolve issue on water supply. **Conduct of trainings/seminars on climate-smart agriculture** ▪ Organize capacity building on agricultural methods, practices, and technology that is suited to climate change.
DANAO NORTE	• 46 individuals attended the climate field school • 15% of the farming families use sustainable production technique • 45% of the farmers have access to hazard information • 12% of the production areas have flood infrastructure coverage • 75% of farming families have access to early warning system **FLOOD** • 26.62 hectare devoted for mixed crops and rainfed rice fields is moderate risk to flood • Php 1,600,632.15 is the estimated potential loss for flood **LANDSLIDE** • 417.75 hectare devoted for mixed crops and grasslands is moderate risk to landslide • Php 16,160,183.4 is the estimated potential loss for the moderate risk areas		
DANAO SUR	• 20 individuals attended the climate field school • 12% of the farming families use sustainable production technique • 62% of the farmers have access to hazard information • 25% of the production areas have flood infrastructure coverage • 4% of farming families have access to early warning system		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	FLOOD • 23.21 hectares devoted for mixed crops, irrigated, and rainfed rice fields is moderate risk to flood • Php 1,384,638.86 is the estimated potential loss for flood		**Provision of alternative livelihood and financial literacy seminars.** ▪ Conduct trainings on different non-agricultural livelihood programs and provide other means of support to ensure income stability of dependent households. Also, it is important to educate farmers and fishermen on how to properly handle budget and expenses. **Sustainable production techniques and provision of advanced equipment** • Promote sustainable and advanced methods that contribute in maintaining the abundance of the natural resources and at the same time increase agricultural productivity.
GUINBIRAYAN	• 13 individuals attended the climate field school • 10% of the farming families use sustainable production technique • 72% of the farmers have access to hazard information • 16% of the production areas have flood infrastructure coverage • 69% of farming families have access to early warning system **FLOOD** • 56.70 hectares devoted for mixed crops, irrigated and rainfed rice fields, and fish ponds is moderate risk to flood • Php 5,621,562.035 is the estimated potential loss for flood **LANDSLIDE** • 13.06 hectares devoted to mixed crops and grasslands is moderate risk to landslide • Php 649,130.8 is the estimated potential loss on moderate risk areas		
GUINTIGBASAN	• 47 individuals attended the climate field school • 15% of the farming families use sustainable production technique • 68% of the farmers have access to hazard information • 14% of the production areas have flood infrastructure coverage • 58% of farming families have access to early warning system		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	FLOOD ▪ 18.85 hectares devoted for mixed crops and rain fed ricefields is moderate risk to flood ▪ Php 1,029,261.25 is the estimated potential loss for flood **LANDSLIDE** ▪ 224.39 hectares identified as forest, mixed crop production area, and grasslands is moderate risk to landslide ▪ Php 5,735,003.5 is the estimated potential loss for landslide		
MAGSAYSAY	▪ 40 individuals attended the climate field school ▪ 20% of the farming families use sustainable production technique ▪ 73% of the farmers have access to hazard information ▪ 10% of the production areas have flood infrastructure coverage ▪ 71% of farming families have access to early warning system **FLOOD** ▪ 32.29 hectares devoted for mixed crops, irrigated and rain fed rice fields, and fish ponds is moderate risk to landslide ▪ Php 3,756,499.49 is the estimated potential loss on moderate risk areas **LANDSLIDE** ▪ 211.57 hectares of mixed crops and grasslands is moderate risk to landslide ▪ Php 7,886,850.5 is the estimated potential loss on moderate risk areas		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
MAT-I	▪ 67 individuals attended the climate field school ▪ 12% of the farming families use sustainable production technique ▪ 68% of the farmers have access to hazard information ▪ 4% of the production areas have flood infrastructure coverage ▪ 69% of farming families have access to early warning system **FLOOD** ▪ 47.40 hectare is moderate risk to flood affecting mixed crops, rain fed rice fields, fish ponds, and grasslands. ▪ Php 3,001,003.155 is the estimated potential loss for flood **LANDSLIDE** ▪ 30.14 hectare of mixed crops is moderate risk to landslide ▪ Php 1,507,137.00 is the estimated potential loss for landslide		
PANDAN	▪ 40 individuals attended the climate field school ▪ 10% of the farming families use sustainable production technique ▪ 53% of the farmers have access to hazard information ▪ 6% of the production areas have flood infrastructure coverage ▪ 72% of farming families have access to early warning system		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	FLOOD ▪ 27.28 hectare devoted for mixed crops, irrigated and rai fed rice fields, and fish ponds is moderate risk to flood ▪ Php 1,912,747.97 is the estimated potential loss for flood **LANDSLIDE** ▪ 61.22 hectares of mixed crops and grasslands is moderate risk to landslide ▪ Php 2,315,353.1 is the estimated potential loss for landslide		
POBLACION	▪ 21 individuals attended the climate field school ▪ 12% of the farming families use sustainable production technique ▪ 69% of the farmers have access to hazard information ▪ 9% of the production areas have flood infrastructure coverage ▪ 89% of farming families have access to early warning system **FLOOD** ▪ 18.41 hectares devoted for mixed crops, irrigated and rai fed rice fields, and fish ponds is moderate risk to flood ▪ Php 1,244,999.86 is the estimated potential loss for flood		
TABUGON	▪ 22 individuals attended the climate field school ▪ 10% of the farming families use sustainable production technique ▪ 79% of the farmers have access to hazard information		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	▪ 25% of the production areas have flood infrastructure coverage ▪ 79% of farming families have access to early warning system **FLOOD** ▪ 21.42 hectare devoted for mixed crops, rain fed rice fields, and fish ponds is moderate risk to flood ▪ Php 1,471,910.785 is the estimated potential loss for flood		

iii. URBAN USE AREAS

Urban use areas pertain to the built environment currently utilized for residential, commercial, industrial, tourism, sanitary waste management facilities, cemeteries, and other land uses unique to the locality. These are often represented as area/zone in the existing/proposed general or urban land use maps. The exposure information can be expressed in terms of area (in hectares or square meters), type of use, and replacement/construction cost (estimated replacement cost per square meter). For this purpose, the urban uses are extracted from the existing land use map (2014 satellite image). This constitute of 128.374601 hectares (91.61% of the urban use areas)—making the residential area as the largest with hectares, followed by 8.296448 hectares of institutional area (e.g. schools, government buildings, churches), 0.146091 hectares of parks and open spaces (cockpit arena and children's park), 1.459129 hectares of cemeteries, 1.384206 hectares of commercial area, 0.008213 hectares of industrial area, and 0.462045 hectares of dumpsite.

Sensitivity criteria considered in identifying the risks are the structural design and current condition. The proportion of the buildings made of light to salvageable materials is one of the criteria under structural design. For Santa Fe, Barangay Canyayo (60%) has the highest proportion of buildings made of light to salvageable materials followed by Barangay Danao Norte (57%), and Pandan (54%). Another is the hazard resistant design employed per structure such as fire wall and perimeter fence. All barangays have low percentage on this with percentage that ranges from eight to 18 percent. For current condition, the municipal structures have low proportion of structures in condemned condition.

Partaking on adaptive measures on the urban use areas especially the residential areas. The capacity and willingness to retrofit or relocate or to conform to new regulations identified using the percentage of owners with the capacity is relatively low in the municipality with 12 to 39 percent only. Barangay Danao Sur has the lowest capacity followed by Danao Norte (17%), and Mat-I (18%). Meanwhile, Barangay Poblacion has the highest percentage of owners who are willing or have the capacity or relocate or retrofit with 39 percent followed by Guinbirayan (35%), and Pandan (33%). Having property insurance is not yet adherent in the municipality seen as none among the barangays possesses this. The municipal government's support climate change adaptation is considered as moderate, according to the TWG. Five percent of the municipal fund is allotted for projects related to climate change such as flood protection, riprapping, and elevation of structures either by adding foundation of adding floor number. Supply of lands which are allotted as alternative sites is also available in all barangays in the municipality.

Flood Exposure and Risk

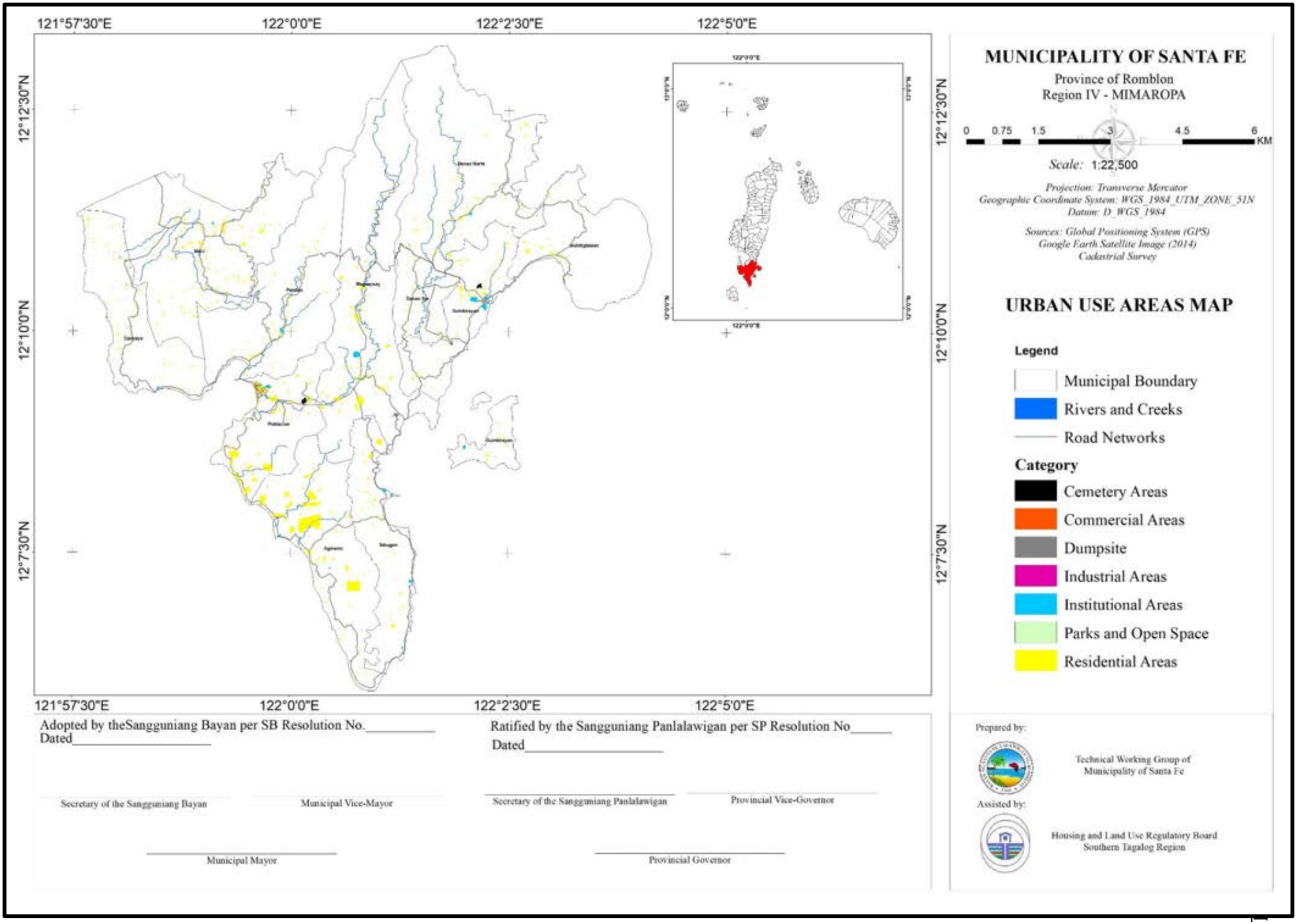
Areas exposed to flood totals to 17.28295511 hectares or 12.33 percent of the urban use areas. Highly exposed areas are constituted of 9.460437 hectares of residential areas, 0.147179 hectares of commercial areas, 0.553566 hectares of institutional areas, 0.00521 hectare of the landfill, and 0.11578 hectare of the parks and open space areas. Agmanic has the widest highly exposed areas with 2.226267 hectares followed by Poblacion, Pandan, and Mat-i. Replacement cost for highly exposed urban areas totals to ₱ 920,383,430.50. Barangay Poblacion, followed by Agmanic, Magsaysay, and Canyayo is where most of the moderately exposed areas are located. These are subcategorized into residential, commercial, institutional, landfill, cemetery, and parks and open space.

Considering the likelihood of occurrence score given by the TWG, all exposed areas were categorized with moderate risk to flooding. This was affected by the severity of consequence score, whereas

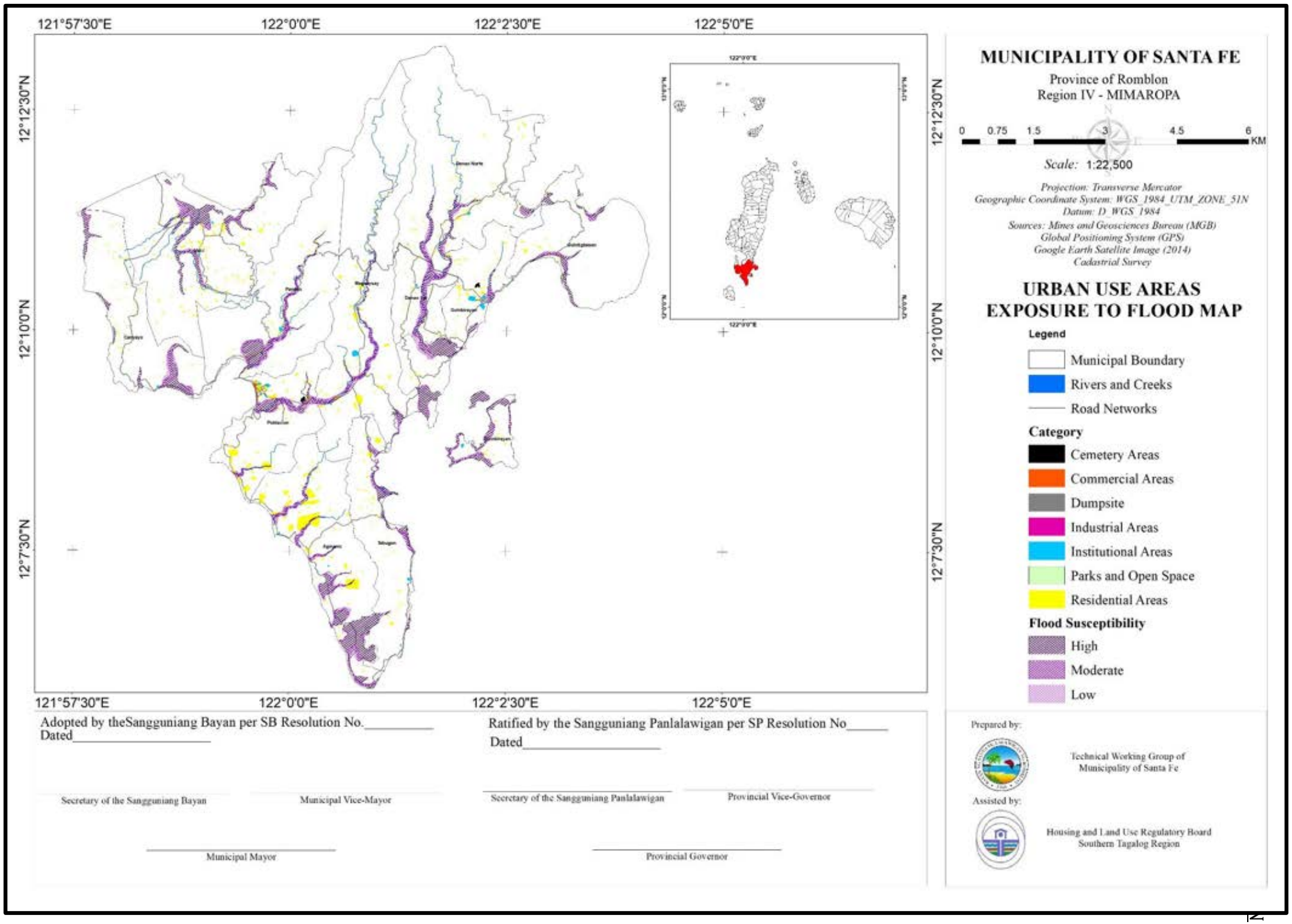
aforementioned that the municipality has high sensitivity to hazard but moderate adaptive capacity. The breakdown of percent affected and affected value or the replacement cost is shown in Table 12.

Table 12. Flood Risk Percentage of Urban Use Areas per Classification

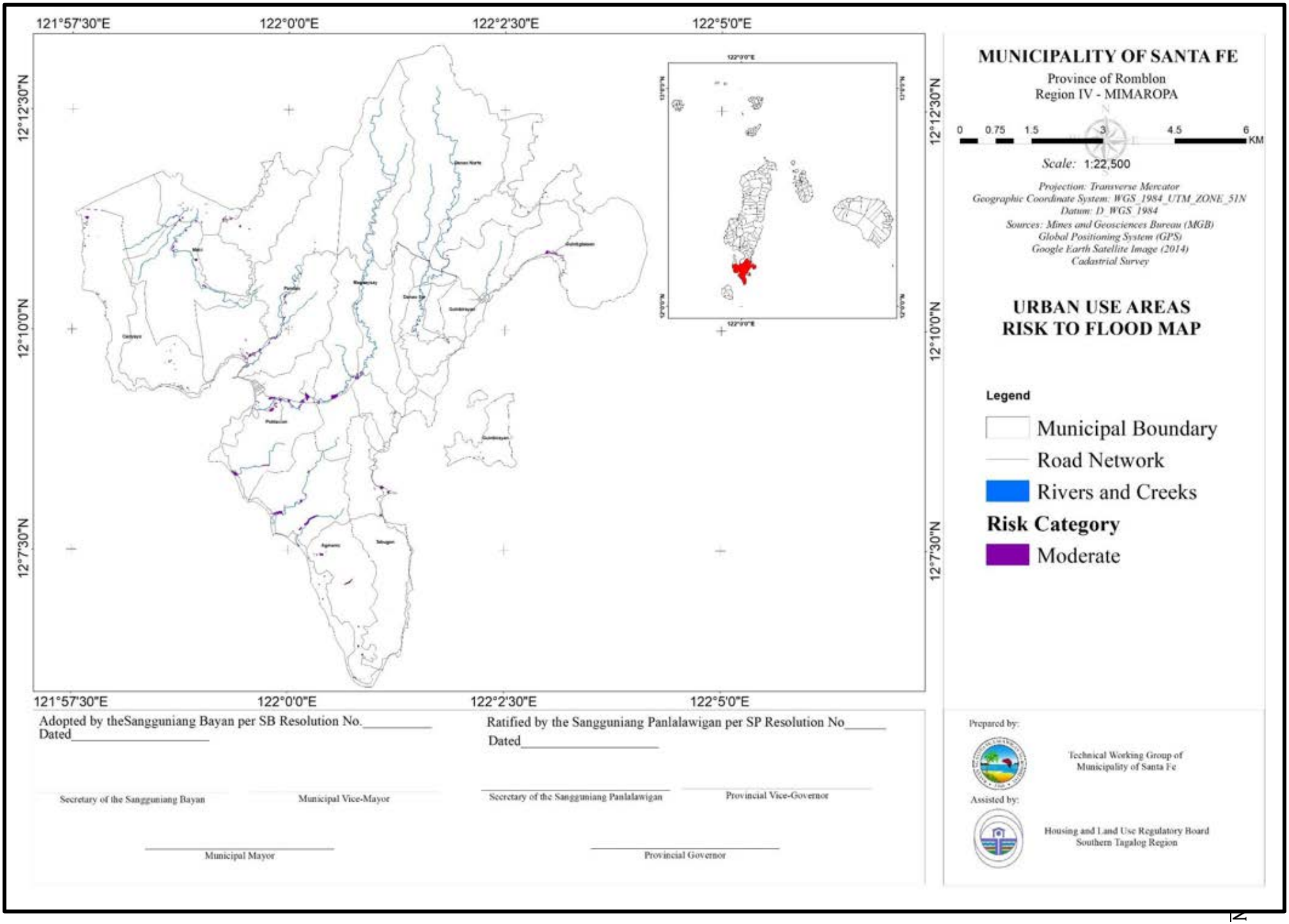
CLASSIFICATION	RISK	PERCENT AFFECTED	AFFECTED VALUE
RESIDENTIAL	MODERATE	12.0723422%	₱ 843,478,665.50
COMMERCIAL	MODERATE	21.8789689%	₱ 9,101,160.00
INSTITUTIONAL	MODERATE	7.48247925%	₱ 62,078,000.00
CEMETERY	MODERATE	48.2630391%	₱ 1,760,550.00
PARKS AND OPEN SPACE	MODERATE	79.7769883%	₱ 2,913,675.00
LANDFILL	MODERATE	7.58497549%	₱1,051,380.00



Map 19. Urban Use Areas Map of Santa Fe, Romblon



Map 20. Urban Use Areas Exposure to Flood Map of Santa Fe, Romblon



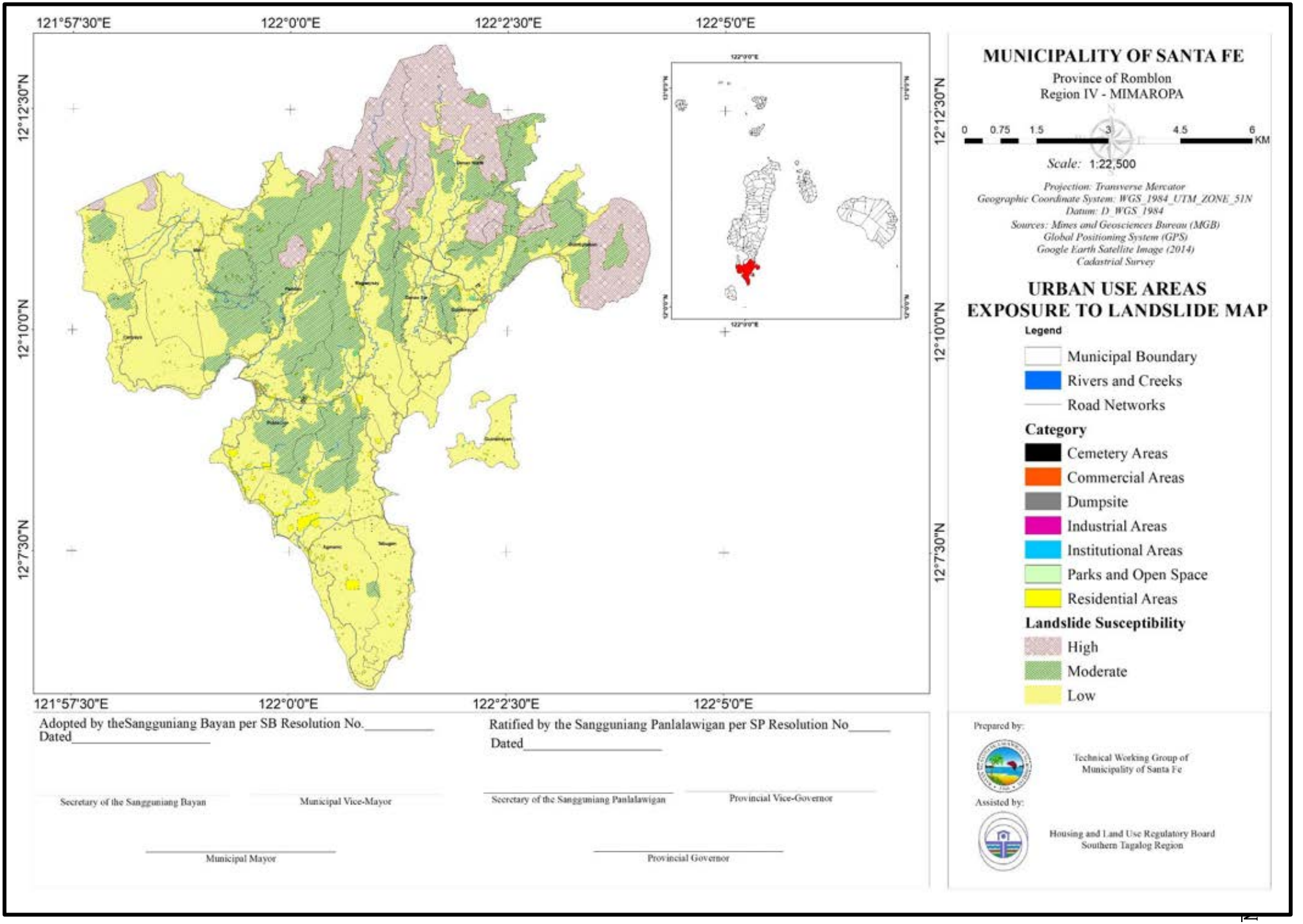
Map 21. Urban Use Areas Risk to Flood Map of Santa Fe, Romblon

Landslide Exposure and Risk

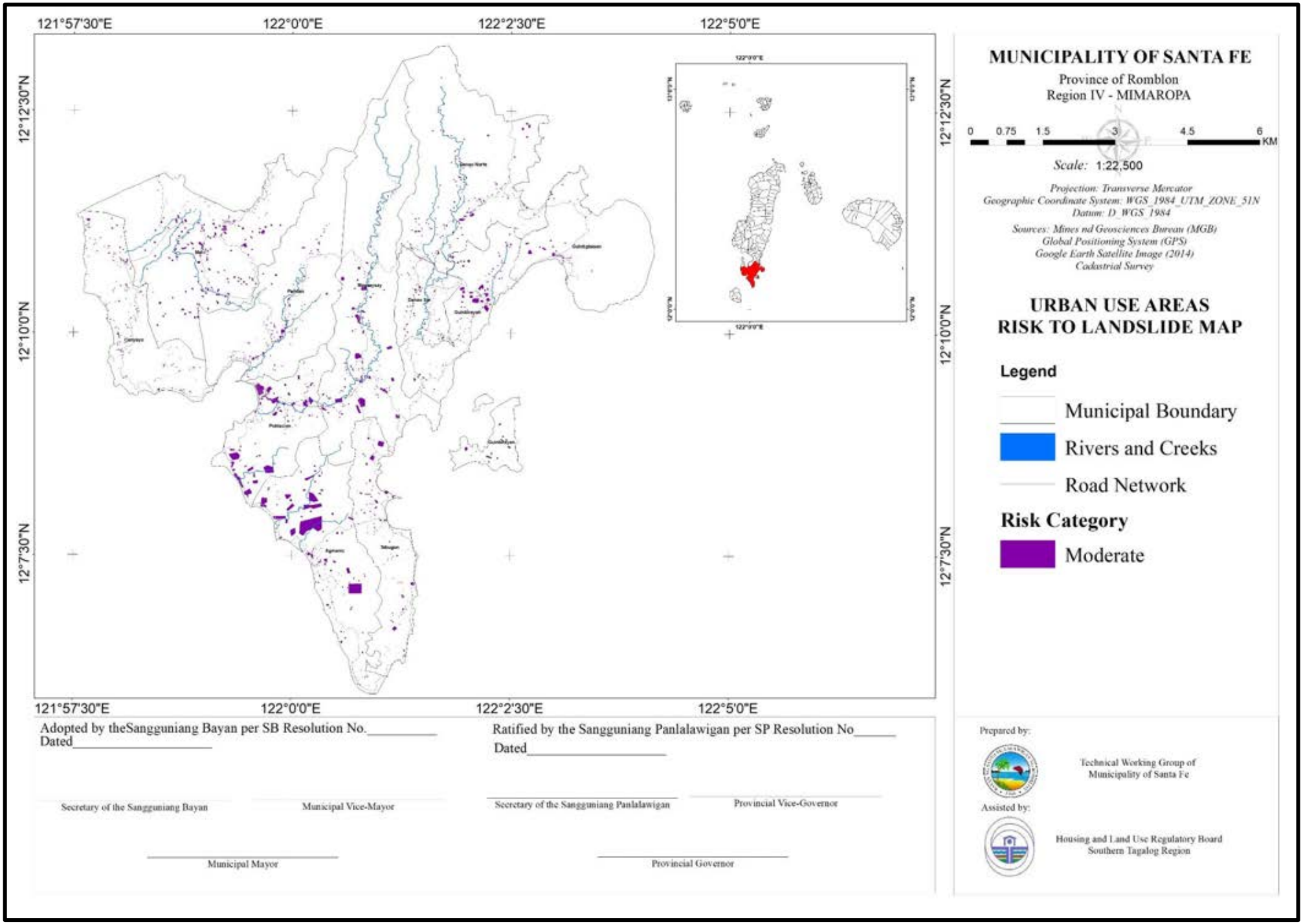
Three among the barangays have an area which are highly exposed to landslide, namely, Danao Norte, Mat-I, and Pandan. Of which, 0.574229 hectare is residential while the remaining 0.035284 hectare is institutional area located in Barangay Danao Norte. Affected value on highly exposed area totals ₱ 32,239,850.00. On the other hand, moderately exposed areas are located in all barangays with an area affected of 14.227215 hectares. This is principally composed of residential areas which is 97.92 percent of the moderately exposed, cemetery (1.28%), institutional areas (0.78 %), and commercial areas (0.02%). Replacement of affected areas will cost ₱ 740,937,630.00. 89.41 percent of the affected areas are lowly exposed to landslide composed of residential (90.88 %), institutional (6.51%), commercial (1.10%), cemetery (1.02%), landfill (0.37%), industrial (6.56%), and parks and open spaces (0.17%). The severity of consequence and likelihood occurrence resulted to a moderate risk on all exposed urban areas. A total of ₱ 7,837,472,625.00 replacement cost on all areas at risk. Detailed information on the areas affected are shown in the following Table 13.

Table 13. Landslide Risk Percentage of Urban Use Areas per Classification

CLASSIFICATION	RISK	PERCENT AFFECTED	AFFECTED VALUE
RESIDENTIAL	MODERATE	100%	₱6,905,832,595.00
COMMERCIAL	MODERATE	100%	₱ 47,666,360.00
INSTITUTIONAL	MODERATE	100%	₱ 829,653,300.00
INDUSTRIAL	MODERATE	100%	₱328,520.00
CEMETERY	MODERATE	100%	₱ 36,478,225.00
PARKS AND OPEN SPACE	MODERATE	100%	₱ 3,652,275.00
LANDFILL	MODERATE	100%	₱ 13,861,350.00



Map 22. Urban Use Areas Exposure to Landslide Map of Santa Fe, Romblon



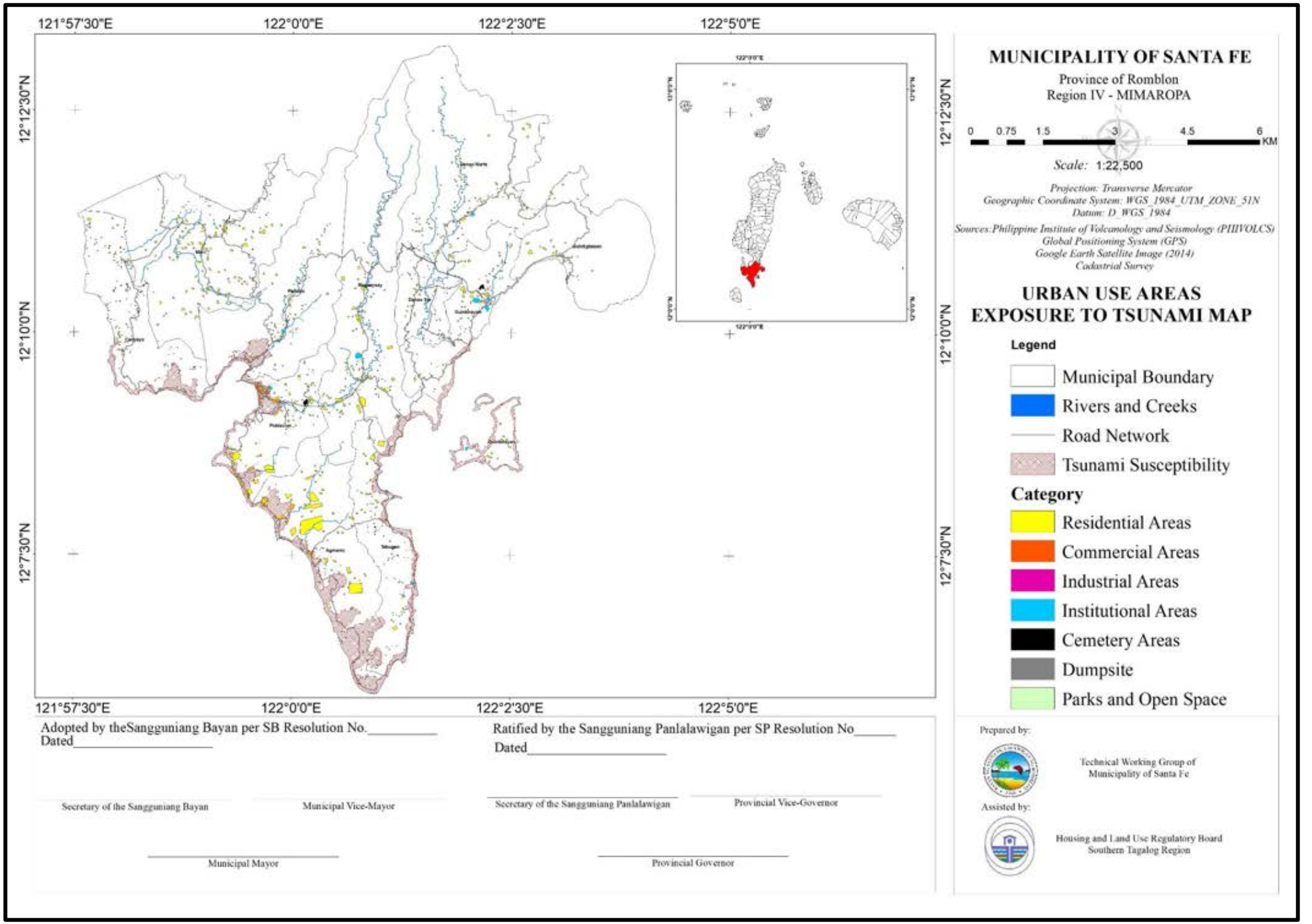
Map 23. Urban Use Areas Risk to Landslide Map of Santa Fe, Romblon

Tsunami Exposure and Risk

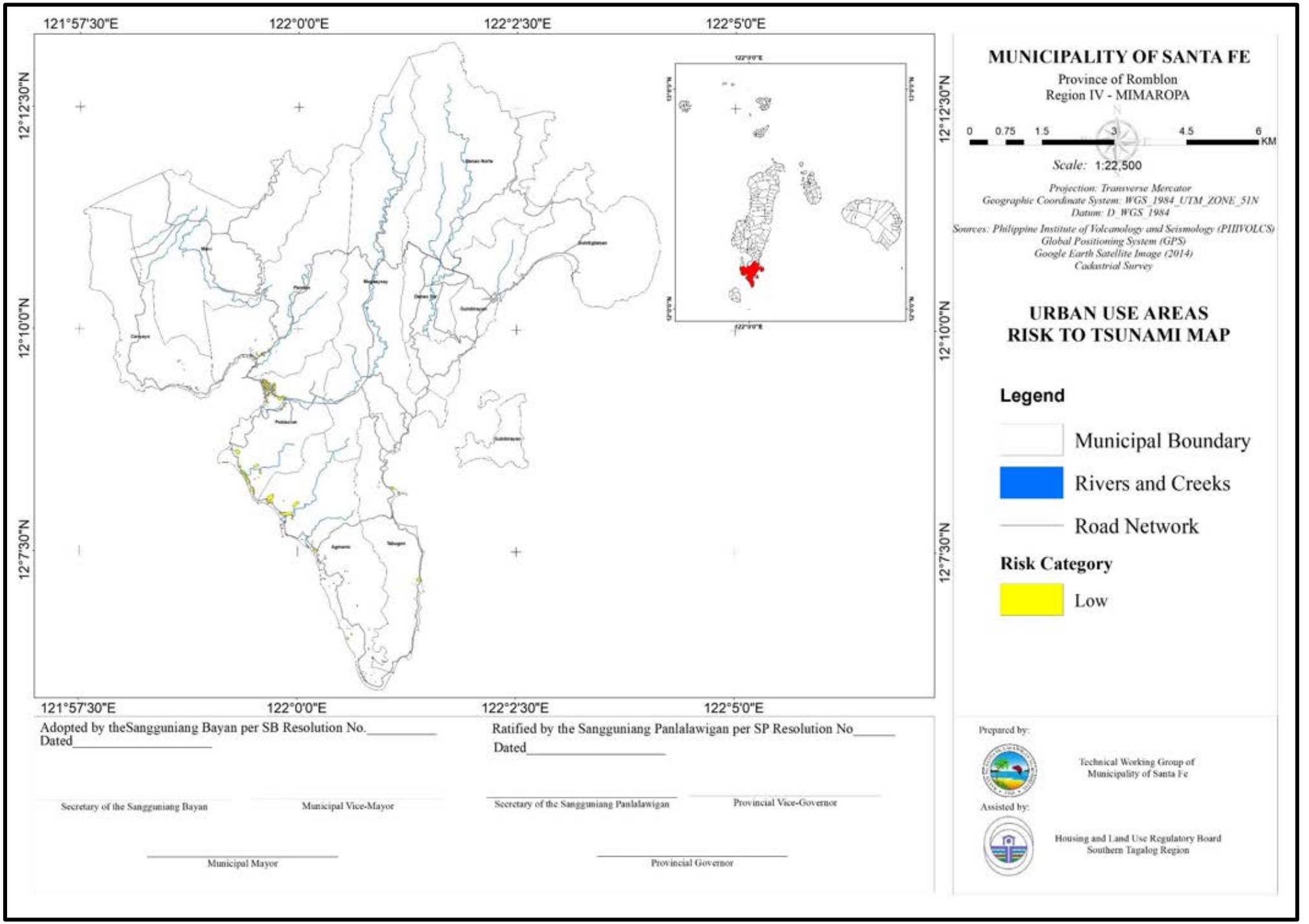
Six of the seven prone barangays have urban areas that are exposed to tsunami, all of which are low susceptibility. The area of exposed sums to 18.498141 hectares which are categorized into 15.840023 hectares of residential area, 0.789299 hectare of commercial area, 1.831151 hectare of the institutional area, 0.008213 hectare of the industrial area and 0.029455 hectare of the parks and open spaces. The low score of the likelihood of occurrence because the municipality has not experienced tsunami yet, all of the exposed are low risk to tsunami, as well.

Table 14. Tsunami Risk Percentage of Urban Use Areas per Classification

CLASSIFICATION	RISK	PERCENT AFFECTED	AFFECTED VALUE
RESIDENTIAL	LOW	12.33890729%	₱ 952,949,330.00
COMMERCIAL	LOW	57.02178722%	₱ 28,831,740.00
INSTITUTIONAL	LOW	22.07150578%	₱ 183,115,100.00
INDUSTRIAL	LOW	100%	₱ 328,520.00
PARKS AND OPEN SPACE	LOW	20.16209075%	₱ 2,945,500.00



Map 24. Urban Use Areas Exposure to Tsunami Map of Santa Fe, Romblon



Map 25. Urban Use Areas Risk to Tsunami Map of Santa Fe, Romblon

DECISION AREAS AND POLICY INTERVENTION

Next to the natural resource-based production areas, the urban use areas are the most evidently destructed upon hazard occurrence, especially the residential areas. All barangays have an urban use area at risk to flood and landslide but, among these, the TWG identified barangays which should be prioritized considering the exposure, sensitivity and the current adaptive capacity. For flood, in no particular order, Poblacion, Pandan, Tabugon, Mat-I, and Agmanic were chosen as the decision areas. For landslide, Barangay Pandan, Mat-I, Magsaysay, and Danao Norte. Lastly, for tsunami, priority barangays are Poblacion, Agmanic, and Pandan. Analyzing the result of the decision areas lead that the most vulnerable Barangay is Pandan.

Mitigating the risks posed by the climate change, the need for a strategy which is long term must be formulated. One of the effective strategies to combat the hazard is the preparation. In terms of the urban use areas, the structures must strictly comply with the Presidential Decree No. 1096 or the National Building Code of the Philippines which covers the design, location, siting, construction, alteration, repair, conversion, use/ occupancy, maintenance, moving, demolition of, and addition to public and private buildings and structures, except traditional indigenous family dwellings. Another intervention is the adoption of a hazard resistant design on the structures such as climate proofing and using of alternative strategies such as structure elevation which the municipality is currently doing. Establishment and strict implementation of buffer zones, particularly urban use areas located along the coast, the rivers, and other water ways that may cause flood. Property insurance can also allow immediate recovery. Possessing this is a post-disaster preparation which is effective in a long-term basis. Disaster preparation and response in line with the RA 10121, an Act Strengthening the Philippine Disaster Risk Reduction and Management System, is also a strategy seen by the municipality. This includes the construction of evacuation centers, socialized housing, and alternative site for evacuation which are all suitable.

Table 15. Summary Matrix for Urban Use Areas

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
AGMANIC	▪ 53% of the urban use areas are made of light to salvageable materials ▪ 8% of the structures are in dilapidated or condemned condition ▪ 16% of the structures employ hazard resistant building design ▪ 36% of the structures have access coverage to infrastructures related to mitigation measures ▪ 32% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance **FLOOD** ▪ 3.36334 hectares of residential area and 0.0072 hectare used as commercial area is moderate risk to flood ▪ Replacement cost for areas affected is estimated Php 168,188,360.00 **LANDSLIDE** ▪ 37.1949 hectares of residential area, 0.00458 hectare of commercial area, and 0.35056 hectare of institutional area is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 1,894,940,250.00	❖ High percentage of urban use areas indicates high sensitivity or vulnerability to hazards ❖ Low percentage of structures that employ hazard resistant building design may lead to higher casualties ❖ Weak post disaster recovery due to lack of property insurance ❖ Significant structural damage to residential are expected. Death and injuries are also expected if no preemptive preparation is implemented addressing landslides ❖ Increased severity of landslide may result to significant property damage ❖ Potential relocation of settlements due to landslide and displacement of land.	**Enforce and monitor implementation of PD 1096** ❖ Identification of relocation sites of affected structures from high and moderate risk to low risk areas ❖ Repair of existing facilities that are in fair and poor condition ❖ Climate proof facilities that are high to moderate risk to flood ❖ Conduct regular monitoring and maintenance check-up of all facilities **Strict Implementation of RA 10121** Construction of disaster resilient multipurpose evacuation center on suitable area in all barangays
CANYAYO	▪ 80% of the urban use areas are made of light to salvageable materials ▪ 11% of the structures are in dilapidated or condemned condition ▪ 18% of the structures employ hazard resistant building design		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	▪ 28% of the structures have access coverage to infrastructures related to mitigation measures ▪ 21% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance **FLOOD** ▪ 1.072344 hectare of residential area, 0.01862 hectare of commercial area and 0.026 hectare of institutional area is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php56,775,980.00 **LANDSLIDE** ▪ 5.61414 hectares of residential area, 0.081518 hectare of commercial area, and 0.488245 hectare of institutional area is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 331,977,040.00	❖ Potential damage to communities, injuries and casualties during landslides; ❖ Identification of additional areas of residential to accommodate potentially affected families and provision of comprehensive housing program for affected families ❖ Future growth in the area may increase exposure and risks if no interventions are implemented	❖ Ensure property insurance coverage of all the structures especially facilities in need of urgent assistance ❖ Implement hazard mitigation and climate resilient design for all facilities (fire wall, perimeter fence, sea wall, riprap) **Establish and strictly enforce buffer zones and other zoning policies that will lessen exposure of urban use areas particularly residential areas settled beside water bodies** **Propose mandatory relocation policy of structures/dwellings on coastal areas and low lying areas with high susceptibility to**
DANAO NORTE	▪ 57% of the urban use areas are made oflight to salvageable materials ▪ 9% of the structures are in dilapidated or condemned condition ▪ 13% of the structures employ hazard resistant building design ▪ 22% of the structures have access coverage to infrastructures related to mitigation measures ▪ 17% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	FLOOD ▪ 0.44251 hectare of residential area and 0.000019 hectare of commercial area is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php22,126,070.00 **LANDSLIDE** ▪ 8.420856 hectares of residential area, 0.077847 hectare of commercial area, and 0.319577 hectare of institutional area is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 455,335,910.00		
DANAO SUR	▪ 35% of the urban use areas are made of light to salvageable materials ▪ 6% of the structures are in dilapidated or condemned condition ▪ 8% of the structures employ hazard resistant building design ▪ 39% of the structures have access coverage to infrastructures related to mitigation measures ▪ 12% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance **FLOOD** ▪ 0.29966 hectare of residential area and 0.007228 hectare of institutional area is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php15,705,800.00		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	LANDSLIDE ▪ 2.773543 hectares of residential area, 0.008241 hectare of commercial area, and 0.19244 hectare of institutional area is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 158,168,180.00		
GUINBIRAYAN	▪ 40% of the urban use areas are made of light to salvageable materials ▪ 9% of the structures are in dilapidated or condemned condition ▪ 11% of the structures employ hazard resistant building design ▪ 35% of the structures have access coverage to infrastructures related to mitigation measures ▪ 35% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance FLOOD ▪ 0.247212 hectare of residential areas and 0.001566 hectare of commercial areas is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php 14,895,360.00 LANDSLIDE ▪ 8.08807 hectares of residential area, 0.09874 hectare of commercial area, 2.72889 hectare of institutional area, and 0.65629 hectare of the cemetery is moderate risk to landslide		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	Replacement cost for areas affected is estimated Php 778,529,920.00		
GUINTIGBASAN	▪ 53% of the urban use areas are made of light to salvageable materials ▪ 10% of the structures are in dilapidated or condemned condition ▪ 10% of the structures employ hazard resistant building design ▪ 43% of the structures have access coverage to infrastructures related to mitigation measures ▪ 22% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance FLOOD ▪ 0.96279 hectare of residential area, 0.00628 hectare of commercial areas, and 0.007798 hectare of institutional areas is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php 49,104,680.00 LANDSLIDE ▪ 3.138886 hectares of residential area, 0.0207 hectare of commercial area, and 0.00774 hectare of institutional area is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 158,338,750.00		
MAGSAYSAY	▪ 40% of the urban use areas are made of light to salvageable materials		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	▪ 9% of the structures are in dilapidated or condemned condition ▪ 16% of the structures employ hazard resistant building design ▪ 46% of the structures have access coverage to infrastructures related to mitigation measures ▪ 26% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance FLOOD ▪ 1.88976 hectare of residential area, 0.028054 hectare of commercial area, 0.01073 of institutional area, and 0.035046 hectare of the dumpsite is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php97,454,450.00 LANDSLIDE ▪ 14.733277 hectares of residential area, 0.12055 hectare of commercial area, 1.44885 hectare of institutional area and 0.46205 hectare of the dumpsite is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 899,026,330.00		
MAT-I	▪ 51% of the urban use areas are made of light to salvageable materials ▪ 12% of the structures are in dilapidated or condemned condition ▪ 12% of the structures employ hazard resistant building design		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	▪ 37% of the structures have access coverage to infrastructures related to mitigation measures ▪ 18% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance FLOOD ▪ 1.820452 hectare of residential area, 0.048581 hectare of commercial area, and 0.05772 hectare of institutional area is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php 98,252,430.00 LANDSLIDE ▪ 15.51117 hectares of residential area, 0.11594 hectare of commercial area, and 0.38194 hectare of institutional area is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 817,231,270.00		
PANDAN	▪ 54% of the urban use areas are made of light to salvageable materials ▪ 14% of the structures are in dilapidated or condemned condition ▪ 9% of the structures employ hazard resistant building design ▪ 31% of the structures have access coverage to infrastructures related to mitigation measures ▪ 33% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	FLOOD ▪ 1.912747 hectare of residential area, 0.016215 hectare of commercial area, and 0.00347 hectare of institutional area is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php 96,470,900.00 LANDSLIDE ▪ 6.2585 hectares of residential area, 0.0405 hectare of commercial area, and 0.37902 hectare of institutional area is moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 352,041,350.00		
POBLACION	▪ 48% of the urban use areas are made of light to salvageable materials ▪ 11% of the structures are in dilapidated or condemned condition ▪ 18% of the structures employ hazard resistant building design 52% of the structures have access coverage to infrastructures related to mitigation measures ▪ 39% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance FLOOD ▪ 3.305685 hectares of residential area, 0.070422 hectare of the cemeteries, and 0.11655 hectare of the parks and open space area is moderate risk to flood		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	LANDSLIDE ▪ 20.317767 hectares of residential area, 0.5153 hectare of commercial area, 0.94576 hectare of institutional area, 0.008213 hectare of industrial area, 0.80284 hectare of the cemetery, and 0.1461 hectare of the parks and open spaces are moderate risk to landslide ▪ Replacement cost for areas affected is estimated Php 1,561,483,490.00		
TABUGON	▪ 49% of the urban use areas are made of light to salvageable materials ▪ 13% of the structures are in dilapidated or condemned condition ▪ 11% of the structures employ hazard resistant building design ▪ 39% of the structures have access coverage to infrastructures related to mitigation measures ▪ 32% of the property owners have the capacity and are willing to retrofit or conform with new regulations ▪ None of the structures are covered with property insurance FLOOD ▪ 0.180444 hectare of residential area, 0.182796 of commercial area, and 0.507826 hectare of the institutional area is moderate risk to flood ▪ Replacement cost for areas at moderate risk is Php 65,288,680.00 LANDSLIDE ▪ 6.32089 hectares of residential area, 0.30031 hectare of commercial area, and 1.05351 hectare of institutional area is moderate risk to landslide Replacement cost for areas affected is estimated Php 430,404,870.00		

iv. LIFELINE UTILITIES

Lifeline utilities refer to major linkage and distribution systems associated with transportation access systems and power, water, and communication distribution/line systems. Exposure can be expressed in the linear kilometers exposed and the construction cost/replacement values. At the minimum, LGUs limit the scope of establishing exposure for major access or distribution networks. The approximate length of road networks of the municipality are about 85.44417 kilometers while there are total of 54.30360 linear meters of bridges. Like in the other exposure units, the exposure, vulnerability, and adaptive capacities are determined to assess the risk of roads, bridges, and power. Generally, the percentage of structures affected by hazards is around 20 to 40% and the replacement value per square meter or construction value is more than two (2) million pesos. In addition, the proportion of structures in dilapidated or condemned condition is low which is equivalent to about less than or equal five (5) percent of the structures. Although the structures are constructed in 2000 onwards, the structures employ hazard mitigation design standards of the year 1980s. Furthermore, around 10-20% of the affected areas are covered by infrastructure-related mitigation measures such as sea walls and flood control measures. As for the capacity and willingness to retrofit and relocate, the owner or concerned administrator has the capacity to retrofit but has no plan yet. Moreover, the percentage of structures covered by property insurance is only about less than or equal to five (5) percent. As for the government investments, with Santa Fe being a fifth-class municipality, local government has moderate capacity to invest in risk management and climate change adaptation or mitigation. Lastly, the local government is implementing existing regulations on hazard mitigation and structural design standards for the presence and adherence to government regulations.

A. Roads

Road networks in Santa Fe are classified as provincial road, municipal road, and barangay road. There are a total of 29.39044 kilometers of provincial roads, 3.64819 kilometers of municipal roads, and 52.40554 kilometers of barangay roads. Since the municipality has on-going road construction projects, the surface types of these roads are either concrete, gravel, or dirt. A total of 85.44417 kilometers (100%) of roads do not employ hazard-resistant design. This means roads do not have drainage canals and/or absence of slope protection mitigation measure. A total of 28.63739 kilometers of roads need major repairs while 46.69041 kilometers need minor repairs, and about 10.11637 kilometers are in good condition.

The provincial roads needing minor repairs are about 13.97736 kilometers in length while a total of 5.15227 kilometers need major repairs. Provincial roads in good condition have a total length of 5.47152 kilometers.

On the other hand, the municipal roads are all in good condition with total length of 3.64819 kilometers.

Furthermore, the barangay roads needing minor repairs have a total length of 32.71305 kilometers while approximately 18.69583 kilometers need major repairs. Around 0.99666 kilometer of barangay road is in good condition.

B. Bridges

Exposure, vulnerability, and adaptive capacities of 13 bridges were determined to identify their risk to hazards. These include Agmanic and Capdang bridge (Agmanic), Santol bridge (Danao Norte),

Danao Sur bridge (Danao Sur), Guinbirayan, Guba, and Atic bridges (Guinbirayan), Magsaysay and Palate bridges (Magsaysay), Pandan bridge (Pandan), and Bulangan and Longa-og bridges (Poblacion).

The surface type of these bridges is concrete except for Guba footbridge which is made of light materials. Agmanic, Capdang, and Magsaysay bridges need minor repairs while six (6) of these bridges are in good condition namely Santol, Danao Sur, Guinbirayan, Palate, Tabok and Barusbos bridges. Four (4) bridges are in fair or poor condition or needs major repairs which includes Atic, Pandan, Guba footbridge, and Longa-og bridges.

C. Electric Posts (Power lines)

The electricity in the municipality is supplied by Tablas Island Electric Cooperative (TIELCO). There are about 310 electric posts in the municipality which are assessed in order to determine the risks. These electric posts are made of steel, in good condition, and employ hazard-resistant design.

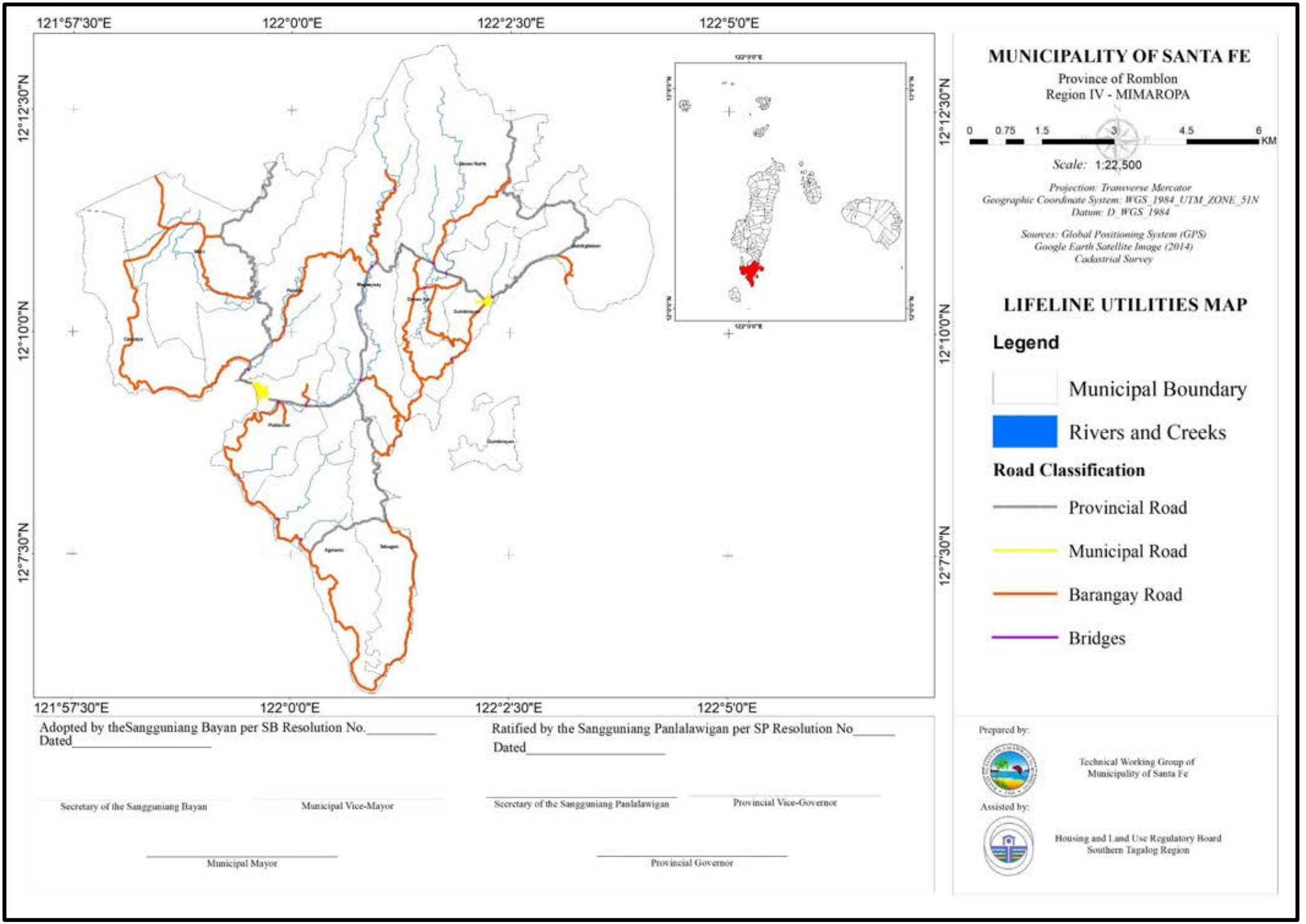
Flood Exposure and Risk

Approximately 14.09508 kilometers of roads are exposed to flooding. About 1.55094 kilometers are exposed to low flood, 3.48974 kilometers are exposed to moderate flood, and 9.05440 kilometers are exposed to high flood.

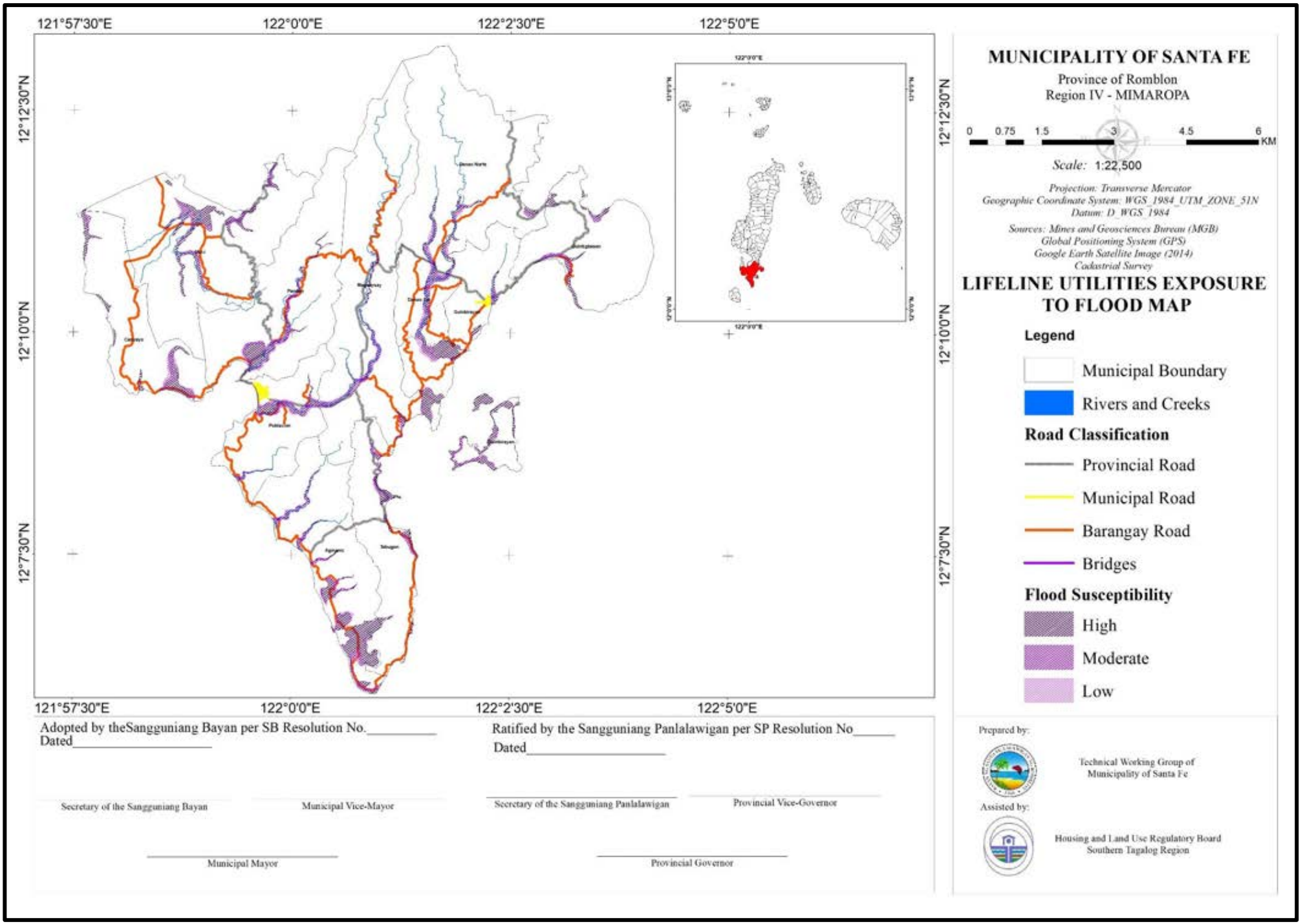
Roads that are at moderate risk to flooding have a total length of 11.35372 kilometers and the affected value of these roads amount to a total ₱71,562,650.00. These include 7.0078 kilometers of barangays roads with affected value of ₱28,502,700.00, municipal roads with total length of 0.08129 kilometer with affected value amounting to ₱406,450.00, and provincial roads with total length of 4.26535 kilometers and affected value of ₱42,653,500.00. Furthermore, roads that are high risk have a total length of 2.74136 kilometers with a total affected value of ₱20,117,350.00. Of these, barangay roads have a total length of 1.45925 kilometers valued at ₱7,296,250.00 and provincial roads have a total length of 1.28211 kilometers valued at ₱12,821,100.00.

There are 11 bridges in the municipality exposed to flood. Of these bridges, three (3) are high risk to flood namely Capdang bridge, Pandan bridge, and Longa-og bridge with a total length of 17.95 meters. The total affected value of bridges at high risk to flood amount to ₱3,589,628.00. The eight (8) remaining bridges are at moderate risk to flood namely Agmanic bridge, Santol bridge, Danao Sur bridge, Guinbirayan bridge, Magsaysay bridge, Palate bridge, and Bulangan bridge with a total length of 36.36 meters. The total affected value of these bridges amount to ₱ 10,860,729.40.

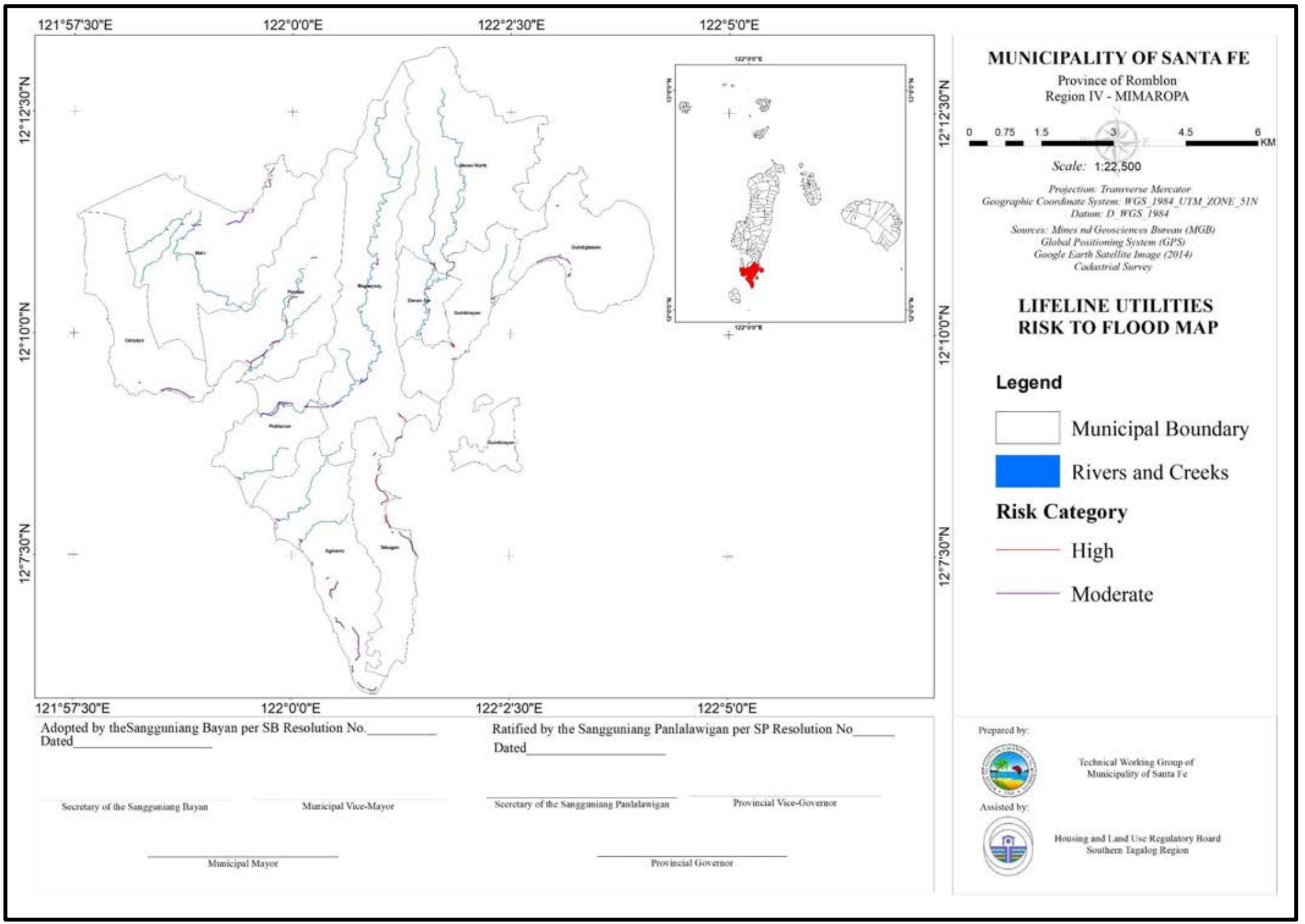
A total of 68 electric posts are susceptible to flooding. Of these, 10 electric posts are exposed to low flood with affected value of ₱200,000.00 while 22 electric posts are exposed to moderate flood with affected value of ₱420,000.00. In addition, 36 electric posts are exposed to high flood with the total affected value of ₱720,000.00. All these 68 electric posts are at moderate risk to flood with a total affected value of ₱1,340,000.00.



Map 26. Lifeline Utilities Map of Santa Fe, Romblon



Map 27. Lifeline Utilities Exposure to Flood Map of Santa Fe, Romblon



Map 28. Lifeline Utilities Risk to Flood Map of Santa Fe, Romblon

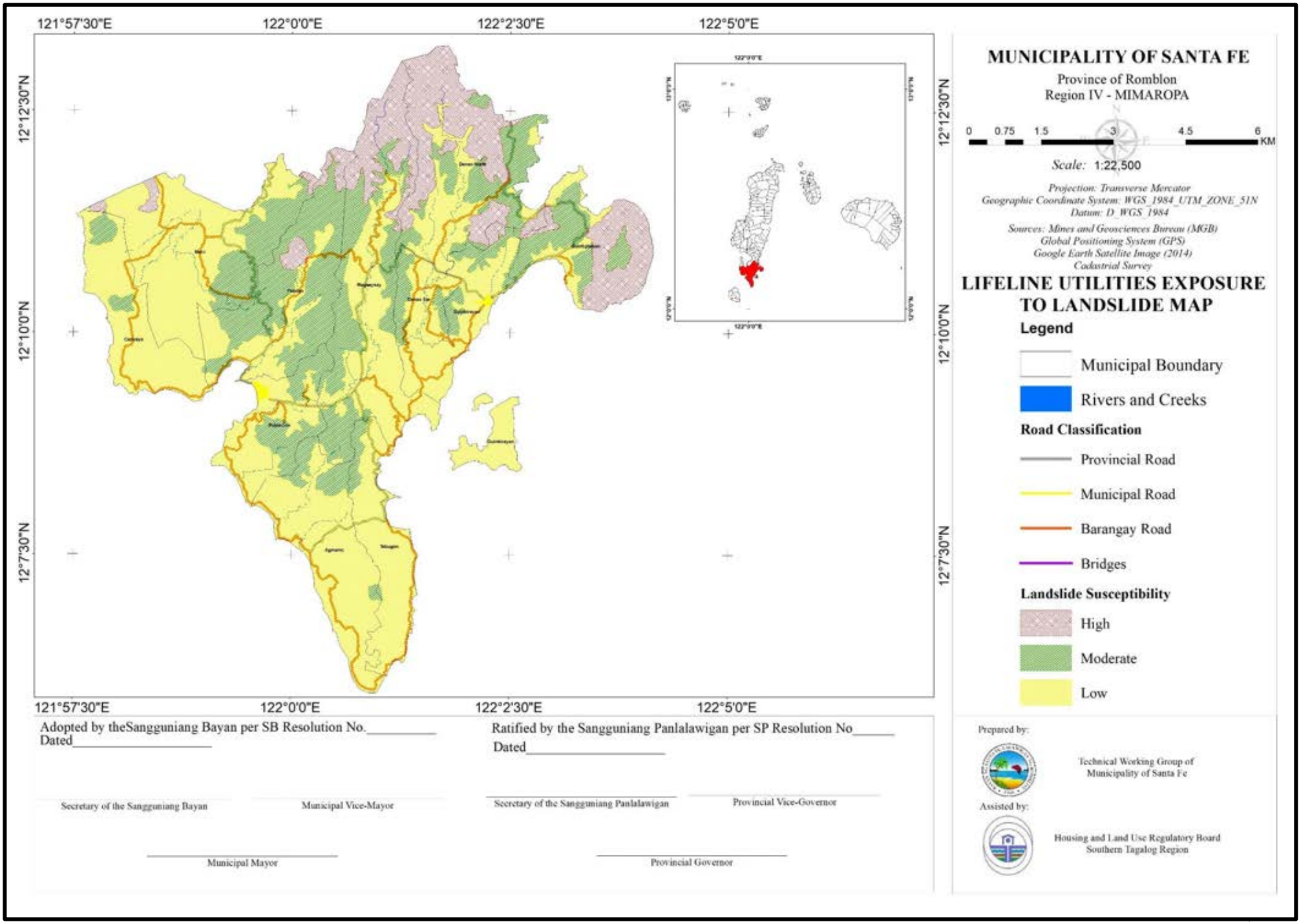
Landslide Exposure and Risk

Roads exposed to landslide have a total length of 85.44417 kilometers and a total affected value of ₱592,414,000.00. These include barangay roads with total length of 52.40554 kilometers and affected value of ₱262,027,700.00, municipal roads with 3.64819 kilometers and ₱36,481,900.00 affected value, and provincial roads with total length of 29.39044 kilometers and affected value amounting to ₱293,904,400.00.

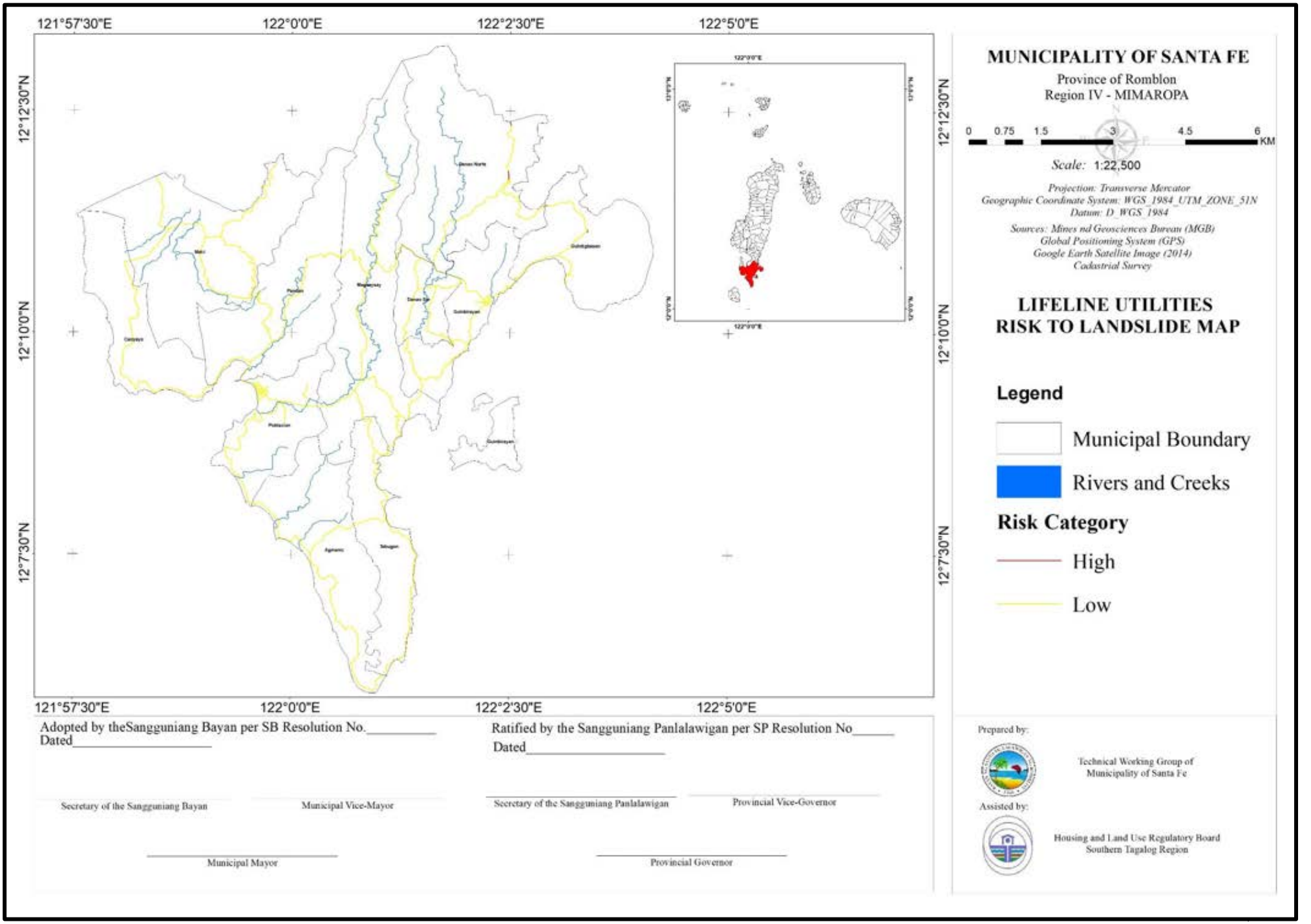
A total of 29.03163 kilometers of provincial roads with total affected value of ₱290,316,300.00 are at low risk to landslide while 0.35881 kilometer is at high risk and its affected value amounts to ₱3,588,100.00. As for the barangay roads at low risk, the total length of affected area is 52.33059 kilometers and the total affected value is ₱261,652,950.00. In addition to this, 0.07495 kilometer of barangay roads is at high risk with affected value of ₱374,750.00. Furthermore, 3.64819 kilometers of municipal roads are at low risk and its affected value is ₱36,481,900.00.

All bridges in the municipality are at low risk to landslide with a total affected value of ₱16,840,878.00 and total length of 0.08420211 kilometer.

310 electric posts are exposed to landslide with a total affected value of ₱6,200,000.00. 249 of these electric posts have low susceptibility with affected value amounting to ₱4,980,000.00. The remaining 61 are moderately susceptible with affected value amounting to ₱1,220,000.00. All of these electric posts are low risk to landslide.



Map 29. Lifeline Utilities Exposure to Landslide Map of Santa Fe, Romblon



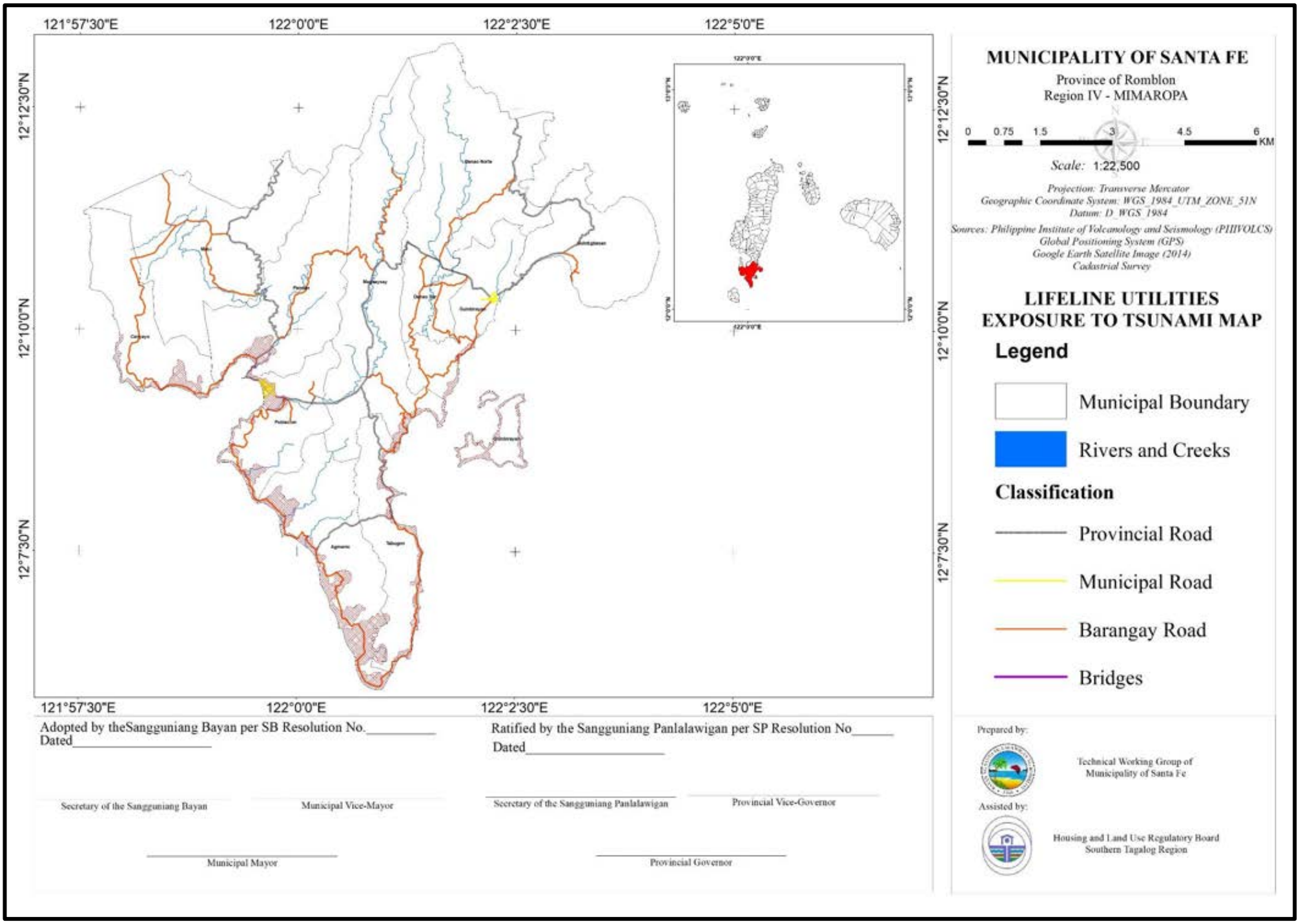
Map 30. Lifeline Utilities Risk to Landslide Map of Santa Fe, Romblon

Tsunami Exposure and Risk

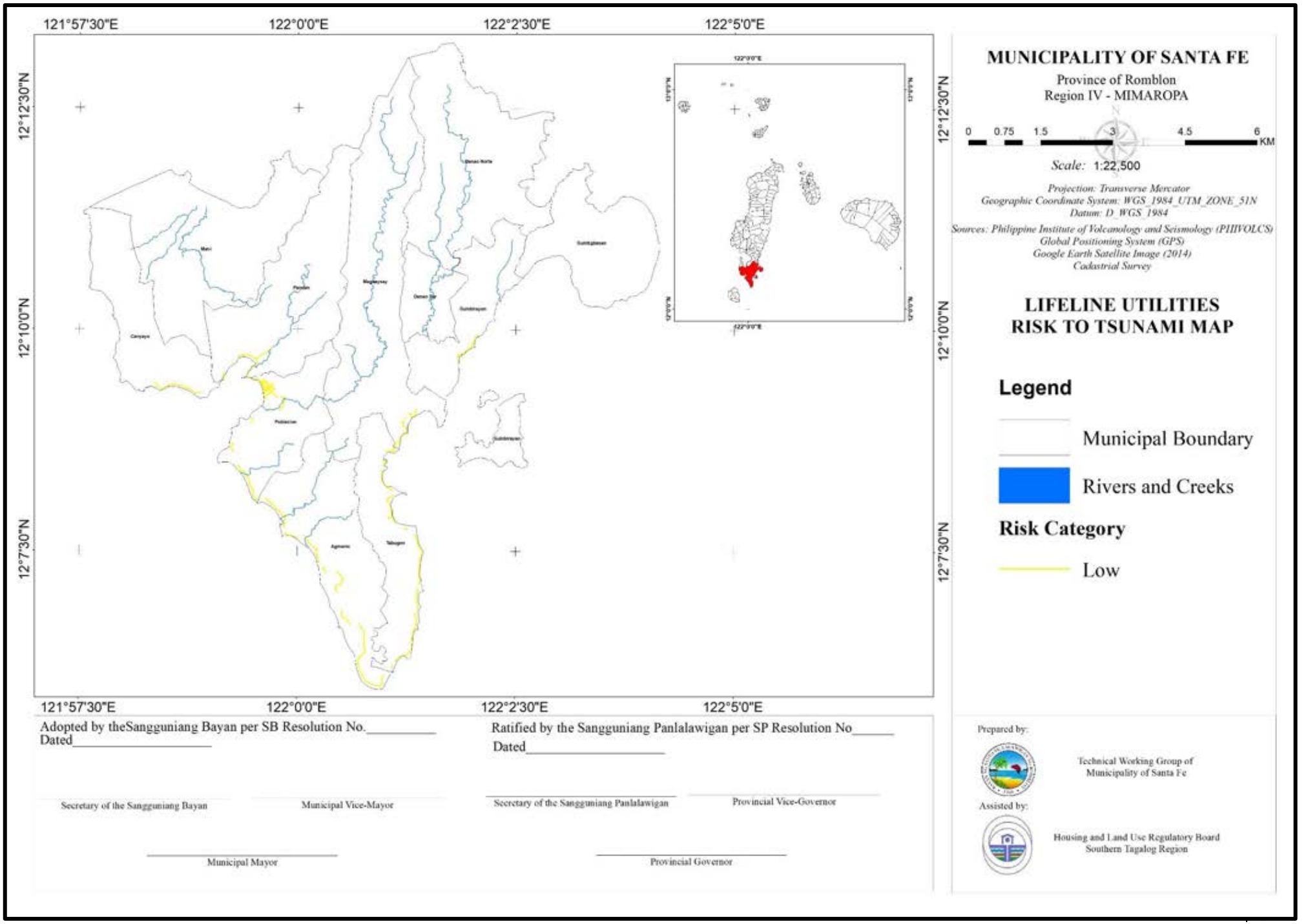
Roads exposed to tsunami have a total length of 19.213975 kilometers and total affected value of ₱121,980,085.00. Only the municipal road in Poblacion with a total length of 2.384381 kilometers and affected value ₱23,843,810.00 is exposed to tsunami. Provincial roads exposed to tsunami has a total length of 2.797661 kilometers and affected value of ₱27,976,610.00 and these are located in Agmanic, Pandan, Tabugon, and Poblacion. All of these roads are at low risk to tsunami.

Agmanic Bridge, Guba footbridge, and Bulangan Bridge are at low risk to tsunami. The total length of these bridges is 21. 8398 meters and the affected value is ₱4,367,960.00.

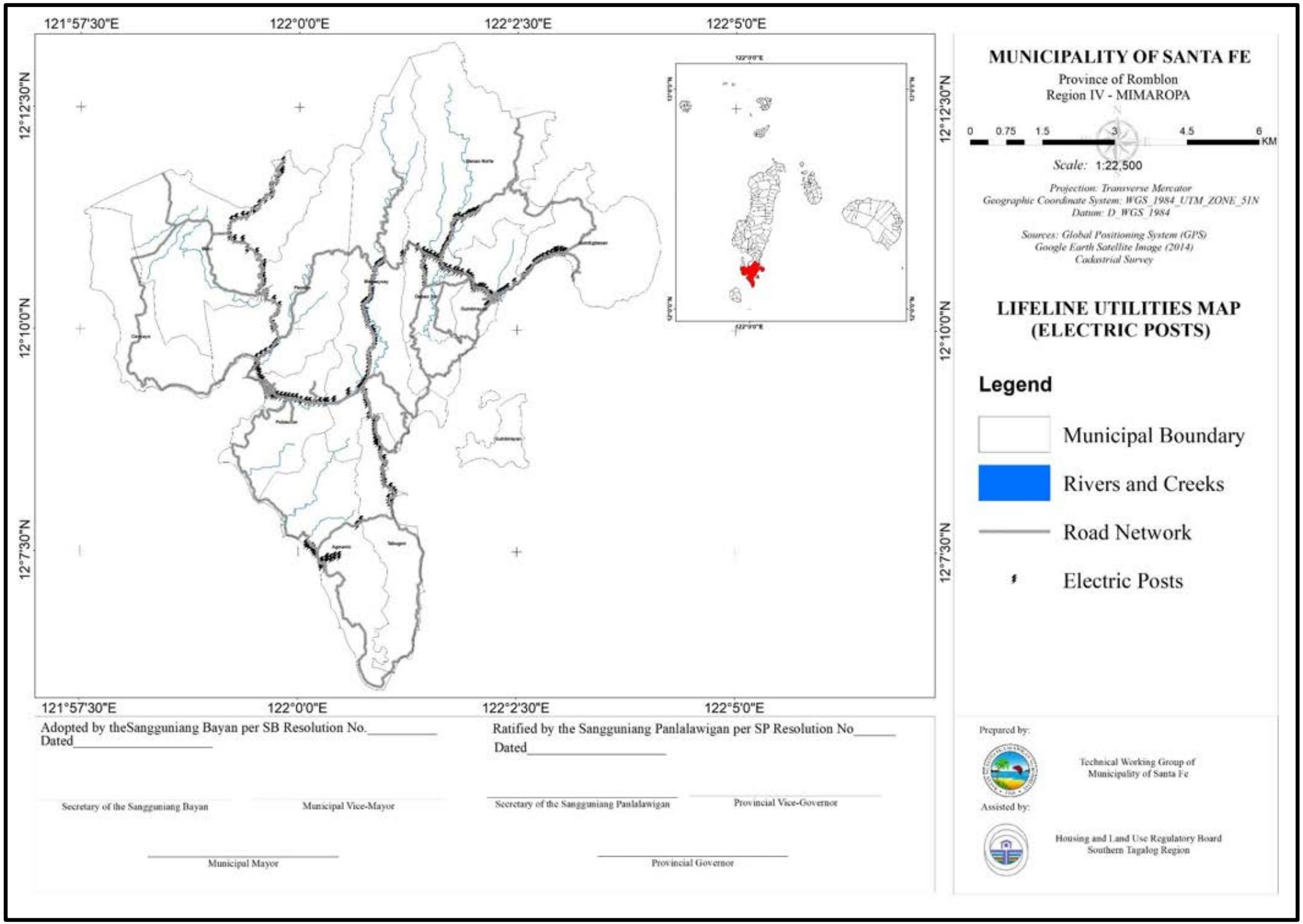
25 electric posts located in Agmanic, Pandan, Poblacion, and Tabugon are exposed to tsunami. The total affected value of these posts amount to ₱500,078.00. These electric posts are in good condition and employ hazard-resistant design. The electric posts are at low risk to tsunami.



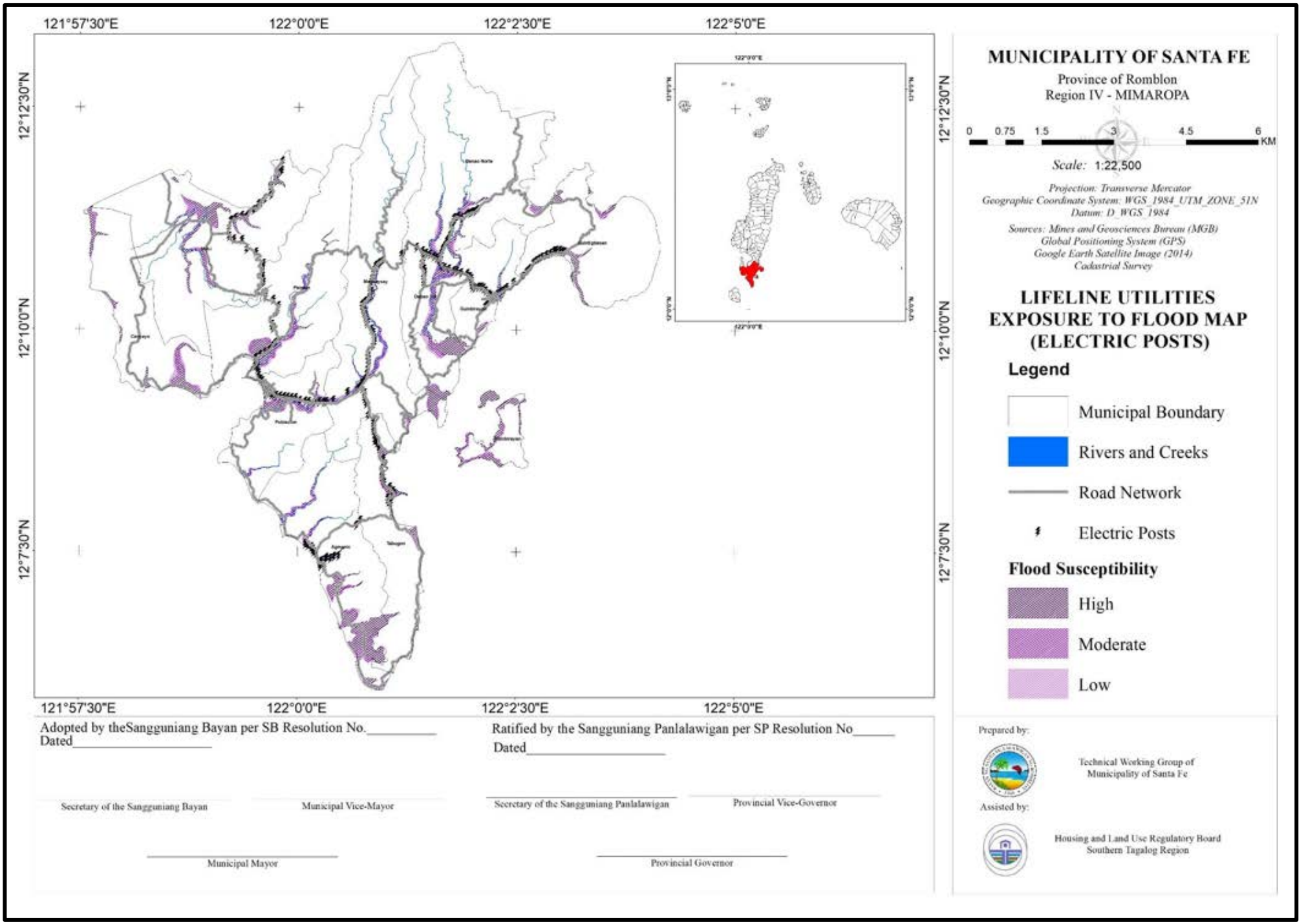
Map 31. Lifeline Utilities Exposure to Tsunami Map of Santa Fe, Romblon



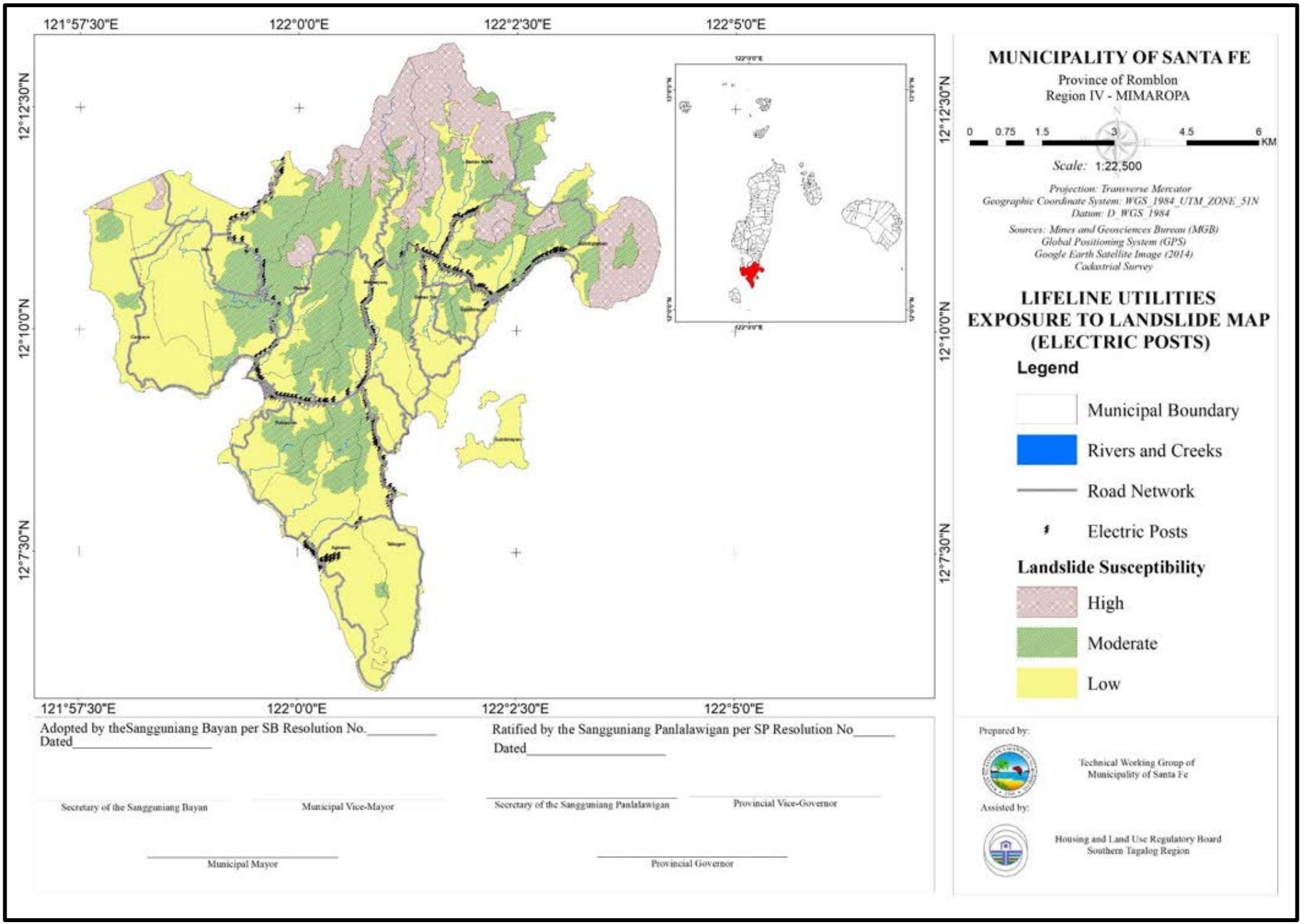
Map 32. Lifeline Utilities Risk to Tsunami Map of Santa Fe, Romblon



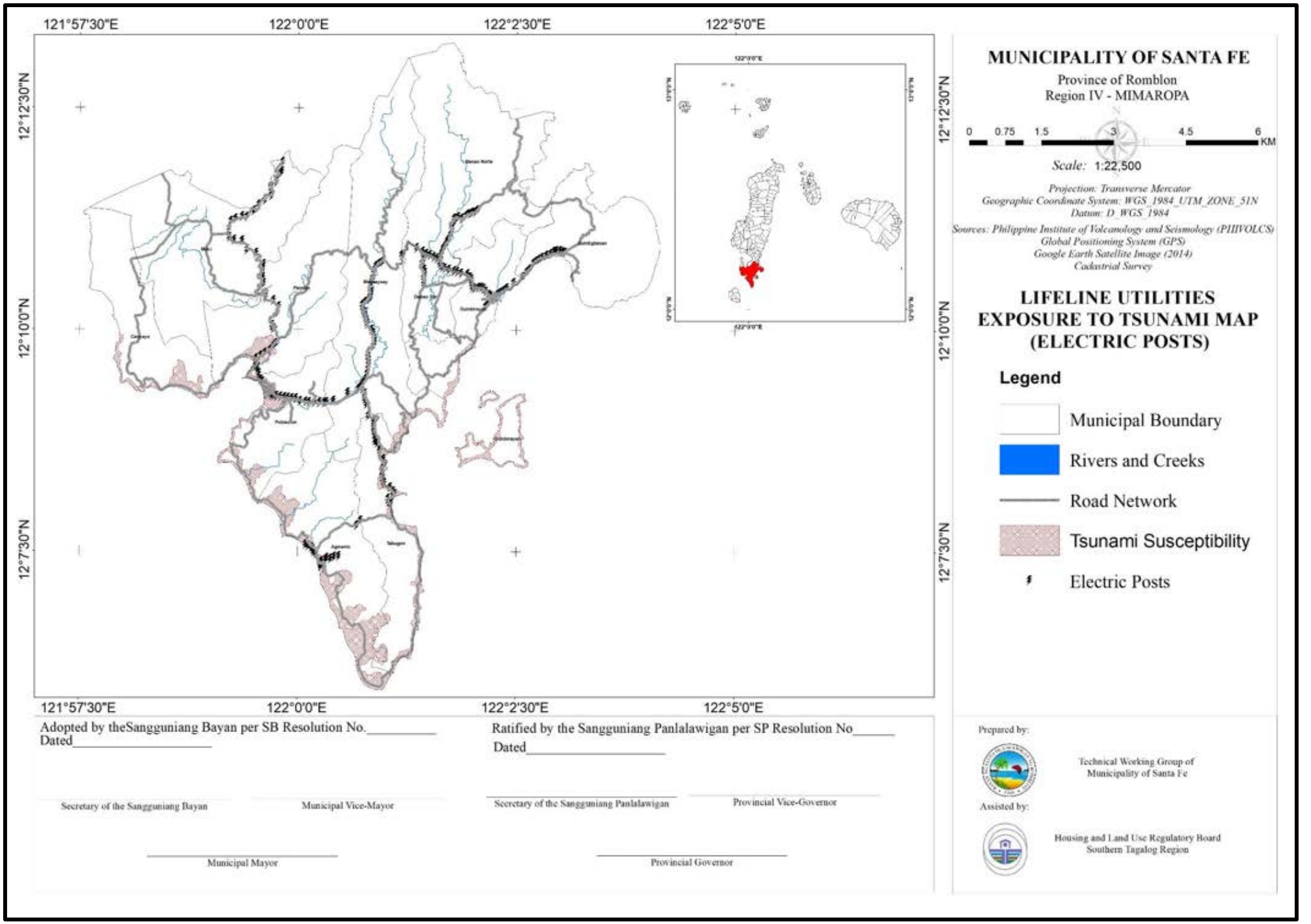
Map 33. Lifeline Utilities Map (Electric Posts) of Santa Fe, Romblon



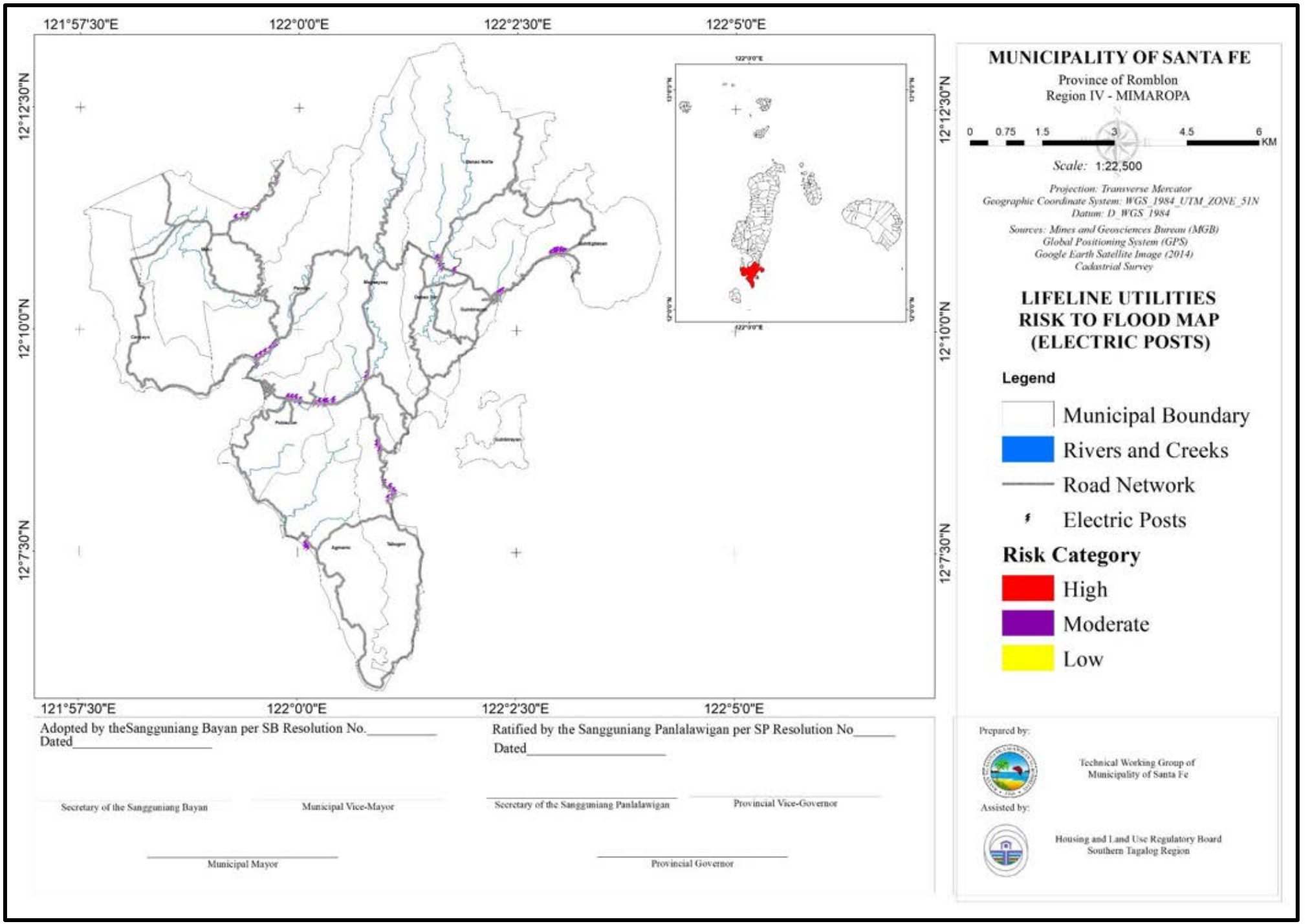
Map 34. Lifeline Utilities (Electric Posts) Exposure to Flood Map of Santa Fe, Romblon



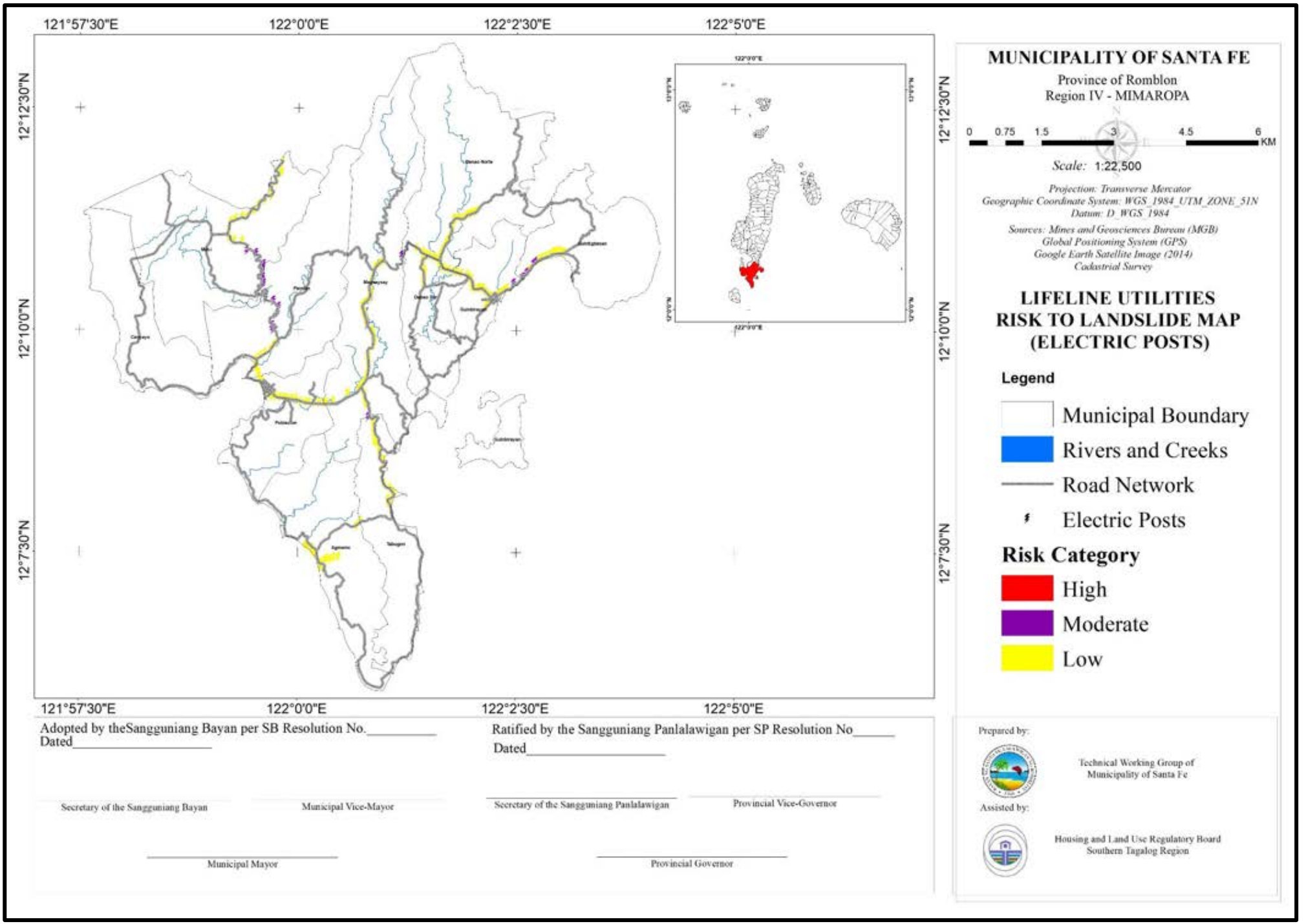
Map 35. Lifeline Utilities (Electric Posts) Exposure to Landslide Map of Santa Fe, Romblon



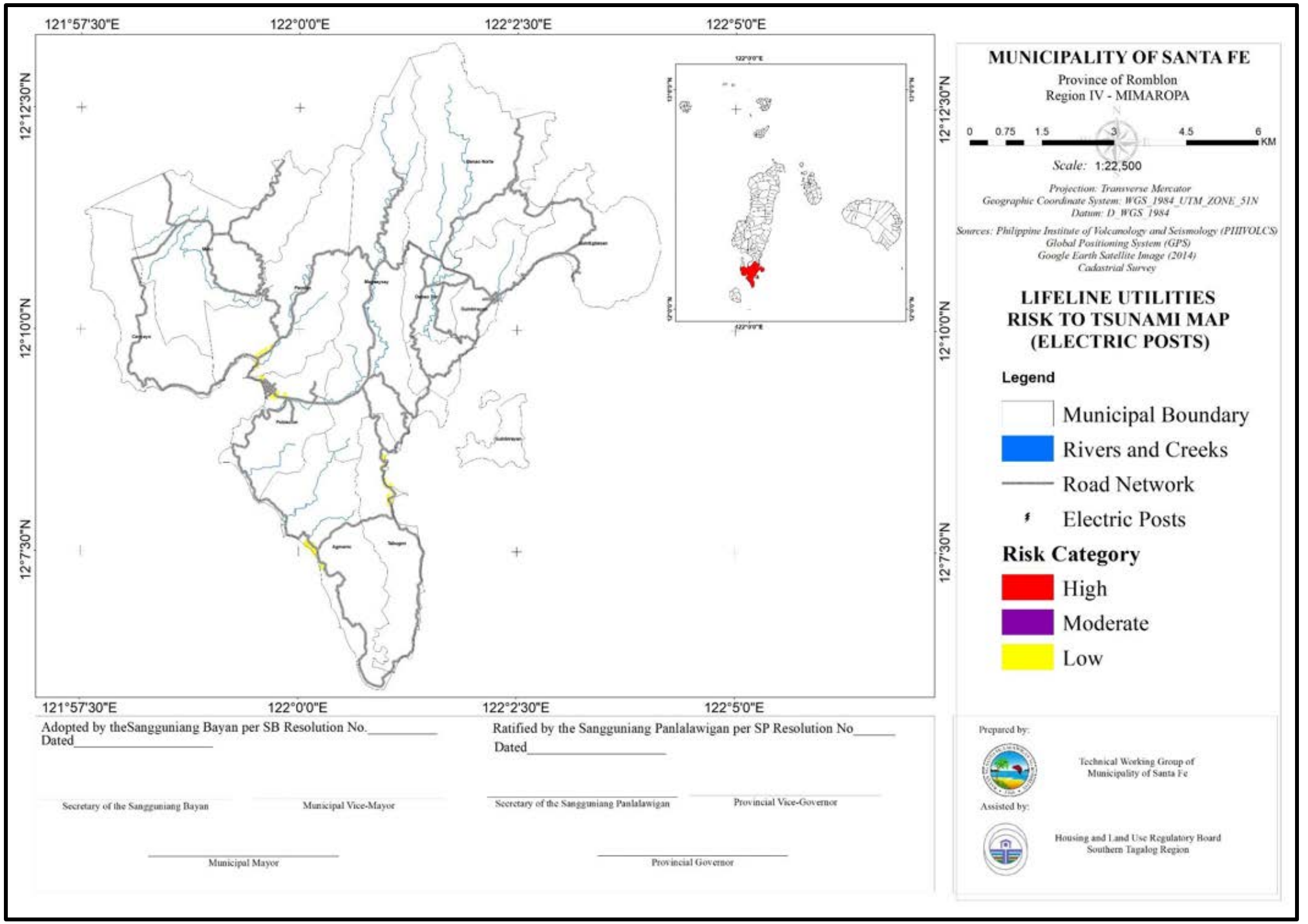
Map 36. Lifeline Utilities (Electric Posts) Exposure to Tsunami Map of Santa Fe, Romblon



Map 37. Lifeline Utilities (Electric Posts) Risk to Flood Map of Santa Fe, Romblon



Map 38. Lifeline Utilities (Electric Posts) Risk to Landslide Map of Santa Fe, Romblon



Map 39. Lifeline Utilities (Electric Posts) Risk to Tsunami Map of Santa Fe, Romblon

Decision Areas and Policy Interventions

The identified decision areas for lifeline utilities include all barangays with most number of roads, electric posts, and bridges at moderate and high risks to hazards. For flood, the decision areas are Tabugon, Pandan, Poblacion, Danao Sur, and Guinbirayan. For landslide, the decision areas are Danao Norte, Guinbirayan, Guintigbasan, Magsaysay, and Poblacion. For tsunami, the decision areas are Tabugon, Pandan, Poblacion, Canyayo, and Agmanic.

The policy interventions for lifeline utilities include road widening and road reconstruction that shall employ hazard-resistant design. In addition to this, retrofitting and applying mitigation measures for existing roads and bridges is a must. Roads and bridges at high risk areas must be prioritized to avoid higher amount of damages to properties and lives. Furthermore, lifeline utilities and its project design must possess and integrate property insurance. Mitigating measures include elevation of roads, installation of early warning devices, seawall construction, riprapping of damaged river banks, and Information, Education, Campaign (IEC). Moreover, regular monitoring of conditions of roads, electric posts, and bridges must be conducted to assure prevention of accidents and delay of service.

Table 16. Summary Matrix for Lifeline Utilities

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
AGMANIC	**ROADS** **FLOOD** ❖ **Barangay Roads** ▪ 0.49769 km is at moderate risk to flood. Replacement cost is ₱ 5,000,000.00 and affected value is ₱ 2,488,450.00 ▪ 0.80885 km is at moderate risk to flood. Replacement cost is ₱ 5,000,000.00 and affected value is ₱4,044,250.00. ▪ Another 1.26594 km is at moderate risk to flood. Replacement cost is ₱ 5,000,000.00 and affected value is ₱ 6,329,700.00 ▪ All these barangay roads are gravel, needs major repairs, and does not employ hazard-resistant design. **ELECTRIC POSTS** **FLOOD** • Electrical posts 222 and 223, steel, good condition and employs a hazard resistant design, is exposed to moderate risk of flood. Replacement cost and affected value of each post is ₱ 20,000. **BRIDGE** **FLOOD** • Capdang bridge ▪ Categorized as high risk ▪ 5.027716 linear meters, concrete, does not employ hazard-resistant design ▪ Affected value is ₱ 1,005,554.00 ▪ Needs minor repairs • Agmanic bridge ▪ Categorized as moderate risk	• Damages to roads and electric posts • Possible power interruption causing inconvenience to work and to household duties • Disruption in transportation of crops and other goods • Difficulty in evacuation and quick response • Muddy, slippery, and damaged roads during rainy season may cause further accidents and loss of lives	• Road widening and reconstruction of roads employing hazard-resistant design • Protection of roads at high risk areas: (1) construction of sewage systems; and (2) riprapping of areas with frequent landslide. • Retrofitting and ensuring that roads and bridges employ hazard-resistant design. • Formulation of alternate routes and road network plan. • Dirt roads must be made concrete employing hazard-resistant design • Regular monitoring of conditions of roads, electric posts, and bridges. • Lifeline utilities must have property insurance; Project design must integrate property insurance.

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	▪ 3.159797 linear meters, concrete, does not employ hazard-resistant design ▪ Affected value is ₱ 631,959.00 ▪ Needs minor repairs All other lifeline utilities not enumerated are low risk to flood, landslide, and tsunami.		• Retrofit and apply mitigation measures for existing roads, bridges. • Upcoming projects of lifeline utilities must secure building permit, clearances, locational clearances, etc.; all types of structure, regardless of proponent, must secure necessary government clearances/permits.
CANYAYO	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.65764 km is at moderate risk. Replacement cost is ₱ 5,000,000.00 and affected value is ₱3,288,200.00. This road is gravel, needs minor repairs, and does not employ hazard-resistant design. • 0.15090 km is at moderate risk. Replacement cost is ₱ 5,000,000.00 and affected value is ₱754,500.00. Road is concrete & gravel, in good condition, but does not employ hazard-resistant design. ▪ Other lifeline utilities not enumerated are low risk to flood, landslide, and tsunami.		
DANAO NORTE	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.10802 km is at high risk. Replacement cost is ₱5,000,000.00 affected value is ₱540,100.00. Road is concrete, needs minor repairs, and does not employ hazard-resistant design. ❖ **Provincial Roads** • 0.00428 km is at high risk. Replacement cost is ₱		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	10,000,000.00 and affected value is ₱42,800. Road is gravel, needs major repairs, and does not employ hazard-resistant design. **LANDSLIDE** ❖ **Barangay Roads** • 0.04434 km is categorized as high risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱221,700.00. Road is partly gravel and partly dirt road, needs major repairs, and does not employ hazard-resistant design. ❖ **Provincial Roads** • 0.26679 km is at high risk. Replacement cost is ₱ 10,000,000.00 and the affected value is ₱2,682,300.00. Road is concrete and gravel, needs major repairs, and does not employ hazard-resistant design. **ELECTRIC POSTS** **FLOOD** Electrical posts 105,106, and 162, steel, in good condition and employ hazard resistant design, are both exposed to moderate risk of flood. Replacement cost and affected value of each post is ₱ 20,000. **BRIDGE** **FLOOD** • Santol bridge ▪ Categorized as moderate risk ▪ 6.46315 meters, concrete, but does not employ hazard-resistant design. ▪ Affected value is ₱ 1,292,630.00 ▪ In good condition All other lifeline utilities not enumerated are low risk to		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
DANAO SUR	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.03450 km is at moderate risk. Replacement cost is ₱5,000,000.00 and affected value is ₱ 172,500.00. It is concrete, needs minor repairs and does not employ hazard-resistant design. • 0.15886 km is at high risk. Replacement cost is ₱ 5,000,000.00 and the affected value is ₱794,300.00. It is concrete and gravel, needs minor repairs, and does not employ hazard-resistant design. • 0.13282 km is at moderate risk. Replacement cost is ₱5,000,000.00 and affected value is ₱664,100.00 It is concrete, needs major repairs, and does not employ hazard-resistant design. ❖ **Provincial Roads** • 0.17815 km is at high risk. Replacement cost is ₱10,000,000.00 and affected value is ₱1,781,500.00. It is gravel, needs minor repairs, and does not employ hazard-resistant design. • 0.00545 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱54,500.00. It is gravel, needs minor repairs, and does not employ hazard-resistant design. • 0.11699 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱1,169,900.00. It is gravel, in poor condition, and does not employ hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	ELECTRIC POSTS **FLOOD** ▪ Electrical posts 107, 108, and 111, made of steel, in good condition and employ hazard resistant design, are exposed to moderate risk of flood. The affected value of each post is ₱ 20,000. **BRIDGE** **FLOOD** • Danao Sur bridge ▪ Categorized as moderate risk ▪ 4.87088 linear meters, concrete, employ a hazard-resistant design ▪ Affected value is ₱974,176.00 ▪ In good condition All other lifeline utilities not enumerated are low risk to flood, landslide, and tsunami.		
GUINBIRAYAN	**ROADS** **FLOOD** ❖ **Barangay Road** • 0.20804 km is at high risk. Replacement cost is ₱5,000,000.00 and affected cost is ₱1,040,200.00. It is partly concrete and partly dirt road, needs major repairs, and does not employ hazard-resistant design. ❖ **Municipal Roads** • 0.07698 km of is at moderate risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱384,900.00 Road is concrete, in good condition, but does not employ hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• 0.00431 km is at moderate risk. Replacement cost is ₱5,000,000.00 and affected value is ₱21,550.00. Road is concrete, good condition, and does not employ hazard-resistant design. ❖ **Provincial Road** • 0.00836 km is at moderate risk. Replacement cost is ₱10,000,000.00 and affected value is ₱83,600. Road is concrete, needs major repairs, and does not employ hazard resistant design. • 0.06149 km is at moderate risk. Replacement cost is ₱10,000,000.00 and affected value is ₱614,900.00. Road is concrete, needs major repairs, without hazard-resistant design. • 0.06244 km is at moderate risk. Replacement cost is ₱10,000,000.00 and affected value is ₱624,400.00. Road is concrete, needs major repairs, and does not employ hazard-resistant design. **ELECTRIC POSTS** **FLOOD** ▪ Electrical posts 134, 135, and 136, steel, in good condition and employ hazard resistant design, are exposed to moderate risk of flood. The affected value and the replacement cost of each post is ₱ 20,000. **BRIDGES** **FLOOD** • Guinbirayan bridge ▪ Categorized as moderate risk ▪ Total of 5.91917 linear meters, concrete, with hazard-resistant design ▪ Affected value is ₱2,600,000.00		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
GUINTIGBASAN	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.08493 km is at moderate risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱424,650.00. It is partially concrete and partially dirt road, needs minor repairs, without hazard-resistant design. • 0.38255 km is at moderate risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱1,912,750.00. It is partially concrete and partially dirt road, needs minor repairs, without hazard-resistant design. ❖ **Provincial Roads** • 0.01095 km is at moderate risk. Replacement cost is ₱10,000,000.00 and affected value is ₱109,500.00. It is dirt road, needs minor repairs, without hazard-resistant design. • 0.06377 km is at moderate risk. Replacement cost is ₱10,000,000.00 and affected value is ₱637,700.00. It is dirt road, needs minor repairs, without hazard-resistant design. • 0.52453 km is at moderate risk. Replacement cost is ₱10,000,000.00 and affected value is ₱5,245,300.00. It is dirt road, needs minor repairs, without hazard-resistant design. **LANDSLIDE** ❖ **Provincial Roads** • 0.09202 km is at high risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱920,200.00. It is dirt road, needs major repairs, without hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	ELECTRIC POSTS **FLOOD** ▪ Electrical posts 148, 149, 150, 151, 152, and 153, made of steel, in good condition and with hazard resistant design, are exposed to moderate risk of flood. The affected value and the replacement cost of each post is ₱ 20,000. All other lifeline utilities not enumerated are at low risk to flood, landslide, and tsunami.		
MAGSAYSAY	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.3333 km is at moderate risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱1,666,500.00. It is partially concrete and partially gravel, needs minor repairs, without hazard-resistant design. • 0.48363 km is at high risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱ 2,418,150.00. It is partially concrete and partially gravel, needs minor repairs, without hazard-resistant design. ❖ **Provincial Roads** • 0.19261 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱1,926,100.00. It is concrete, in good condition, without hazard-resistant design. • 0.10441 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱1,044,100.00. It is concrete, in good condition, without hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• 0.40119 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱4,011,900.00. It is partially concrete and partially gravel, in good condition, without hazard-resistant design. **ELECTRIC POSTS** **FLOOD** ▪ Electrical posts 61, 62, 63, 68, and 69, made of steel, in good condition and with hazard resistant design, are exposed to moderate risk of flood. The replacement cost and the affected value of each post is ₱ 20,000. **BRIDGES** **FLOOD** • Magsaysay bridge ▪ Categorized as moderate risk ▪ 7.01544 linear meters, concrete, with hazard-resistant design ▪ Affected value is 1,000,000.00 ▪ Needs minor repairs • Palate bridge ▪ Categorized as high risk ▪ 1.59017 linear meters, concrete, with hazard-resistant design ▪ Affected value is ₱318,034.00 ▪ In good condition All other lifeline utilities not enumerated are at low risk to flood, landslide, and tsunami.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
MAT-I	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.02248 km is at moderate risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱112,400.00. It is partially concrete and partially dirt road, needs minor repairs, without hazard-resistant design. • 0.29326 km is at moderate risk. Replacement cost is ₱5,000,000.00 and the affected value is ₱1,466,300.00. It is partially concrete and partially dirt road, needs minor repairs, without hazard-resistant design. ❖ **Provincial Roads** • 0.03897 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱389,700.00. It is concrete, in good condition, with hazard-resistant design. • 0.40632 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱4,063,200.00. It is concrete, in good condition, with hazard-resistant design. • 0.77523 km is at moderate risk. Replacement cost is ₱10,000,000.00 and the affected value is ₱7,752,300.00. It is concrete, in good condition, with hazard-resistant design. **ELECTRIC POSTS** **FLOOD** • Electrical posts 4, 9, 11, 12, and 13, made of steel, in good condition and employ hazard resistant design, are exposed to moderate risk of flood. The affected value and the replacement cost of each post is ₱		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
PANDAN	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.1568 km of barangay road is categorized as moderate risk. The affected value is ₱ 784,100.00. It is gravel, needs minor repairs, and does not employ hazard-resistant design. • 0.50070 km of barangay road is categorized as high risk. The affected value is ₱ 2,503,500.00. It is concrete and gravel, needs major repairs, and does not employ hazard-resistant design. • 0.31324 km of barangay road is categorized as moderate risk. The affected value is ₱ 1,566,200.00. It is gravel, needs minor repairs, and does not employ hazard-resistant design. ❖ **Provincial Roads** • 0.06323 km of provincial road is categorized as moderate risk. The affected value is ₱ 632,300.00. It is concrete, in good condition, and employs hazard-resistant design. • 0.56648 km of provincial road is categorized as moderate risk. The affected value is ₱ 5,664,800.00. It is a mix of concrete and gravel, needs minor repairs, and employs hazard-resistant design. • 0.11764 km of provincial road is categorized as moderate risk. The affected value is ₱ 1,176,400.00. It is concrete, in good condition, and employs hazard-resistant design. **LANDSLIDE** ❖ **Barangay Roads** • 0.03061 km of barangay road is at high risk to landslide. The affected value is ₱ 153,050.00. It is		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• concrete, needs minor repairs, and does not employ hazard-resistant design. **ELECTRIC POSTS** **FLOOD** • Electrical posts 31, 32, 33, 34, 35, 36, and 37, made of steel, in good condition and employ hazard resistant design, are exposed to moderate risk of flood. The affected value of each post is ₱ 20,000. **BRIDGE** **FLOOD** • Pandan bridge ▪ 5.13678 linear meters, steel, does not employ hazard-resistant design ▪ Categorized as high risk ▪ Affected value is ₱ 6,900,000.00 ▪ In poor condition All other lifeline utilities not enumerated are at low risk to flood, landslide, and tsunami.		
POBLACION	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.06325 km of barangay road is categorized as moderate risk. The affected value is ₱ 316,250.00. It is concrete and gravel, needs minor repairs, and does not employ hazard-resistant design. • 0.72424 km of barangay road is categorized as moderate risk. The affected value is ₱ 3,621,200.00. It is concrete and gravel, needs minor repairs, and does not employ hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• 0.15970 km of barangay road is categorized as moderate risk. The affected value is ₱ 798,500.00. It is concrete and gravel, needs minor repairs, and does not employ hazard-resistant design. ❖ **Provincial Roads** • 0.28188 km of provincial road is categorized as moderate risk. The affected value is ₱ 2,818,800.00. It is concrete, needs major repairs, and does not employ hazard-resistant design. • 0.05009 km of provincial road is categorized as high risk. The affected value is ₱ 500,900.00. It is concrete and gravel, needs major repairs, and does not employ hazard-resistant design. • 0.24416 km of provincial road is categorized as moderate risk. The affected value is ₱ 2,441,600.00. It is concrete and gravel, needs minor repairs, and does not employ hazard-resistant design. **ELECTRIC POSTS** **FLOOD** • Electrical posts 53, 54, 55, 56, 59, and 60, made of steel, in good condition and employ hazard resistant design, are exposed to moderate risk of flood. The affected value of each post is ₱ 20,000. **BRIDGES** **FLOOD** • Bulangan bridge ▪ Categorized as moderate risk ▪ The affected value is ₱1,467,380.00 ▪ In excellent condition		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• Longa-og bridge ▪ Categorized as high risk ▪ The affected value is ₱1,556,718.00 ▪ In fair condition All other lifeline utilities not enumerated are at low risk to flood, landslide, and tsunami.		
TABUGON	**ROADS** **FLOOD** ❖ **Barangay Roads** • 0.03009 km of barangay road is categorized as moderate risk. The affected value is ₱150,450.00. It is dirt road, in poor condition, and does not employ hazard-resistant design. • 0.23440 km of barangay road is categorized as moderate risk. The affected value is ₱1,172,000.00. It is concrete/dirt road, in good condition, and does not employ hazard-resistant design. • 0.66049 km of barangay road is categorized as moderate risk. The affected value is ₱3,302,450.00. It is concrete/dirt road, in good condition, and does not employ hazard-resistant design. ❖ **Provincial Roads** • 0.09017 km of provincial road is categorized as moderate risk. The affected value is ₱901,700.00. This road is concrete and gravel, in good condition, and employs hazard-resistant design. • 0.12908 km of provincial road is categorized as moderate risk. The affected value is ₱1,290,800.00. This road is concrete and gravel, in good condition, and employs hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• 1.04959 km of provincial road is categorized as high risk. The affected value is ₱10,495,900.00. This road is concrete and gravel, in good condition, and employs hazard-resistant design. **ELECTRIC POSTS** **FLOOD** • Electrical posts 192, 193, 194, 199, 200, 201, 202, 203, 204, and 205, made of steel, in good condition and employ hazard resistant design, are exposed to moderate risk of flood. The affected value of each post is ₱ 20,000. All other lifeline utilities not enumerated are at low risk to flood, landslide, and tsunami.		

v. CRITICAL POINT FACILITIES

Critical point facilities are facilities that provide key socio-economic support services such as schools, hospitals/rural health units, local government buildings, roads, bridges, air/sea ports, communication towers, and power-related and water-related facilities. These facilities are often utilized by the community as evacuation centers in times of calamity.

About 31 facilities are exposed to flood. These facilities are located in barangays Canyayo, Guinbirayan, Guintigbasan, Magsaysay, Mat-i, Pandan, Poblacion, and Tabugon. In addition to that, 81 facilities located in all barangays of the municipality are exposed to landslide. These facilities are necessary in each barangay as they provide different basic social services.

According to the HLURB Guidelines, vulnerability conditions for critical point facilities should focus mainly on the structural design characteristics of buildings and structures. One of the adaptive capacities for critical point facilities is the employment of hazard-resistant design. Out of 80 critical point facilities susceptible to hazards in the municipality, only three (3) are in fair condition while the rest are in good condition. These facilities are Puro Day Care Center, Pandan Foursquare, and Santa Fe Central Elementary School. The first two mentioned facilities are made from light materials and do not employ hazard-resistant design. Unlike the three (3) mentioned facilities, the rest of the facilities in the municipality are in good condition, employ hazard-resistant design, and the wall materials are concrete.

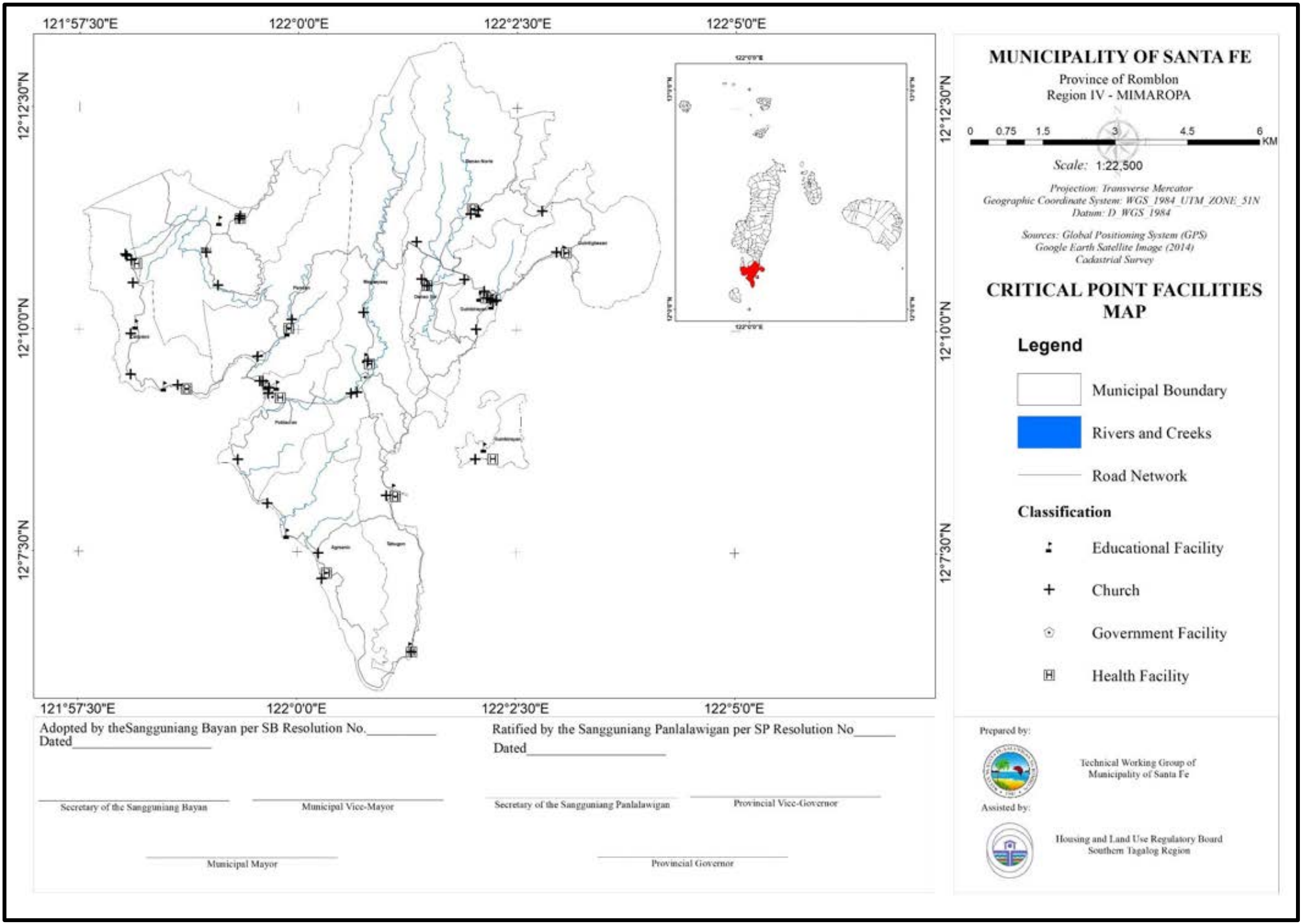
One of the adaptive capacities for critical point facilities is the capacity and willingness to retrofit. Generally for Santa Fe, according to TWG, the owners or the concerned administrators have the capacity to retrofit but are not willing to retrofit. In addition to that, less than or equal to five percent of the facilities are covered by property insurance and infrastructure-related mitigation measures such as sea walls and flood control measures. Furthermore, the local government has moderate capacity to invest in risk management and climate change adaptation or mitigation.

Since the construction of evacuation centers are still going on, the municipality utilizes schools and barangay halls as alternative evacuation centers. In addition to that, the Municipal Disaster Risk Reduction Office has designated households whose houses employ hazard-resistant design to serve as alternative evacuation areas in times of disasters.

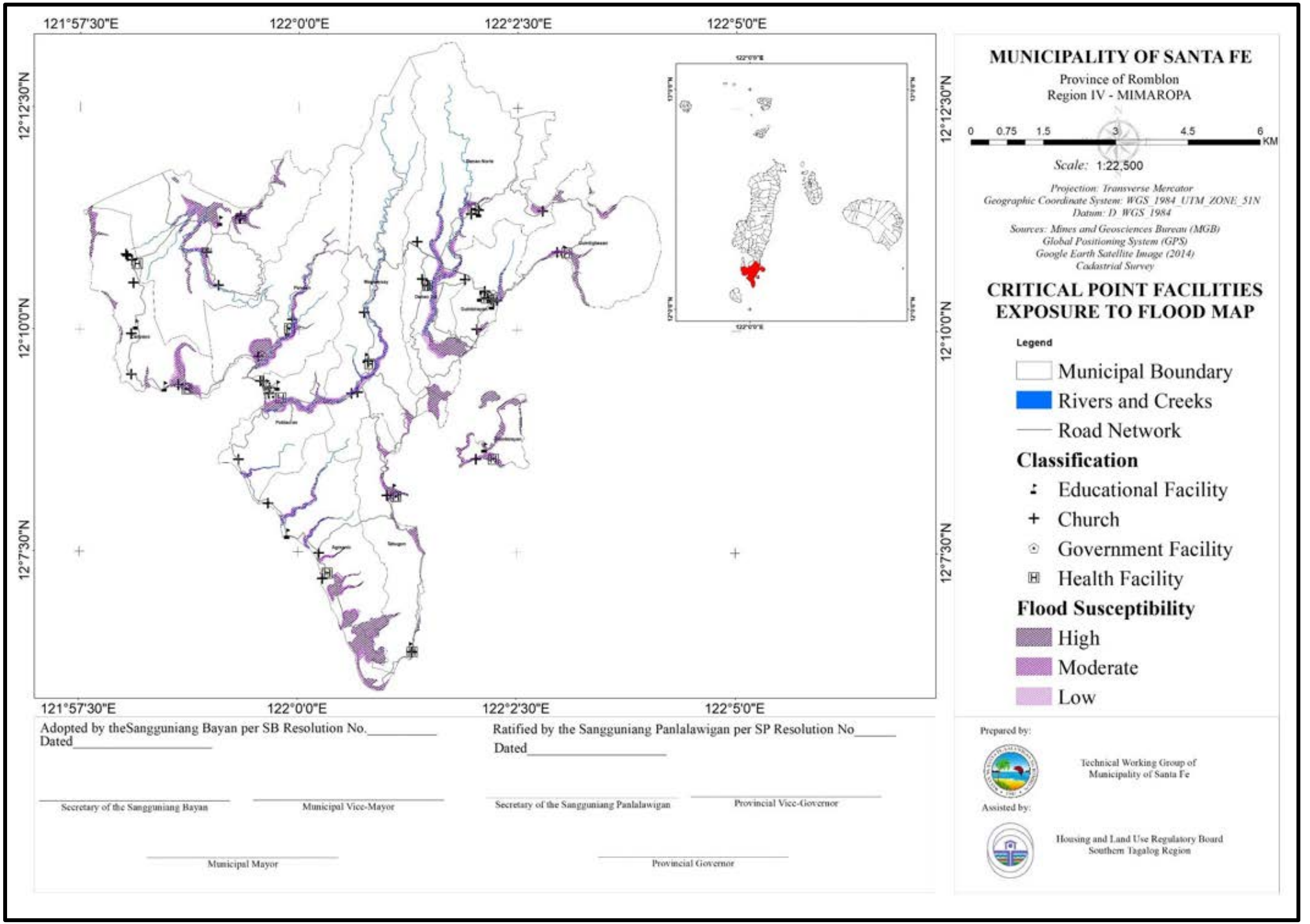
Flood Exposure and Risk

There are 31 facilities exposed to flood in eight (8) barangays of the municipality. These barangays are Canyayo, Guinbirayan, Guintigbasan, Magsaysay, Mat-i, Pandan, Poblacion, and Tabugon. Based on MGB, there are 18 facilities highly susceptible to flood. Facilities with high flood susceptibility have expected flood depth of greater than or equal to one (1) meter. Six (6) of these are churches, six (6) are day care centers, two (2) are health facilities, three are barangay halls, and one (1) is a public plaza. Furthermore, there are 11 facilities that are moderately susceptible to flood. These include three (3) churches, two (2) elementary schools, two (2) day care centers, two (2) health stations and one (1) Rural Health Unit, and one (1) barangay hall. Facilities with moderate susceptibility can expect up to one-meter high of flood. Moreover, three (3) facilities have low susceptibility to flood including one (1) day care center, one (1) barangay hall, and one (1) public plaza.

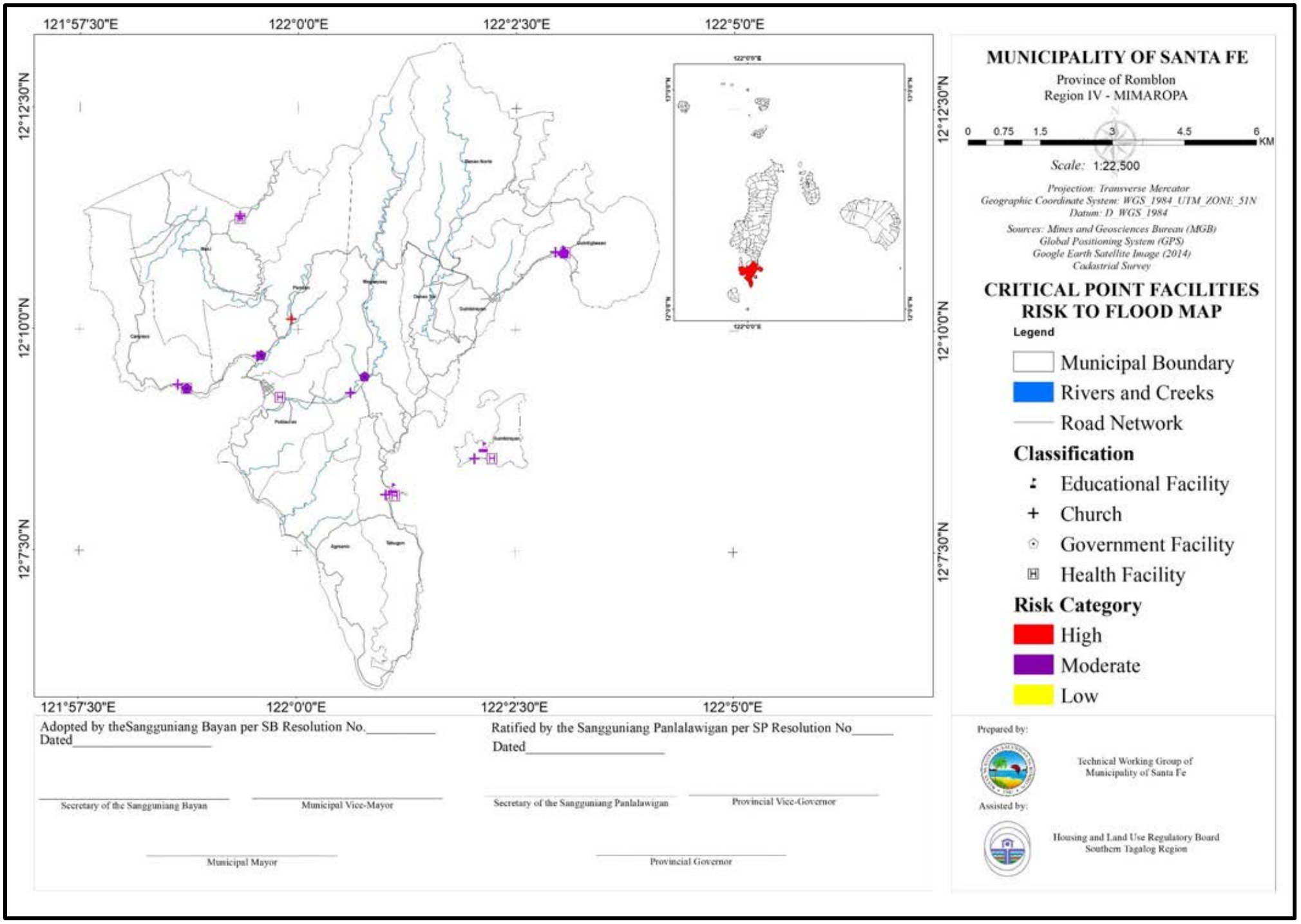
On the other hand, despite having different susceptibility to flood, 30 facilities are categorized with moderate risk to flood while one (1) facility is categorized with high risk to flood. The facility identified to be located in high risk area is Foursquare Church in Pandan. Among these facilities, only Puro Day Care Center and Pandan Foursquare Church are made from light materials, in fair condition, and do not employ hazard-resistant design. The rest of the facilities are made of concrete walls, in good condition, and employ a hazard-resistant design.



Map 40. Critical Point Facilities of Santa Fe, Romblon



Map 41. Critical Point Facilities Exposure to Flood Map of Santa Fe, Romblon

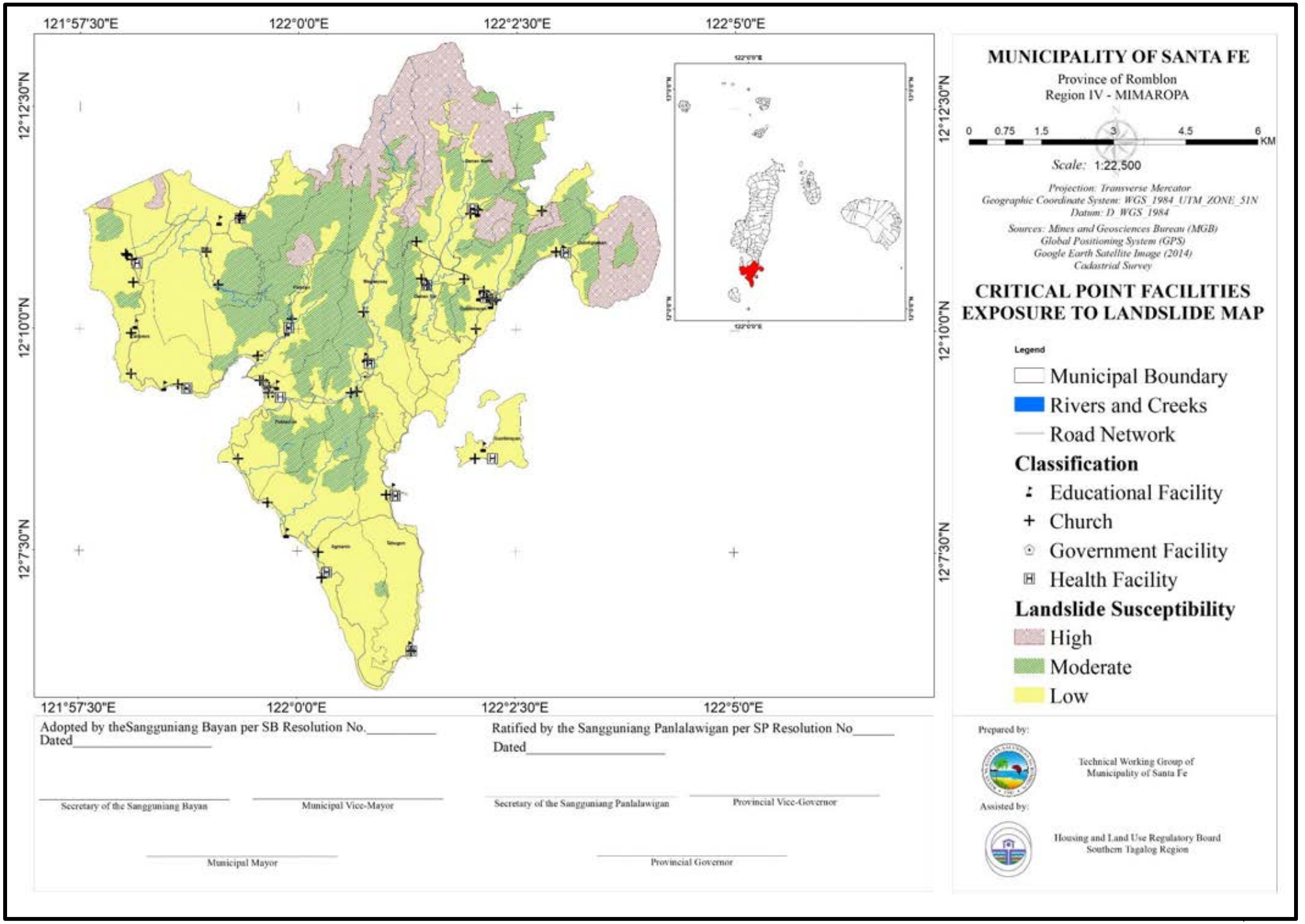


Map 42. Critical Point Facilities Risk to Flood Map of Santa Fe, Romblon

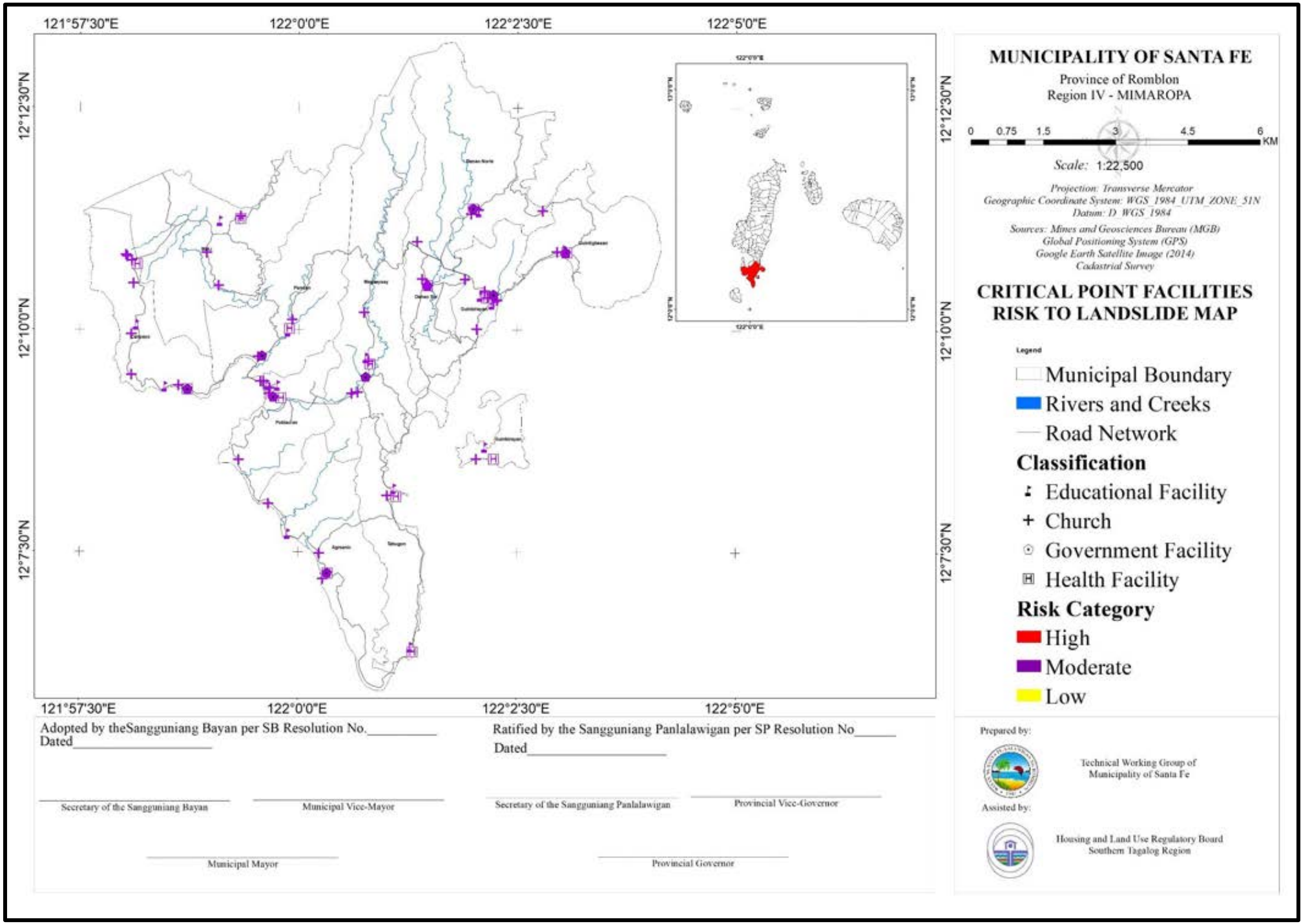
Landslide Exposure and Risk

About 80 facilities are exposed to landslide in all 11 barangays of the municipality. According to landslide susceptibility map of MGB, there are 73 facilities have low susceptibility to landslide. 22 of which are churches, 14 are schools, 12 are day care centers, 12 are health stations, 10 are barangay halls, and three (3) are public plazas. Furthermore, there are six (6) facilities with moderate susceptibility to landslide and three (3) of which are churches, one (1) is a day care center, one (1) is a school and one (1) is a barangay hall. Lastly, only Baptist Church in barangay Danao Norte has high susceptibility to landslide.

However, despite having low, moderate, and high susceptibilities to landslide, all 80 facilities in all 11 barangays are all categorized with moderate risk. Among these facilities, only Puro Day Care Center in Guinbirayan and Foursquare Church in Pandan do not employ hazard-resistant design as these two (2) are made up of light materials. The two mentioned facilities, along with Santa Fe Central Elementary School, are all in fair condition.



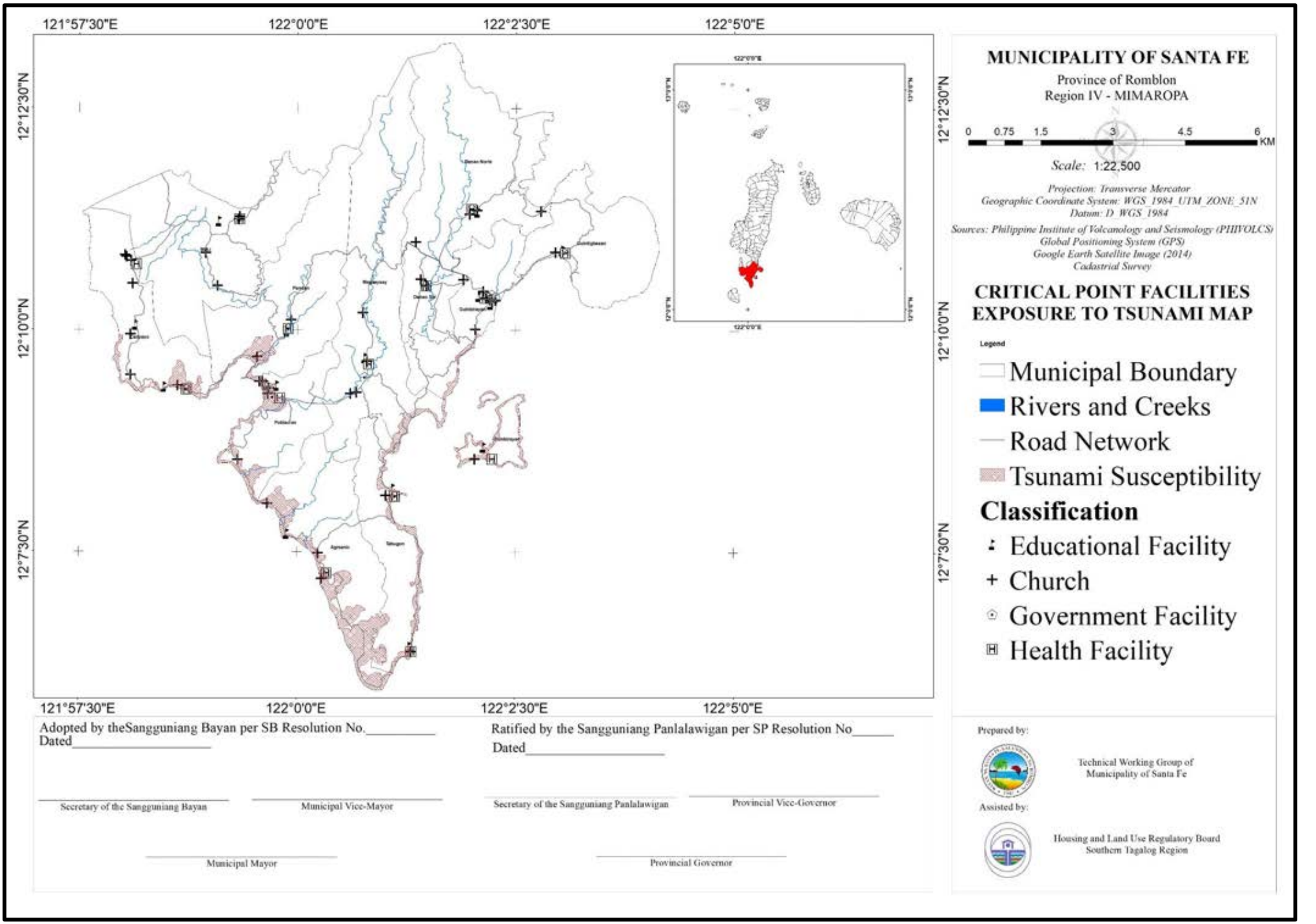
Map 43. Critical Point Facilities Exposure to Landslide Map of Santa Fe, Romblon



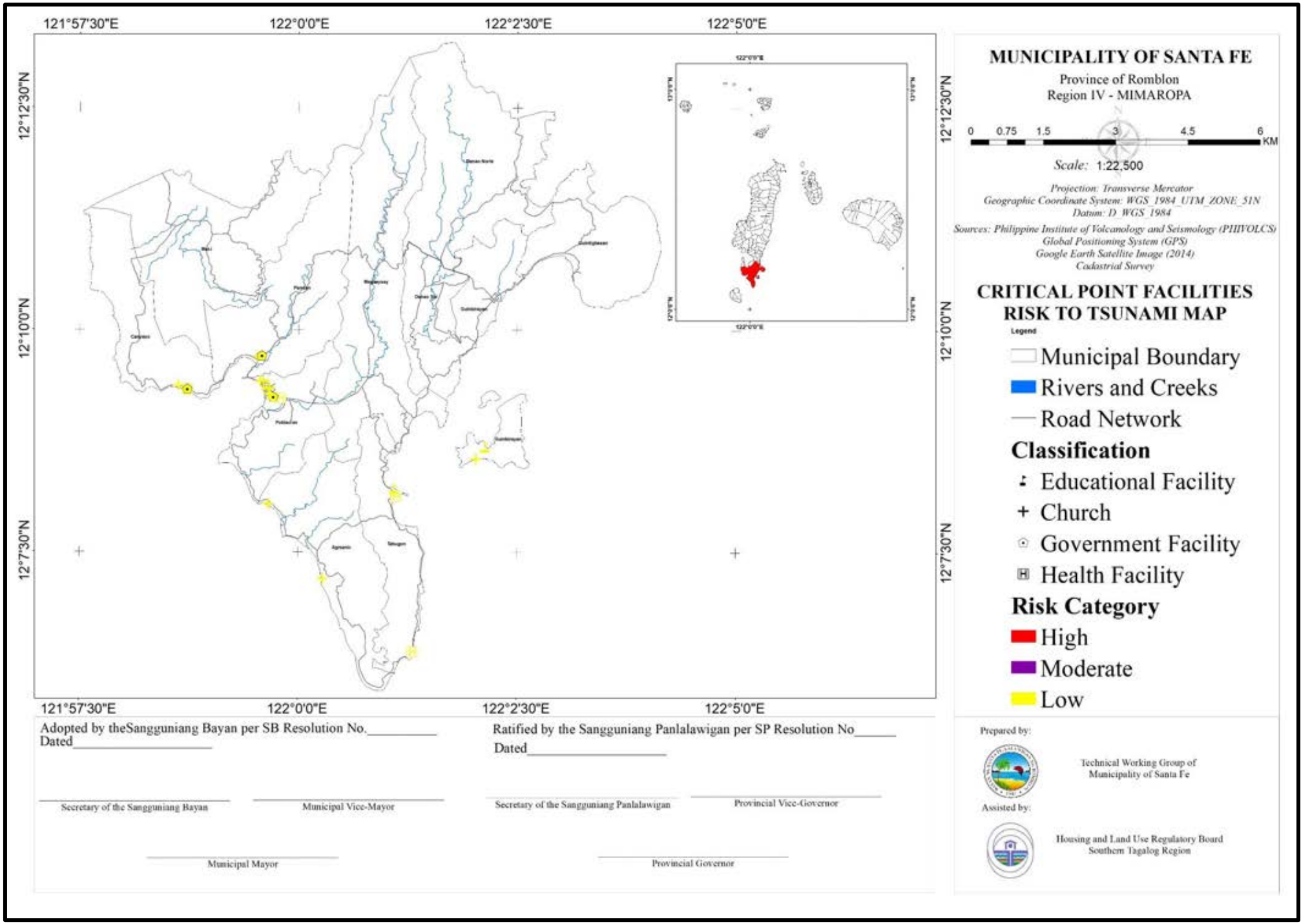
Map 44. Critical Point Facilities Risk to Landslide Map of Santa Fe, Romblon

Tsunami Exposure and Risk

47 facilities from eight (8) barangays are exposed to tsunami. Of these facilities, only Puro Day Care Center is in fair condition and does not employ hazard-resistant design standards while the rest are in good condition with hazard-resistant design standards. In addition to this, the Puro Day Care Center is made up of light materials while the rest are made concrete materials. All of these facilities are at low risk to tsunami.



Map 45. Critical Point Facilities Exposure to Tsunami Map of Santa Fe, Romblon



Map 46. Critical Point Facilities Risk to Tsunami Map of Santa Fe, Romblon

Decision Areas and Policy Interventions

To mitigate negative impacts of climate change to critical point facilities, like the other exposure units, policy interventions were formulated and decision areas were identified. According to risk categories on flood and landslide, Foursquare Church located in Barangay Pandan is at high risk to flood and must therefore be prioritized. In addition to that, there are about 26 critical point facilities that need to be prioritized. These include eight (8) churches, three (3) schools, six (6) day care centers, three (3) health centers, and four (4) barangay halls. The decision areas for flood include Tabugon, Poblacion, Pandan, Guintigbasan, and Guinbirayan while Danao Norte, Mat-i, Poblacion, Guinbirayan, and Tabugon are the decision areas for landslide. The facilities in these barangays are identified to have higher sensitivity and are more exposed to hazards.

Because these facilities also serve as alternative evacuation centers but are exposed to hazards, the policy interventions include construction of evacuation centers or alternative evacuation centers in safe areas not exposed to hazards which must also employ hazard-resistant design.

In addition to that, facilities must be covered with infrastructure-related mitigation measures such as sea walls, and riprap to lessen the damages to facilities caused by hazards. Furthermore, it is recommended that facilities needing urgent assistance must have property insurance. On the other hand, facilities in fair condition must be repaired employing hazard-resistant design standards. With this, there must also be regular monitoring and maintenance check of the facilities. Furthermore, emergency vehicles must also be procured for faster and more efficient rescue missions and other necessary rescue equipment must also be provided for by the Municipal Disaster Risk Reduction Office.

Table 17. Summary Matrix for Critical Point Facilities

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
AGMANIC	**FLOOD** • The critical point facilities are not susceptible to flooding. **LANDSLIDE** • Barangay Hall (64 sqm), Catholic Church (52 sqm), Agmanic Elementary School (504 sqm), Barangay Health Center (36 sqm), Capdang Catholic Church (50 sqm), and Agmanic Baptist Church (50 sqm) are exposed to moderate risk to landslide. • All facilities are concrete, in good condition, and employ hazard-resistant design. • These facilities are not covered with property insurance.	• The critical point facilities, however, cannot be used as evacuation centers when landslide occurs as all facilities are at moderate risk. • Lack of evacuation center or alternative evacuation center. • Covered courts can be utilized as evacuation site provided that these courts are safe from hazards. • There is a need for more evacuation centers since a number of facilities are exposed to hazards, thus, cannot be utilized as evacuation centers • No facility has property insurance • Possible disruption of school activities if schools are utilized as temporary evacuation centers. •	• Construction of evacuation centers in safe areas not exposed to hazards. • Evacuation centers must also employ hazard-resistant design. • Ensure access to infrastructure related mitigation measures. • Open courts can be converted to covered courts that can be utilized as temporary evacuation centers. • Procure emergency vehicle that may be used for quick response. • Repair facilities in poor condition. • Climate proof facilities that are exposed to moderate and high
CANYAYO	**FLOOD** • The Catholic Church (90 sqm), barangay hall, (62 sqm) and health center (15 sqm) are at moderate risk to flooding. • The above-mentioned facilities are all concrete, in good condition, and employ a hazard-resistant design. • Facilities are not covered by property insurance. **LANDSLIDE** • Canyayo Catholic Church (90 sqm), Canyayo Baptist church (56 sqm), Barangay Hall (62 sqm), Lamberto Antaran Memorial School (441 sqm), Canyayo Elementary School (378 sqm), Health Center (15 sqm), Campong Health Center (30 sqm), Lunoc Born Again Church (50 sqm), Lunoc Catholic Church (50 sqm), Campong Catholic Church (52 sqm), Campong Born Again Church (50 sqm), and Campong Christian Church (50 sqm) are at		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• The materials of the above-mentioned facilities are all concrete, in good condition, and employ a hazard-resistant design. • Facilities are not covered with property insurance.	▪ Possible disruption of social services provided by facilities	• risks of flood and landslide. • Ensure that all facilities are disaster resilient and employ hazard-resistant design standards. • Facilities needing urgent assistance must have property insurance. • Regular monitoring and maintenance check of the facilities must be conducted. • Project design must integrate property insurance. • Retrofit and apply mitigation measures for existing • Upcoming projects must secure building permit, clearances, locational clearances, etc.
DANAO NORTE	**FLOOD** • The critical facilities of Danao Norte are not susceptible to flooding and tsunami. **LANDSLIDE** • Baptist church (30 sqm), Barangay hall (78 sqm), Catholic Church (50 sqm), Danao Norte Elementary School (378 sqm), Foursquare Church (72 sqm), Health Center (15 sqm), and Seventh Day Adventist (21 sqm) are at moderate risk to landslide. • These facilities are all concrete, in good condition, and employ a hazard-resistant design		
DANAO SUR	**FLOOD** • The critical point facilities are not exposed to flooding. **LANDSLIDE** • Barangay hall (36 sqm), Catholic Church (40 sqm), Danao Sur Elementary (504 sqm), Foursquare Church (48 sqm), and Health Center (9 sqm) are at moderate risk to landslide. All facilities are concrete, employ a hazard-resistant design, no property insurance, and in good condition.		
GUINBIRAYAN	**FLOOD** • Puro Catholic Church (40 sqm), Puro Barangay Health Station (42 sqm), and Vicente Antaran Montiel Memorial School (452 sqm) are moderately at risk to flooding. • These facilities are in good condition, concrete, and employ a hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	• These facilities are all exposed to flood depth of greater than or equal to one (1) meter. **LANDSLIDE** • Catholic Church (180 sqm), Baptist church (120 sqm), barangay hall (70 sqm), Puro Catholic Church (40 sqm), Guinbirayan Elementary School (945 sqm), Foursquare Church (45 sqm), Vicente Antaran Montiel Memorial School (452 sqm), Puro Health Station (42 sqm), Health Center (32 sqm), Guinbirayan National High School (1071 sqm), Philippine Independent Church (52 sqm), Guinbirayan Good News Church (52 sqm), and True Vine Gospel Church are at moderate risk to landslide (52 sqm). • All above-mentioned critical point facilities are concrete, in good condition, and employ a hazard-resistant design. These facilities are also not covered		• All types of structure, regardless of proponent, must secure necessary government clearances/ permits
GUINTIGBASAN	**FLOOD** • Guintigbasan Catholic Church (96 sqm), Guintigbasan Barangay Hall (32 sqm), Guintigbasan Elementary School (693 sqm), and Health Center (30 sqm) are at moderate risk to flood. • These facilities are all exposed to flood depth of greater than or equal to one (1) meter • These facilities are concrete, in good condition, and employ a hazard-resistant design. **LANDSLIDE** • Critical Point Facilities at moderate risk to landslide include Barangay Hall (52 sqm), Catholic Church (96 sqm), Guintigbasan Elementary School (693 sqm), and Health Center (30 sqm).		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
MAGSAYSAY	**FLOOD** • Barangay Hall (60 sqm) and Magsaysay Kingdom of God (64 sqm) are at moderate risk to flood. • These are exposed to flood depth of one (1) meter high. • These are concrete, in good condition, and employ hazard-resistant design. **LANDSLIDE** • Baptist Church (60 sqm), Barangay Hall (60 sqm), Catholic Church (60 sqm), Magsaysay Elementary School (504 sqm), Health Center (20 sqm), Magsaysay Kingdom of God (50 sqm), and Iglesia ni Cristo (50 sqm) are all at moderate risk to landslide. • Landslide has likelihood of occurrence of three (3). These facilities are all concrete, in good condition, and employ a hazard-resistant design.		
MAT-I	**FLOOD** • Health Center (30 sqm), Catholic Church (48 sqm) are at moderate risk to flood. • These are exposed to flood depth of greater than or equal to one (1) meter high. • These are concrete, in good condition, and employ hazard-resistant design. **LANDSLIDE** • Barangay Hall (30 sqm), Catholic Church (70 sqm), Health Center (30 sqm), Foursquare Church (50 sqm), Mat-i Elementary School (943 sqm), Iglesia ni Cristo (50 sqm), and Mat-i Catholic Church are all at moderate risk to landslide. • Landslide has likelihood of occurrence of three (3). • These facilities are all concrete, in good condition, and employ a hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
PANDAN	**FLOOD** • Pandan Barangay Hall (50 sqm), Pandan Saint Joseph Chapel (72 sqm), and Foursquare Church (80 sqm) are at moderate risk to flood. • These facilities are exposed to flood depth of greater than one (1) meter high. • These are concrete, in good condition, and employ hazard-resistant design except for Pandan Foursquare Church which is made of light materials. **LANDSLIDE** • Foursquare Church (35 sqm), Barangay Hall (50 sqm), Saint Joseph Chapel (72 sqm), Pandan Elementary School (567 sqm), Pandan Health Center (30 sqm), and Barangay Hall (new; 50 sqm) are at moderate risk to landslide. • Landslide has likelihood of occurrence of three (3). • All facilities, except for Foursquare Church, are all concrete, in good condition, and employ a hazard-resistant design. • Foursquare Church is made of light materials, in good		
POBLACION	**FLOOD** • Only Rural Health Unit (440 sqm) is at moderate risk to flood. • This facility is exposed to flood depth of (one) 1 meter high. • Flooding has likelihood of occurrence of three (3). • These are concrete, in good condition, and employ hazard-resistant design.		

DECISION AREA	TECHNICAL FINDINGS	IMPLICATIONS	POLICY INTERVENTIONS
	LANDSLIDE • Assembly of God (96 sqm), Baptist Church (104 sqm), Barangay Hall (49 sqm), Catholic Church (508 sqm), Seventh Day Adventist (84 sqm), Rural Health Unit (440 sqm), Santa Fe National High School (1,260 sqm), Santa Fe Central Eementary School (1595 sqm), and Tipolo Catholic Church (50 sqm) are at moderate risk to landslide. • Landslide has likelihood of occurrence of three (3). • All of the above-mentioned facilities are all concrete, in good condition, and employ a hazard-resistant design		
TABUGON	**FLOOD** • Barangay Hall (48sqm), Tabugon Elementary School (567 sqm), Tabugon Health Center (52 sqm), and Tabugon Catholic Church (50 sqm) are at moderate risk to flood. • All of these facilities are exposed to flood depth of greater than one (1) meter. • Flooding has likelihood of occurrence of five (5). • These facilities are concrete, in good condition, and employ hazard-resistant design. (Tabugon has a covered court.) **LANDSLIDE** • Baptist Church (48 sqm), Barangay Hall (48 sqm), Tabugon Elementary School (567 sqm), Guinpoingan Health Center (52 sqm), Guinpoingan Elementary (378 sqm), Health Center (34 sqm), and Tabugon Catholic Church (50 sqm) are at moderate risk to landslide. • Landslide has likelihood of occurrence of three (3). • All of the above-mentioned facilities are all concrete, in good condition, and employ a hazard-resistant design. (Tabugon has a covered court.)		

SUMMARY AND CONCLUSION

APPENDICES

Appendix Table 1. Population Severity of Consequence Score Matrix

CRITERIA			LOW (1-1.99)	MODERATE (2-2.99)	HIGH (3-3.99)	VERY HIGH (4)
EXPOSURE	**Are there significant number of population affected by hazard?**	what is the percentage of the population affected by hazard?	≤ 5% of the total population are affected	>5%-10% of the total population affected	>10 - <20% of the total population are affected	≥20% of the population of the total population are affected
	Exposure Average Score					
VULNERABILITY (SENSITIVITY)	**Are there significant number of population or Households in need of assistance?**	Percentage of informal settlers	≤ 5% of the affected HH are informal settlers	>5%-10% of the affected HH are informal settlers	>10 - <20% of the affected HHs are informal settlers	≥20% of the affected HHs are informal settlers
		Percentage living in dwelling units with walls made from light materials	≤ 5% of the affected HH are living in dwelling units made from light materials	>5%-10% of the affected HH are living in dwelling units made from light materials	>10 - <20% of the affected HH are living in dwelling units made from light materials	≥20% of the affected HH are living in dwelling units made from light materials
		Percentage below the Poverty Threshold	≤ 5% of the affected HH are below poverty threshold	>5%-10% of the affected HH are below poverty	>10 - <20% of the affected HH are below poverty threshold	≥20% of the affected HH are below poverty threshold

				threshold		
		Percentage of young and old dependents	≤ 5% of the total affected population belongs to age-bracket 0-5 and 65 years and over	>5%-10% of the total affected population belongs to age-bracket 0-5 and 65 years and over	>10 - <20% of the total affected population belongs to age-bracket 0-5 and 65 years and over	≥20% of the total affected population belongs to age-bracket 0-5 and 65 years and over
		Percentage Malnourished Individuals	≤ 5% of the total affected population are malnourished	>5%-10% of the total affected population are malnourished	>10 - <20% of the total affected population are malnourished	≥20% of the total affected population are malnourished
	(Sensitivity Indicator) Vulnerability Average Score					
			(1-1.99)	**(2-2.99)**	**(3-3.99)**	**(4)**
			VERY HIGH	**HIGH**	**MODERATE**	**LOW**
VULNERABILITY (Adaptive Capacity)	**Are there any existing intervention to assist the affected population or households?**	Access to infrastructure-related mitigation measures (IRMM) like evacuation centers	≥20% of the affected HHs have access to IRMM	>10 - <20% of the affected HHs have access to IRMM	>5%-10% of the affected HHs have access to IRMM	≤ 5% of the affected HHs have access to IRMM
		Access to financial assistance	≥20% of the affected Population have access to financial assistance	>10 - <20% of the affected Population have access to financial assistance	>5%-10% of the affected Population have access to financial assistance	≤ 5% of the affected Population have access to financial assistance
		Capacity and willingness to retrofit t or relocate	≥20% of the affected HHs have the	>10 - <20% of the affected HHs have	>5%-10% of the affected HHs have the	≤ 5% of the affected HHs have the Capacity

			Capacity and willingness to retrofit or relocate	the Capacity and willingness to retrofit or relocate	Capacity and willingness to retrofit or relocate	and willingness to retrofit or relocate
		Access to information	≥20% of the affected HHs have access to climate, climate change and hazards-related information affecting the area	>10 - <20% of the affected HHs have access to climate, climate change and hazards-related information affecting the area	>5%-10% of the affected HHs have access to climate, climate change and hazards-related information affecting the area	≤ 5% of the affected HHs have access to climate, climate change and hazards-related information affecting the area
		Government investments	Local government have very high capacity to invest in risk management and climate change adaptation/ mitigation	Local government have high capacity to invest in risk management and climate change adaptation/ mitigation	Local government moderate capacity to invest in risk management and climate change adaptation / mitigation	Local government low capacity to invest in risk management and climate change adaptation / mitigation
	(Adaptive Capacity Indicator) Vulnerability Average Score					
	Severity of Consequence Score for Affected Population					

Appendix Table 2. Natural Resource-Based Production Areas Severity of Consequence Score Matrix

CRITERIA	LOW	MODERATE	HIGH	VERY HIGH

			(1-1.99)	(2-2.99)	(3-3.99)	(4)
EXPOSURE	**Are there significant areas affected by hazard?**	percentage of areas affected by hazard	≤5% of total production areas are affected	>5 to10% of total production areas are affected	>10-20% of total production areas are affected	≥20% of total production areas are affected
	How much is the estimated lost?	Estimated Lost based on Production	≤500,000 of total production areas are affected	>500,000-1M-	>1 M-2M	>2M
		-Crops				
		-Fishpond				
		-livestock and poultry				
	What is the percentage of dependent HH?	Percentage of HHs dependent in the affected areas	≤5% of the total HHs are dependent in the affected areas	>5 to10% of the total HHs are dependent in the affected areas	>10-20% of the total HHs are dependent in the affected areas	≥20% of the total HHs are dependent in the affected areas
VULNERABILITY (SENSITIVITY)	**Exposure Average Score**					
	What is the condition of the production areas?	Irrigation Coverage	≤5% of affected production areas have access to irrigation	>5 to10% of affected production areas have access to irrigation	>10-20% of affected production areas have access to irrigation	≥20% of affected production areas have access to irrigation
		Application of sustainable production techniques/methods by dependent households	≤5% of HHs are employing sustainable production methods	>5 to10% of HHs are employing sustainable production methods	>10-20% of HHs are employing sustainable production methods	≥20% of HHs are employing sustainable production methods
	(Sensitivity Indicator) Vulnerability Average Score					
			(1-1.99)	**(2-2.99)**	**(3-3.99)**	**(4)**
			VERY HIGH	**HIGH**	**MODERATE**	**LOW**

VULNERABILITY (Adaptive Capacity)	**Are there any existing interve ntion to assist or to protect the affected areas?**	Access to hazard mitigation measures/struc tures (i.e. seawall, flood control, slope stabilization…)	≥20% Percentage of areas are protected/co vered by mitigation measures	>10 - <20% Percentage of areas are protected/co vered by mitigation measures	>5%-10% Percentage of areas are protected/c overed mitigation measures	≤ 5% Percentage of areas are protected/c overed by mitigation measures
		Access to insurance system	≥20% of affected areas are covered by post disaster economic protection	>10 - <20% of affected areas are covered by post disaster economic protection	>5%-10%of affected areas are covered by post disaster economic protection	≤ 5% of affected areas are covered by post disaster economic protection
		Alternative Livelihood	≥20% of the affected HHs have the Capacity and willingness to retrofit or relocate	>10 - <20% of the affected HHs have the Capacity and willingness to retrofit or relocate	>5%-10% of the affected HHs have the Capacity and willingness to retrofit or relocate	≤ 5% of the affected HHs have the Capacity and willingness to retrofit or relocate
		Percentage of the population engaged in production who attended climate field school	≥20% of Families dependent to affected areas attended climate field school	>10 - <20% of Families dependent to affected areas attended climate field school	>5%-10% of Families dependent to affected areas attended climate field school	≤ 5% of Families dependent to affected areas attended climate field school
		Access to information	≥20% of the affected HHs have access to climate, climate change and hazards-related information affecting the area	>10 - <20% of the affected HHs have access to climate, climate change and hazards-related information affecting the area	>5%-10% of the affected HHs have access to climate, climate change and hazards-related information affecting the area	≤ 5% of the affected HHs have access to climate, climate change and hazards-related information affecting the area

		Institutional financial and technical capacity to provide local agriculture and forestry based extension programs (technology and knowledge transfer related to climate change proofed production)	≥20%	>10 - <20%	>5%-10%	≤ 5%
	(Adaptive Capacity Indicator) Vulnerability Average Score					
	Severity of Consequence Score for Affected Production Areas					

Appendix Table 3. Urban Used Areas Severity of Consequence Score Matrix

CRITERIA			**LOW (1-1.99)**	**MODERATE (2-2.99)**	**HIGH (3-3.99)**	**VERY HIGH (4)**
EXPOSURE	**Are there significant areas affected by hazard?**	percentage of areas affected by hazard	≤10% of nonresidential structures are affected or ≤5% of residential structures are affected	>10 to 20% of non-residential structures are affected or >5 to10% of residential structures are affected	>20 to <40% of non-residential structures are affected or >10-20% of residential structures are affected	≥ 40% of nonresidential structures are affected or ≥20% of residential structures are affected
	What is the value for replacement?	replacement value of affected area.	replacement value is 100,000-500,000 per dwelling unit	replacement value is >500,000 but less than 1m per dwelling unit	replacement value is >1m but less than 2m per dwelling unit	replacement value is more than 2m
	Exposure Average Score					
VULNERABILIT	**What is the condition of the affected**	Proportion of dwelling units made of light materials or salvageable materials	≤5% of residential Structures are made of light materials	>5 to10% of residential Structures are made of light materials	>10-20% of residential Structures are made of light materials	≥20% of residential Structures are made of light materials

	structures?	Proportion of residential buildings in dilapidated/condemned Condition	≤5% of residential buildings or structures are dilapidated/condemned	>5 to10%of residential buildings or structures are dilapidated/condemned	>10-20% of residential buildings or structures are dilapidated/condemned	≥20% of residential buildings or structures are dilapidated/condemned
		Structure employing hazard mitigation design	≤5% of structures employing site preparation, hazard resistant and/ or climate proofed design standards	>5 to10% of structures employing site preparation, hazard resistant and/ or climate proofed design standards	>10-20% of structures employing site preparation, hazard resistant and/ or climate proofed design standards	≥20% of structures employing site preparation, hazard resistant and/ or climate proofed design standards
	(Sensitivity Indicator) Vulnerability Average Score					
			(1-1.99)	**(2-2.99)**	**(3-3.99)**	**(4)**
			VERY HIGH	**HIGH**	**MODERATE**	**LOW**
VULNERABILITY (Adaptive Capacity)	**Are there any existing intervention to assist or to protect the affected areas?**	Area coverage to infrastructure related mitigation measures	≥20% Percentage of areas are covered by infrastructure-related mitigation measures (i.e. sea walls, flood control measures)	>10 - <20% Percentage of areas covered by infrastructure-related mitigation measures (i.e. sea walls, flood control measures)	>5%-10% Percentage of areas covered by infrastructure-related mitigation measures (i.e. sea walls, flood control measures)	≤ 5% Percentage of areas covered by infrastructure-related mitigation measures (i.e. sea walls, flood control measures)
		Capacity and willingness to retrofit t or relocate	≥20% of the affected HHs have the Capacity and willingness to retrofit or relocate	>10 - <20% of the affected HHs have the Capacity and willingness to retrofit or relocate	>5%-10% of the affected HHs have the Capacity and willingness to retrofit or relocate	≤ 5% of the affected HHs have the Capacity and willingness to retrofit or relocate
		Percentage of structures covered by property insurance	≥20% of the structures are covered by property insurance	>10 - <20% of the structures are covered by property insurance	>5%-10% of the structures are covered by property insurance	≤ 5% of the structures are covered by property insurance

		Government investments	Local government have very high capacity to invest in risk management and climate change adaptation/ mitigation	Local government have high capacity to invest in risk management and climate change adaptation/ mitigation	Local government moderate capacity to invest in risk management and climate change adaptation/ mitigation	Local government low capacity to invest in risk management and climate change adaptation/ mitigation
		Available alternative sites	The LGU owns an alternative residential site integrated in the CLUP and Local Shelter Plan	The LGU has identified an alternative residential site integrated in the CLUP and Local Shelter Plan with funding for acquisition	The LGU has identified alternative residential sites integrated in the CLUP and Local Shelter Plan and looking for funding source for acquisition	The LGU has identified alternative residential sites integrated in the CLUP and Local Shelter Plan
		Presence and adherence to government regulations on hazard mitigation and structural design standards	Local government is implementing existing regulations on hazard mitigation and structural design and monitors compliance thereof	Local government is implementing existing regulations on hazard mitigation and structural design	Local government has existing regulations on hazard mitigation and structural design	Local government has no regulations on hazard mitigation and structural design
	(Adaptive Capacity Indicator) Vulnerability Average Score					
	Severity of Consequence Score for Affected Urban Areas					

Appendix Table 4. Lifeline Utilities Severity of Consequence Score Matrix

CRITERIA			LOW (1-1.99)	MODERATE (2-2.99)	HIGH (3-3.99)	VERY HIGH (4)
EXPOSURE	**Are there significant areas affected by hazard?**	percentage of structures affected by hazard	≤10% of structure is affected	>10 to 20% of structure is affected	>20 to <40% of structure is affected	≥ 40% of structure is affected by hazard
	What is the value for replacement?	replacement value per sq.m. or construction value	replacement value is 100,000-500,000 per dwelling unit	replacement value is >500,000 but less than 1m per dwelling unit	replacement value is >1m but less than 2m per dwelling unit	replacement value is more than 2m
	Exposure Average Score					
VULNERABILITY (SENSITIVITY)	**What is the condition of the affected structures?**	Condition	Excellent	Good	Fair	Poor/Condemned
		Date of construction	Constructed in 2000 onwards & employing hazard resistant and/or climate proofed design standards	constructed in 1990s & employing hazard resistant and/or climate proofed design standards	constructed in 1980s & employing hazard resistant and/or climate proofed design standards	constructed in 1970s & employing hazard resistant and/or climate proofed design standards
		Structure employing hazard mitigation design				
	(Sensitivity Indicator) Vulnerability Average Score					
			(1-1.99)	**(2-2.99)**	**(3-3.99)**	**(4)**
			VERY HIGH	**HIGH**	**MODERATE**	**LOW**
		Percentage of structures covered by property insurance	>20% property insurance coverage	>10 - <20% property insurance coverage	>5%-10% property insurance coverage	≤ 5% property insurance coverage

		Government investments	Local government have very high capacity to invest in risk management and climate change adaptation/ mitigation	Local government have high capacity to invest in risk management and climate change adaptation/ mitigation	Local government moderate capacity to invest in risk management and climate change adaptation / mitigation	Local government low capacity to invest in risk management and climate change adaptation/ mitigation
		Presence and adherence to government regulations on hazard mitigation and structural design standards	Local government is implementing existing regulations on hazard mitigation and structural design and monitors compliance thereof	Local government is implementing existing regulations on hazard mitigation and structural design	Local government has existing regulations on hazard mitigation and structural design	Local government has no regulations on hazard mitigation and structural design
	(Adaptive Capacity Indicator) Vulnerability Average Score					
	Severity of Consequence Score for Affected Lifeline Utilities					

Appendix Table 5. Critical Point Facilities Severity of Consequence Score Matrix

CRITERIA			**LOW (1-1.99)**	**MODERATE (2-2.99)**	**HIGH (3-3.99)**	**VERY HIGH (4)**
EXPOSURE	**Are there significant areas affected by hazard?**	percentage of structures affected by hazard	≤10% of structure is affected	>10 to 20% of structure is affected	>20 to <40% of structure is affected	≥ 40% of structure is affected by hazard
	What is the value for	replacement value per sq.m. or construction value	replacement value is 100,000-500,000 per dwelling unit	replacement value is >500,000 but less than 1m	replacement value is >1m but less than 2m per dwelling unit	replacement value is more than 2m

	replacement?			per dwelling unit		
	Exposure Average Score					
VULNERABILITY (SENSITIVITY)	**What is the condition of the affected structures?**	Proportion of the structure are made of light materials or salvageable materials	≤5% of Structure is made of light materials	>5 to10% of Structure is made of light materials	>10-20% of Structure is made of light materials	≥20% of structure made of light materials
		Proportion of the structure is in dilapidated/condemned Condition	≤5% of the structures is dilapidated/condemned	>5 to10% of the structure is dilapidated/condemned	>10-20% of the structure is dilapidated/condemned	≥20% of the structure is dilapidated/condemned
		Date of construction	Constructed in 2000 onwards & employing hazard resistant and/or climate proofed design standards	constructed in 1990s & employing hazard resistant and/or climate proofed design standards	constructed in 1980s & employing hazard resistant and/or climate proofed design standards	constructed in 1970s & employing hazard resistant and/or climate proofed design standards
		Structure employing hazard mitigation design				
	(Sensitivity Indicator) Vulnerability Average Score					
			(1-1.99)	**(2-2.99)**	**(3-3.99)**	**(4)**
			VERY HIGH	**HIGH**	**MODERATE**	**LOW**
		Capacity and willingness to retrofit or relocate	The owner or concerned administrator has a plan, capacity and willingness to retrofit	The owner or concerned administrator has the capacity to retrofit but no plan yet	The owner or concerned administrator has capacity to retrofit but not willing to retrofit	No capacity to retrofit
		Percentage of structures covered by property insurance	>20% property insurance coverage	>10 - <20% property insurance coverage	>5%-10% property insurance coverage	≤ 5% property insurance coverage

		Government investments	Local government have very high capacity to invest in risk management and climate change adaptation/ mitigation	Local government have high capacity to invest in risk management and climate change adaptation/ mitigation	Local government moderate capacity to invest in risk management and climate change adaptation/ mitigation	Local government low capacity to invest in risk management and climate change adaptation/ mitigation
		Presence and adherence to government regulations on hazard mitigation and structural design standards	Local government is implementing existing regulations on hazard mitigation and structural design and monitors compliance thereof	Local government is implementing existing regulations on hazard mitigation and structural design	Local government has existing regulations on hazard mitigation and structural design	Local government has no regulations on hazard mitigation and structural design
	(Adaptive Capacity Indicator) Vulnerability Average Score					
	Severity of Consequence Score for Affected Critical Point Facilities					

Source: Supplemental Guidelines on Mainstreaming Disaster Risk Reduction and Climate Change Adaptation in the Comprehensive Land Use Plan, HLURB,2015.

Appendix Table 6. Population Risk Table (flood)

Barangay	Flood Susceptibility	Severity of Consequence Score	Likelihood of Occurrence Score	RISK SCORE	RISK CATEGORY
Agmanic	HIGH	2.708334	5	13.54167	MODERATE
	MODERATE	2.958333	3	8.874999	MODERATE
	LOW	3.208332	3	9.624996	MODERATE
Canyayo	HIGH	2.41667	5	12.08335	MODERATE
	MODERATE	2.08333	3	6.24999	MODERATE
	LOW	2.91667	3	8.75001	MODERATE
Danao Norte	HIGH	2.312499	5	11.562495	MODERATE
	LOW	2.312499	3	6.937497	MODERATE
Danao Sur	HIGH	2.33333	5	11.66665	MODERATE
	MODERATE	2.36111	3	7.08333	MODERATE

Barangay	Flood Susceptibility	Severity of Consequence Score	Likelihood of Occurrence Score	RISK SCORE	RISK CATEGORY
	LOW	2.27778	3	6.83334	MODERATE
Guinbirayan	HIGH	2.58333	5	12.91665	MODERATE
	MODERATE	2.0625	3	6.1875	MODERATE
	LOW	2.562501	3	7.687503	MODERATE
Guintigbasan	HIGH	2.333334	5	11.66667	MODERATE
	MODERATE	2.583333	3	7.749999	MODERATE
	LOW	2.708334	3	8.125002	MODERATE
Magsaysay	HIGH	1.958334	5	9.79167	MODERATE
	MODERATE	1.958334	3	5.875002	MODERATE
	LOW	2.208333	3	6.624999	MODERATE
Mat-i	HIGH	2.645832	5	13.22916	MODERATE
	MODERATE	1.958334	3	5.875002	MODERATE
Pandan	HIGH	2.895834	5	14.47917	MODERATE
	MODERATE	2.645832	3	7.937496	MODERATE
	LOW	2.895834	3	8.687502	MODERATE
Poblacion	HIGH	2.4375	5	12.1875	MODERATE
	MODERATE	2.395833	3	7.187499	MODERATE
	LOW	2.395833	3	7.187499	MODERATE
Tabugon	HIGH	2.645832	5	13.22916	MODERATE
	MODERATE	2.645832	3	7.937496	MODERATE
	LOW	2.645832	3	7.937496	MODERATE

Appendix Table 7. Population Risk Table (landslide)

Barangay	Landslide Susceptibility	Severity of Consequence Score	Likelihood of Occurrence Score	RISK SCORE	RISK CATEGORY
Agmanic	LOW	2.68056	3	8.04168	MODERATE
Canyayo	MODERATE	2.68056	3	8.04168	MODERATE
	LOW	2.68056	3	8.04168	MODERATE
Danao Norte	MODERATE	2.65972	3	7.97916	MODERATE
	LOW	2.74306	3	8.22918	MODERATE
Danao Sur	MODERATE	2.49306	3	7.47918	MODERATE
	LOW	2.74306	3	8.22918	MODERATE
Guinbirayan	MODERATE	2.38889	3	7.16667	MODERATE

Barangay	Landslide Susceptibility	Severity of Consequence Score	Likelihood of Occurrence Score	RISK SCORE	RISK CATEGORY
	LOW	2.63889	3	7.91667	MODERATE
Guintigbasan	MODERATE	2.68056	3	8.04168	MODERATE
	LOW	2.70138	3	8.10414	MODERATE
Magsaysay	MODERATE	2.59722	3	7.79166	MODERATE
	LOW	2.61806	3	7.85418	MODERATE
Mat-i	MODERATE	2.59722	3	7.79166	MODERATE
	LOW	2.68056	3	8.04168	MODERATE
Pandan	HIGH	2.51389	5	7.54167	MODERATE
	MODERATE	2.65972	3	7.97916	MODERATE
	LOW	2.63889	3	7.91667	MODERATE
Poblacion	MODERATE	2.34028	3	7.02084	MODERATE
	LOW	2.61111	3	7.83333	MODERATE
Tabugon	LOW	2.65972	3	7.97916	MODERATE

Appendix Table 8. Population Risk Table (tsunami)

Barangay	Likelihood of Occurrence Score	Severity of Consequence Score	Risk Score	Risk Category
Agmanic	2	2.68056	5.36112	LOW
Guinbirayan	2	2.43056	4.86112	LOW
Pandan	2	2.70139	5.40278	LOW
Poblacion	2	2.59028	5.18056	LOW
Tabugon	2	2.45139	4.90278	LOW

Appendix Table 9. Natural Resource-Based Production Areas Risk Table (flood)

Barangay	Dominant Crop	Flood Susceptibility	Likelihood of Occurrence Score	Severity of Consequence	RISKZ SCORE	RISK CATEGORY
AGMANIC	FRUIT BEARING TREES	HIGH	5	1.5000	7.5000	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.5000	4.5000	MODERATE
	FRUIT BEARING TREES	LOW	3	1.5000	4.5000	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.5000	7.5000	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.5000	4.5000	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.5000	4.5000	MODERATE
	FISH PONDS	HIGH	5	1.5000	7.5000	MODERATE
	FISH PONDS	MODERATE	3	1.5000	4.5000	MODERATE
	FISH PONDS	LOW	3	1.5000	4.5000	MODERATE
CANYAYO	FRUIT BEARING TREES	HIGH	5	1.5833	7.9167	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.5833	4.7500	MODERATE
	FRUIT BEARING TREES	LOW	3	1.5833	4.7500	MODERATE
	GRASSLANDS	HIGH	5	1.5833	7.9167	MODERATE
DANAO NORTE	FRUIT BEARING TREES	HIGH	5	1.4167	7.0833	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.4167	4.2500	MODERATE
	FRUIT BEARING TREES	LOW	3	1.4167	4.2500	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.4167	7.0833	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.4167	4.2500	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.4167	4.2500	MODERATE
DANAO SUR	FRUIT BEARING TREES	HIGH	5	1.4167	7.0833	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.4167	4.2500	MODERATE
	FRUIT BEARING TREES	LOW	3	1.4167	4.2500	MODERATE
	IRRIGATED RICEFIELD	HIGH	5	1.9167	9.5833	MODERATE
	IRRIGATED RICEFIELD	MODERATE	3	1.9167	5.7500	MODERATE
	IRRIGATED RICEFIELD	LOW	3	1.9167	5.7500	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.4167	7.0833	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.4167	4.2500	MODERATE
GUINBIRAYAN	FRUIT BEARING TREES	HIGH	5	1.5000	7.5000	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.3333	4.0000	MODERATE
	FRUIT BEARING TREES	LOW	3	1.3333	4.0000	MODERATE
	IRRIGATED RICEFIELD	LOW	3	2.0000	6.0000	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.3333	6.6667	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.3333	4.0000	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.3333	4.0000	MODERATE
	FISH PONDS	HIGH	5	1.3333	6.6667	MODERATE

Barangay	Dominant Crop	Flood Susceptibility	Likelihood of Occurrence Score	Severity of Consequence	RISKZ SCORE	RISK CATEGORY
	FISH PONDS	MODERATE	3	1.3333	4.0000	MODERATE
GUINTIGBASAN	FRUIT BEARING TREES	HIGH	5	1.4167	7.0833	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.4167	4.2500	MODERATE
	FRUIT BEARING TREES	LOW	3	1.4167	4.2500	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.4167	7.0833	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.4167	4.2500	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.4167	4.2500	MODERATE
MAGSAYSAY	FRUIT BEARING TREES	HIGH	5	1.6667	8.3333	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.6667	5.0000	MODERATE
	FRUIT BEARING TREES	LOW	3	1.6667	5.0000	MODERATE
	IRRIGATED RICEFIELD	HIGH	5	2.1667	10.8333	MODERATE
	IRRIGATED RICEFIELD	MODERATE	3	2.1667	6.5000	MODERATE
	IRRIGATED RICEFIELD	LOW	3	2.1667	6.5000	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.6667	8.3333	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.6667	5.0000	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.6667	5.0000	MODERATE
	FISH PONDS	HIGH	5	1.6667	8.3333	MODERATE
	FISH PONDS	MODERATE	3	1.6667	5.0000	MODERATE
MATI	FRUIT BEARING TREES	HIGH	5	1.5833	7.9167	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.5833	4.7500	MODERATE
	FRUIT BEARING TREES	LOW	3	1.5833	4.7500	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.5833	7.9167	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.5833	4.7500	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.5833	4.7500	MODERATE
	FISH PONDS	HIGH	5	1.5833	7.9167	MODERATE
	GRASSLANDS	HIGH	5	bh8jk/	#VALUE!	MODERATE
	GRASSLANDS	MODERATE	3	1.5833	4.7500	MODERATE
PANDAN	FRUIT BEARING TREES	HIGH	5	1.3333	6.6667	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.3333	4.0000	MODERATE
	FRUIT BEARING TREES	LOW	3	1.3333	4.0000	MODERATE
	IRRIGATED RICEFIELD	HIGH	5	1.8333	9.1667	MODERATE
	IRRIGATED RICEFIELD	MODERATE	3	1.8333	5.5000	MODERATE
	IRRIGATED RICEFIELD	LOW	3	1.8333	5.5000	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.3333	6.6667	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.3333	4.0000	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.3333	4.0000	MODERATE

Barangay	Dominant Crop	Flood Susceptibility	Likelihood of Occurrence Score	Severity of Consequence	RISKZ SCORE	RISK CATEGORY
	FISH PONDS	HIGH	5	1.3333	6.6667	MODERATE
POBLACION	FRUIT BEARING TREES	HIGH	5	1.5000	7.5000	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.5000	4.5000	MODERATE
	FRUIT BEARING TREES	LOW	3	1.5000	4.5000	MODERATE
	IRRIGATED RICEFIELD	MODERATE	3	1.5000	4.5000	MODERATE
	IRRIGATED RICEFIELD	LOW	3	1.5000	4.5000	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.5000	7.5000	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.5000	4.5000	MODERATE
	NON IRRIGATED RICEFIELD	LOW	3	1.5000	4.5000	MODERATE
	FISH PONDS	HIGH	5	1.5000	7.5000	MODERATE
	FISH PONDS	MODERATE	3	1.5000	4.5000	MODERATE
	FISH PONDS	LOW	3	1.5000	4.5000	MODERATE
TABUGON	FRUIT BEARING TREES	HIGH	5	1.1667	5.8333	MODERATE
	FRUIT BEARING TREES	MODERATE	3	1.1667	3.5000	MODERATE
	FRUIT BEARING TREES	LOW	3	1.1667	3.5000	MODERATE
	NON IRRIGATED RICEFIELD	HIGH	5	1.1667	5.8333	MODERATE
	NON IRRIGATED RICEFIELD	MODERATE	3	1.1667	3.5000	MODERATE
	FISH PONDS	HIGH	5	1.1667	5.8333	MODERATE
	FISH PONDS	MODERATE	3	1.1667	3.5000	MODERATE
	FISH PONDS	LOW	3	1.1667	3.5000	MODERATE

Appendix Table 10. Natural Resource-Based Production Areas Risk Table (landslide)

Barangay	Dominant Crop	Landslide Susceptibility	Likelihood of Occurrence Score	Severity of Consequence	RISK SCORE	RISK CATEGORY
AGMANIC	FRUIT BEARING TREES	MODERATE	2	1.8333	3.6667	LOW
	FRUIT BEARING TREES	LOW	2	2.1667	4.3333	LOW
	GRASSLANDS	MODERATE	2	1.8333	3.6667	LOW
	GRASSLANDS	LOW	2	1.8333	3.6667	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.6667	3.3333	LOW
	FISH PONDS	LOW	2	1.6667	3.3333	LOW
CA	FRUIT BEARING TREES	HIGH	4	1.7333	6.9333	MODERATE
	FRUIT BEARING TREES	MODERATE	2	1.9	3.8	LOW

Barangay	Dominant Crop	Landslide Susceptibility	Likelihood of Occurrence Score	Severity of Consequence	RISK SCORE	RISK CATEGORY
	FRUIT BEARING TREES	LOW	2	2.2333	4.4667	LOW
	GRASSLANDS	MODERATE	2	1.7333	3.4667	LOW
	GRASSLANDS	LOW	2	1.9	3.8	LOW
DANAO NORTE	FRUIT BEARING TREES	HIGH	4	1.9333	7.7333	MODERATE
	FRUIT BEARING TREES	MODERATE	2	1.9333	3.8667	LOW
	FRUIT BEARING TREES	LOW	2	1.7667	3.5333	LOW
	GRASSLANDS	HIGH	4	1.7667	7.0667	MODERATE
	GRASSLANDS	MODERATE	2	1.6	3.2	LOW
	GRASSLANDS	LOW	2	1.4333	2.8667	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.4333	2.8667	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.4333	2.8667	LOW
DANAO SUR	FRUIT BEARING TREES	MODERATE	2	2.1	4.2	LOW
	FRUIT BEARING TREES	LOW	2	2.1	4.2	LOW
	IRRIGATED RICEFIELDS	MODERATE	2	2.1	4.2	LOW
	IRRIGATED RICEFIELDS	LOW	2	2.4333	4.8667	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.6	3.2	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.7667	3.5333	LOW
GUINBIRAYAN	FRUIT BEARING TREES	HIGH	4	1.6667	6.6667	MODERATE
	FRUIT BEARING TREES	MODERATE	2	2	4	LOW
	FRUIT BEARING TREES	LOW	2	2.1667	4.3333	LOW
	IRRIGATED RICEFIELDS	LOW	2	2.1667	4.3333	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.6667	3.3333	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.6667	3.3333	LOW
	FISH PONDS	LOW	2	1.6667	3.3333	LOW
	GRASSLANDS	HIGH	4	1.6667	6.6667	MODERATE
	GRASSLANDS	MODERATE	2	1.6667	3.3333	LOW
	GRASSLANDS	LOW	2	1.6667	3.3333	LOW
GUI MBI	FOREST	HIGH	4	1.9333	7.7333	MODERATE
	FOREST	MODERATE	2	1.4333	2.8667	LOW

Barangay	Dominant Crop	Landslide Susceptibility	Likelihood of Occurrence Score	Severity of Consequence	RISK SCORE	RISK CATEGORY
	FRUIT BEARING TREES	HIGH	4	1.7667	7.0667	MODERATE
	FRUIT BEARING TREES	MODERATE	2	1.9333	3.8667	LOW
	FRUIT BEARING TREES	LOW	2	1.6	3.2	LOW
	GRASSLANDS	HIGH	4	1.6	6.4	MODERATE
	GRASSLANDS	MODERATE	2	1.6	3.2	LOW
	GRASSLANDS	LOW	2	1.4333	2.8667	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.4333	2.8667	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.4333	2.8667	LOW
MAGSAYSAY	FRUIT BEARING TREES	HIGH	4	2	8	MODERATE
	FRUIT BEARING TREES	MODERATE	2	2.1667	4.3333	LOW
	FRUIT BEARING TREES	LOW	2	2.1667	4.3333	LOW
	GRASSLANDS	HIGH	4	1.8333	7.3333	MODERATE
	GRASSLANDS	MODERATE	2	1.6667	3.3333	LOW
	GRASSLANDS	LOW	2	1.6667	3.3333	LOW
	IRRIGATED RICEFIELDS	MODERATE	2	2.3333	4.6667	LOW
	IRRIGATED RICEFIELDS	LOW	2	2.1667	4.3333	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.6667	3.3333	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.6667	3.3333	LOW
	FISH PONDS	LOW	2	1.6667	3.3333	LOW
MAT-I	FRUIT BEARING TREES	HIGH	4	1.7333	6.9333	MODERATE
	FRUIT BEARING TREES	MODERATE	2	2.2333	4.4667	LOW
	FRUIT BEARING TREES	LOW	2	2.2333	4.4667	LOW
	GRASSLANDS	MODERATE	2	1.7333	3.4667	LOW
	GRASSLANDS	LOW	2	1.9	3.8	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.7333	3.4667	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.9	3.8	LOW
	FISH PONDS	LOW	2	1.7333	3.4667	LOW
PANDA	FRUIT BEARING TREES	HIGH	4	1.6667	6.6667	MODERATE
	FRUIT BEARING TREES	MODERATE	2	2	4	LOW
	FRUIT BEARING TREES	LOW	2	2	4	LOW

Barangay	Dominant Crop	Landslide Susceptibility	Likelihood of Occurrence Score	Severity of Consequence	RISK SCORE	RISK CATEGORY
	GRASSLANDS	HIGH	4	1.5	6	MODERATE
	GRASSLANDS	MODERATE	2	1.8333	3.6667	LOW
	GRASSLANDS	LOW	2	1.5	3	LOW
	IRRIGATED RICEFIELDS	MODERATE	2	2	4	LOW
	IRRIGATED RICEFIELDS	LOW	2	2	4	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.5	3	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.5	3	LOW
	FISH PONDS	LOW	2	1.5	3	LOW
POBLACION	FRUIT BEARING TREES	MODERATE	2	2.1667	4.3333	LOW
	FRUIT BEARING TREES	LOW	2	2.1667	4.3333	LOW
	GRASSLANDS	MODERATE	2	2	4	LOW
	GRASSLANDS	LOW	2	1.6667	3.3333	LOW
	IRRIGATED	LOW	2	1.6667	3.3333	LOW
	NON IRRIGATED RICEFIELD	MODERATE	2	1.6667	3.3333	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.6667	3.3333	LOW
	FISH PONDS	LOW	2	1.6667	3.3333	LOW
TABUGON	FRUIT BEARING TREES	MODERATE	2	1.5333	3.0667	LOW
	FRUIT BEARING TREES	LOW	2	1.8667	3.7333	LOW
	NON IRRIGATED RICEFIELD	LOW	2	1.3667	2.7333	LOW
	FISH PONDS	LOW	2	1.3667	2.7333	LOW
	GRASSLANDS	MODERATE	2	1.3667	2.7333	LOW
	GRASSLANDS	LOW	2	1.3667	2.7333	LOW

Appendix Table 11. Natural Resource-Based Production Areas Risk Table (tsunami)

BARANGAY	DOMINANT UTILIZATION	LIKELIHOOD OF OCCURRENCE SCORE	SEVERITY OF CONSEQUENCE SCORE	*RISK SCORE*	*RISK CATEGORY*
AGMANIC	FRUIT BEARING TREES	2	2.166667	4.333333	**LOW**
	NON-IRRIGATED RICEFIELD	2	1.666667	3.333333	**LOW**
	SWAMP	2	1.666667	3.333333	**LOW**
CANYAYO	GRASSLANDS	2	1.733333	3.466667	**LOW**
	FRUIT BEARING TREES	2	2.233333	4.466667	**LOW**
GUINBIRAYAN	FRUIT BEARING TREES	2	1.666667	3.333333	**LOW**
MAGSAYSAY	FRUIT BEARING TREES	2	1.666667	3.333333	**LOW**
PANDAN	SWAMP	2	2	4	**LOW**
	FRUIT BEARING TREES	2	2	4	**LOW**
POBLACION	FRUIT BEARING TREES	2	1.833333	3.666667	**LOW**
	NON-IRRIGATED RICEFIELD	2	1.666667	3.333333	**LOW**
	SWAMP	2	1.666667	3.333333	**LOW**
TABUGON	FRUIT BEARING TREES	2	1.366667	2.733333	**LOW**
	NON-IRRIGATED RICEFIELD	2	1.366667	2.733333	**LOW**

Appendix Table 12. Urban Use Areas Risk Table (flood)

Barangay	TYPE	SUSCEPTIBILITY	LIKELIHOOD OF OCCURRENCE	SEVERITY SCORE	RISK SCORE	RISK CATEGORY
AGMANIC	**RESIDENTIAL**	**HIGH**	**5**	2.3000	11.5000	**MODERATE**
	RESIDENTIAL	**MODERATE**	**3**	2.1333	6.4000	**MODERATE**
	RESIDENTIAL	**LOW**	**3**	2.1333	6.4000	**MODERATE**
	COMMERCIAL	**HIGH**	**5**	2.1333	10.6667	**MODERATE**
CANYAYO	**RESIDENTIAL**	**HIGH**	**5**	2.4111	12.0556	**MODERATE**
	RESIDENTIAL	**MODERATE**	**3**	2.4111	7.2333	**MODERATE**
	RESIDENTIAL	**LOW**	**3**	2.2444	6.7333	**MODERATE**
	COMMERCIAL	**MODERATE**	**3**	2.2444	6.7333	**MODERATE**
	INSTITUTIONAL	**HIGH**	**5**	2.2444	11.2222	**MODERATE**

Barangay	TYPE	SUSCEPTIBILITY	LIKELIHOOD OF OCCURRENCE	SEVERITY SCORE	RISK SCORE	RISK CATEGORY
DANAO NORTE	RESIDENTIAL	HIGH	5	2.2000	11.0000	MODERATE
	RESIDENTIAL	MODERATE	3	2.2000	6.6000	MODERATE
	RESIDENTIAL	LOW	3	2.2000	6.6000	MODERATE
	COMMERCIAL	HIGH	5	2.2000	11.0000	MODERATE
DANAO SUR	RESIDENTIAL	HIGH	5	2.2556	11.2778	MODERATE
	RESIDENTIAL	MODERATE	3	2.0889	6.2667	MODERATE
	RESIDENTIAL	LOW	3	2.0889	6.2667	MODERATE
	INSTITUTIONAL	HIGH	5	2.0889	10.4444	MODERATE
GUINBIRAYAN	RESIDENTIAL	HIGH	5	2.1333	10.6667	MODERATE
	RESIDENTIAL	MODERATE	3	2.1333	6.4000	MODERATE
	RESIDENTIAL	LOW	3	2.1333	6.4000	MODERATE
	COMMERCIAL	MODERATE	3	2.1333	6.4000	MODERATE
GUINTIGBASAN	RESIDENTIAL	HIGH	5	2.3556	11.7778	MODERATE
	RESIDENTIAL	MODERATE	3	2.3556	7.0667	MODERATE
	RESIDENTIAL	LOW	3	2.3556	7.0667	MODERATE
	COMMERCIAL	HIGH	5	2.0222	10.1111	MODERATE
	INSTITUTIONAL	HIGH	5	2.0222	10.1111	MODERATE
	INSTITUTIONAL	MODERATE	3	2.0222	6.0667	MODERATE
	INSTITUTIONAL	LOW	3	2.0222	6.0667	MODERATE
MAGSAYSAY	RESIDENTIAL	HIGH	5	2.3000	11.5000	MODERATE
	RESIDENTIAL	MODERATE	3	2.1333	6.4000	MODERATE
	RESIDENTIAL	LOW	3	2.1333	6.4000	MODERATE
	COMMERCIAL	HIGH	5	2.1333	10.6667	MODERATE
	COMMERCIAL	MODERATE	3	2.1333	6.4000	MODERATE
	COMMERCIAL	LOW	3	2.1333	6.4000	MODERATE
	INSTITUTIONAL	HIGH	5	2.1333	10.6667	MODERATE
	INSTITUTIONAL	LOW	3	2.1333	6.4000	MODERATE
	MRF	HIGH	5	2.1333	10.6667	MODERATE
	MRF	MODERATE	3	2.1333	6.4000	MODERATE
MATI	RESIDENTIAL	HIGH	5	2.4778	12.3889	MODERATE
	RESIDENTIAL	MODERATE	3	2.3111	6.9333	MODERATE
	COMMERCIAL	HIGH	5	2.3111	11.5556	MODERATE
	COMMERCIAL	MODERATE	3	2.3111	6.9333	MODERATE

Barangay	TYPE	SUSCEPTIBILITY	LIKELIHOOD OF OCCURRENCE	SEVERITY SCORE	RISK SCORE	RISK CATEGORY
	INSTITUTIONAL	MODERATE	3	2.3111	6.9333	MODERATE
PANDAN	RESIDENTIAL	HIGH	5	2.4667	12.3333	MODERATE
	RESIDENTIAL	MODERATE	3	2.1333	6.4000	MODERATE
	RESIDENTIAL	LOW	3	2.1333	6.4000	MODERATE
	COMMERCIAL	HIGH	5	2.1333	10.6667	MODERATE
	INSTITUTIONAL	HIGH	5	2.1333	10.6667	MODERATE
POBLACION	RESIDENTIAL	HIGH	5	2.4111	12.0556	MODERATE
	RESIDENTIAL	MODERATE	3	2.2444	6.7333	MODERATE
	RESIDENTIAL	LOW	3	2.2444	6.7333	MODERATE
	CEMETERY	MODERATE	3	2.2444	6.7333	MODERATE
	CEMETERY	LOW	3	2.2444	6.7333	MODERATE
	Parks and Open Spaces	HIGH	5	2.3778	11.8889	MODERATE
	Parks and Open Spaces	MODERATE	3	2.5111	7.5333	MODERATE
TABUGON	RESIDENTIAL	HIGH	5	2.2444	11.2222	MODERATE
	RESIDENTIAL	MODERATE	3	2.2444	6.7333	MODERATE
	RESIDENTIAL	LOW	3	2.2444	6.7333	MODERATE
	COMMERCIAL	HIGH	5	2.2444	11.2222	MODERATE
	COMMERCIAL	MODERATE	3	2.2444	6.7333	MODERATE
	COMMERCIAL	LOW	3	2.2444	6.7333	MODERATE
	INSTITUTIONAL	HIGH	5	2.4111	12.0556	MODERATE

Appendix Table 13. Urban Use Areas Risk Table (landslide)

Barangay	TYPE	LANDSLIDE SUSCEPTIBILITY	LIKELIHOOD OF OCCURRENCE	SEVERITY SCORE	RISK SCORE	RISK CATEGORY
AGMANIC	RESIDENTIAL	MODERATE	3	2.1333	6.4000	MODERATE
	RESIDENTIAL	LOW	3	2.6333	7.9000	MODERATE
	COMMERCIAL	LOW	3	2.1333	6.4000	MODERATE
	INSTITUTIONAL	LOW	3	2.1333	6.4000	MODERATE
CAN [illegible]	RESIDENTIAL	MODERATE	3	2.4111	7.2333	MODERATE
	RESIDENTIAL	LOW	3	2.7444	8.2333	MODERATE

Barangay	TYPE	LANDSLIDE SUSCEPTIBILITY	LIKELIHOOD OF OCCURRENCE	SEVERITY SCORE	RISK SCORE	RISK CATEGORY
	COMMERCIAL	LOW	3	2.2444	6.7333	MODERATE
	INSTITUTIONAL	LOW	3	2.4111	7.2333	MODERATE
DANAO NORTE	RESIDENTIAL	HIGH	5	2.2000	11.0000	MODERATE
	RESIDENTIAL	MODERATE	3	2.7000	8.1000	MODERATE
	RESIDENTIAL	LOW	3	2.7000	8.1000	MODERATE
	COMMERCIAL	MODERATE	3	2.2000	6.6000	MODERATE
	COMMERCIAL	LOW	3	2.2000	6.6000	MODERATE
	INSTITUTIONAL	HIGH	5	2.2000	11.0000	MODERATE
	INSTITUTIONAL	LOW	3	2.2000	6.6000	MODERATE
DANAO SUR	RESIDENTIAL	MODERATE	3	2.4222	7.2667	MODERATE
	RESIDENTIAL	LOW	3	2.5889	7.7667	MODERATE
	COMMERCIAL	MODERATE	3	2.0889	6.2667	MODERATE
	COMMERCIAL	LOW	3	2.0889	6.2667	MODERATE
	INSTITUTIONAL	LOW	3	2.2556	6.7667	MODERATE
GUINBIRAYAN	RESIDENTIAL	MODERATE	3	2.3000	6.9000	MODERATE
	RESIDENTIAL	LOW	3	2.6333	7.9000	MODERATE
	COMMERCIAL	LOW	3	2.1333	6.4000	MODERATE
	INSTITUTIONAL	LOW	3	2.6333	7.9000	MODERATE
	CEMETERY	LOW	3	2.3000	6.9000	MODERATE
GUINTIGB ACAN	RESIDENTIAL	MODERATE	3	2.5222	7.5667	MODERATE
	RESIDENTIAL	LOW	3	2.5222	7.5667	MODERATE
	COMMERCIAL	LOW	3	2.0222	6.0667	MODERATE
	INSTITUTIONAL	LOW	3	2.0222	6.0667	MODERATE
MAGSAYSAY	RESIDENTIAL	MODERATE	3	2.4667	7.4000	MODERATE
	RESIDENTIAL	LOW	3	2.6333	7.9000	MODERATE
	COMMERCIAL	LOW	3	2.1333	6.4000	MODERATE
	INSTITUTIONAL	MODERATE	3	2.1333	6.4000	MODERATE
	INSTITUTIONAL	LOW	3	2.3000	6.9000	MODERATE
	MRF	LOW	3	2.1333	6.4000	MODERATE
MAT-I	RESIDENTIAL	HIGH	5	2.3111	11.5556	MODERATE
	RESIDENTIAL	MODERATE	3	2.8111	8.4333	MODERATE
	RESIDENTIAL	LOW	3	2.8111	8.4333	MODERATE
	COMMERCIAL	LOW	3	2.3111	6.9333	MODERATE
	INSTITUTIONAL	MODERATE	3	2.3111	6.9333	MODERATE

Barangay	TYPE	LANDSLIDE SUSCEPTIBILITY	LIKELIHOOD OF OCCURRENCE	SEVERITY SCORE	RISK SCORE	RISK CATEGORY
	INSTITUTIONAL	LOW	3	2.3111	6.9333	MODERATE
PANDAN	RESIDENTIAL	HIGH	5	2.0667	10.3333	MODERATE
	RESIDENTIAL	MODERATE	3	2.5667	7.7000	MODERATE
	RESIDENTIAL	LOW	3	2.5667	7.7000	MODERATE
	COMMERCIAL	LOW	3	2.0667	6.2000	MODERATE
	INSTITUTIONAL	MODERATE	3	2.2333	6.7000	MODERATE
	INSTITUTIONAL	LOW	3	2.2333	6.7000	MODERATE
POBLACION	RESIDENTIAL	MODERATE	3	2.3444	7.0333	MODERATE
	RESIDENTIAL	LOW	3	2.6778	8.0333	MODERATE
	COMMERCIAL	LOW	3	2.1778	6.5333	MODERATE
	INDUSTRIAL	LOW	3	2.1778	6.5333	MODERATE
	INSTITUTIONAL	LOW	3	2.1778	6.5333	MODERATE
	CEMETERY	MODERATE	3	2.1778	6.5333	MODERATE
	CEMETERY	LOW	3	2.1778	6.5333	MODERATE
	PARKS AND OPEN SPACES	LOW	3	2.1778	6.5333	MODERATE
TABUGON	RESIDENTIAL	MODERATE	3	2.2444	6.7333	MODERATE
	RESIDENTIAL	LOW	3	2.7444	8.2333	MODERATE
	COMMERCIAL	LOW	3	2.2444	6.7333	MODERATE
	INSTITUTIONAL	LOW	3	2.5778	7.7333	MODERATE

Appendix Table 14. Urban Use Areas Risk Table (tsunami)

Barangay	TYPE	LIKELIHOOD OF OCCURRENCE	SEVERITY OF CONSEQUUENCE	RISK SCORE	RISK CATEGORY
AGMANIC	RESIDENTIAL	2	2.6333	5.2667	LOW
	COMMERCIAL	2	2.1333	4.2667	LOW
	INSTITUTIONAL	2	2.1333	4.2667	LOW
CANYAYO	RESIDENTIAL	2	2.4111	4.8222	LOW
	COMMERCIAL	2	2.2444	4.4889	LOW
	INSTITUTIONAL	2	2.2444	4.4889	LOW
GUINBIRAYAN	RESIDENTIAL	2	2.1333	4.2667	LOW
PANDAN	RESIDENTIAL	2	2.4667	4.9333	LOW
	COMMERCIAL	2	2.1333	4.2667	LOW
	INSTITUTIONAL	2	2.1333	4.2667	LOW

Barangay	TYPE	LIKELIHOOD OF OCCURRENCE	SEVERITY OF CONSEQUUENCE	RISK SCORE	RISK CATEGORY
POBLACION	**RESIDENTIAL**	2	2.7444	5.4889	**LOW**
	COMMERCIAL	2	2.2444	4.4889	**LOW**
	INSTITUTIONAL	2	2.2444	4.4889	**LOW**
	INDUSTRIAL	2	2.0778	4.1556	**LOW**
	PARKS AND OPEN SPACES	2	2.2444	4.4889	**LOW**
TABUGON	**RESIDENTIAL**	2	2.2444	4.4889	**LOW**
	COMMERCIAL	2	2.9111	5.8222	**LOW**
	INSTITUTIONAL	2	2.9111	5.8222	**LOW**

Appendix Table 15. Lifeline Utilities Risk Table (flood)

Name	Classification	Flood Susceptibility	Likelihood of Occurrence Score	Severity of Consequence Score	RISK SCORE	RISK CATEGORY
Agmanic	Barangay Road	**LOW**	3	2.600	7.800	**MODERATE**
	Barangay Road	**MODERATE**	3	2.817	8.451	**MODERATE**
	Barangay Road	**HIGH**	5	2.683	13.415	**MODERATE**
	Electrical Post 222	**LOW**	3	2.133	6.400	**MODERATE**
	Electrical Post 223	**HIGH**	5	2.500	12.500	**MODERATE**
	Capdang Bridge	**HIGH**	5	3.050	15.250	**HIGH**
	Agmanic Bridge	**MODERATE**	3	2.667	8.001	**MODERATE**
Canyayo	Barangay Road	**HIGH**	5	2.817	14.085	**MODERATE**
	Barangay Road	**MODERATE**	3	2.567	18.600	**MODERATE**
Danao Norte	Barangay Road	**HIGH**	5	3.067	24.700	**HIGH**
	Provincial Road	**HIGH**	5	3.400	17.000	**HIGH**
	Electrical Post 106	**HIGH**	5	2.500	12.500	**MODERATE**
	Electrical Post 105 and 162	**MODERATE**	3	2.167	6.501	**MODERATE**
	Santol Bridge	**HIGH**	5	2.833	14.165	**MODERATE**
Danao Sur	Barangay Road	**LOW**	3	2.550	7.650	**MODERATE**
	Barangay Road	**HIGH**	5	3.050	15.250	**HIGH**
	Barangay Road	**MODERATE**	3	2.967	8.901	**MODERATE**
	Provincial Road	**HIGH**	5	3.483	17.415	**HIGH**
	Provincial Road	**LOW**	3	2.917	8.750	**MODERATE**

	Provincial Road	MODERATE	3	3.083	9.250	MODERATE
	Electrical Post 111	HIGH	5	2.500	12.500	MODERATE
	Electrical Post 107	MODERATE	3	2.133	6.400	MODERATE
	Electrical Post 108	LOW	3	2.117	10.583	MODERATE
	Danao Sur Bridge	HIGH	5	2.667	13.335	MODERATE
Guinbirayan	Barangay Road	HIGH	5	3.417	17.085	HIGH
	Municipal Road	LOW	3	2.117	6.350	MODERATE
	Municipal Road	MODERATE	3	2.133	6.400	MODERATE
	Provincial Road	LOW	3	2.417	7.251	MODERATE
	Provincial Road	HIGH	5	2.983	14.915	MODERATE
	Provincial Road	MODERATE	3	2.917	8.751	MODERATE
	Electrical Post 134	HIGH	5	2.500	12.500	MODERATE
	Electrical Post 136	MODERATE	3	2.167	6.501	MODERATE
	Electrical Post 135	LOW	3	2.133	6.399	MODERATE
	Guinbirayan Bridge	MODERATE	3	2.817	8.451	MODERATE
	Guinbirayan Bridge	HIGH	5	2.667	8.001	MODERATE
Guintigbasan	Provincial Road	LOW	3	2.500	7.500	MODERATE
	Provincial Road	HIGH	5	3.333	16.665	MODERATE
	Provincial Road	MODERATE	3	3.083	9.249	MODERATE
	Barangay Road	HIGH	5	2.967	14.835	MODERATE
	Barangay Road	MODERATE	3	2.800	8.400	MODERATE
	Electrical Post 148, 153, and 152	HIGH	5	2.500	12.500	MODERATE
	Electrical Post 149, 150, and 151	MODERATE	3	2.133	6.399	MODERATE
Magsaysay	Barangay Road	HIGH	5	3.000	15.000	HIGH
	Barangay Road	MODERATE	3	2.500	7.500	MODERATE
	Provincial Road	LOW	3	2.200	6.600	MODERATE
	Provincial Road	HIGH	5	2.283	11.415	MODERATE
	Provincial Road	MODERATE	3	2.200	6.600	MODERATE
	Electrical Post 63	HIGH	5	2.500	12.500	MODERATE

	Electrical posts 61, 62, and 68	MODERATE	3	2.133	6.399	MODERATE
	Electrical Post 69	LOW	3	2.167	6.501	MODERATE
	Magsaysay Bridge	HIGH	5	2.667	13.335	MODERATE
	Palate Bridge	HIGH	5	2.483	12.415	MODERATE
Mat-i	Barangay Road	HIGH	5	2.733	13.665	MODERATE
	Barangay Road	MODERATE	3	2.500	7.500	MODERATE
	Provincial Road	LOW	3	2.500	7.500	MODERATE
	Provincial Road	HIGH	5	2.950	14.750	MODERATE
	Provincial Road	MODERATE	3	2.915	8.745	MODERATE
	Electrical Post 11, 12, and 4	MODERATE	3	2.133	6.399	MODERATE
	Electrical Post 9 and 13	HIGH	5	2.500	12.500	MODERATE
Pandan	Barangay Road	LOW	3	2.200	6.600	MODERATE
	Barangay Road	HIGH	5	3.317	16.585	HIGH
	Barangay Road	MODERATE	3	3.125	9.375	MODERATE
	Provincial Road	LOW	3	2.500	7.500	MODERATE
	Provincial Road	HIGH	5	2.950	14.750	MODERATE
	Provincial Road	MODERATE	3	2.915	8.745	MODERATE
	Electrical Post 33, 34, 35, 36, and 37	HIGH	5	2.500	12.500	MODERATE
	Electrical Post 31	MODERATE	3	2.167	6.501	MODERATE
	Electrical Post 32	LOW	3	2.133	6.399	MODERATE
	Pandan Bridge	HIGH	5	3.267	16.335	HIGH
Poblacion	Barangay Road	LOW	3	2.200	6.600	MODERATE
	Barangay Road	HIGH	5	3.150	15.750	MODERATE
	Barangay Road	MODERATE	3	2.500	7.500	MODERATE
	Provincial Road	LOW	3	2.950	8.850	MODERATE
	Provincial Road	HIGH	5	3.083	15.415	HIGH
	Provincial Road	MODERATE	3	3.800	11.400	MODERATE
	Electrical Post 59	HIGH	5	2.500	12.500	MODERATE
	Electrical Post 53 and 54	MODERATE	3	2.167	6.501	MODERATE
	Electrical Post 55, 56, and 60	LOW	3	2.133	6.399	MODERATE

	Bulangan Bridge	HIGH	5	2.883	14.415	MODERATE
	Longa-og Bridge	HIGH	5	3.067	15.335	HIGH
Tabugon	Barangay Road	LOW	3	2.550	7.650	MODERATE
	Barangay Road	HIGH	5	2.883	14.415	MODERATE
	Barangay Road	MODERATE	3	3.083	9.249	MODERATE
	Provincial Road	LOW	3	2.483	7.449	MODERATE
	Provincial Road	HIGH	5	3.167	15.835	HIGH
	Provincial Road	MODERATE	3	2.950	8.850	MODERATE
	Electrical posts 199-200, 202-205, 194, and 192	HIGH	5	2.500	12.500	MODERATE
	Electrical posts 193 and 201	MODERATE	3	2.167	6.501	MODERATE

Appendix Table 16. Lifeline Utilities Risk Table (landslide)

Name	Classification	Landslide Susceptibility	Likelihood of Occurrence Score	Severity of Consequence Score	RISK SCORE	RISK CATEGORY
Agmanic	Barangay Road	LOW	2	3.183	6.366	LOW
	Provincial Road	LOW	2	3.183	6.366	LOW
	Electrical posts 208-223	LOW	2	2.25	4.5	LOW
	Agmanic Bridge	LOW	2	3.05	6.1	LOW
	Capdang Bridge	LOW	2	3.050	6.100	LOW
Canyayo	Barangay Road	LOW	2	3.167	6.334	LOW
	Barangay Road	MODERATE	2	3.233	6.466	LOW
Danao Norte	Provincial Roads	LOW	2	3.317	6.634	LOW
	Provincial Roads	MODERATE	2	3.383	6.766	LOW
	Provincial Roads	HIGH	4	3.083	12.332	HIGH
	Barangay Road	LOW	2	3.167	6.334	LOW
	Barangay Road	MODERATE	2	3.233	6.466	LOW
	Barangay Road	HIGH	4	3.233	12.932	HIGH
	Electrical posts 102- 106, 109, 162-164, 167-174, 176-182	LOW	2	2.25	4.5	LOW

	Santol Bridge	**LOW**	2	3.05	6.1	**LOW**
Danao Sur	Barangay Road	**LOW**	2	3.167	6.334	**LOW**
	Barangay Road	**MODERATE**	2	3.317	6.634	**LOW**
	Provincial Roads	**LOW**	2	3.317	6.634	**LOW**
	Provincial Roads	**MODERATE**	2	3.4	6.8	**LOW**
	Electrical posts 154-157, 107-113, 158,-161, and 100	**LOW**	2	2.25	4.5	**LOW**
	Danao Sur Bridge	**LOW**	2	3.05	6.1	**LOW**
Guinbirayan	Barangay Road	**LOW**	2	2.25	4.5	**LOW**
	Barangay Road	**MODERATE**	2	3.15	6.3	**LOW**
	Municipal Roads	**LOW**	2	2.25	4.5	**LOW**
	Provincial Roads	**LOW**	2	2.25	4.5	**LOW**
	Provincial Roads	**MODERATE**	2	3.383	6.766	**LOW**
	Electrical Posts 128-131, 139	**MODERATE**	2	2.5	5	**LOW**
	Electrical posts 124-127, 132-138, 114-122	**LOW**	2	2.317	4.634	**LOW**
	Guinbirayan Bridge	**LOW**	2	3.05	6.1	**LOW**
	Atic Bridge	**LOW**	2	3.067	6.134	**LOW**
	Guba Footbridge	**LOW**	2	3.67	7.34	**LOW**
Guintigbasan	Barangay Road	**LOW**	2	2.733	5.466	**LOW**
	Provincial Roads	**LOW**	2	2.25	4.5	**LOW**
	Provincial Roads	**MODERATE**	2	3.383	6.766	**LOW**
	Provincial Roads	**HIGH**	4	3.233	12.932	**HIGH**
	Electrical Post 140, 141, 143, and 144	**MODERATE**	2	2.5	5	**LOW**
	Electrical posts 142, 145-149, 151-153	**LOW**	2	2.317	4.634	**LOW**
Magsaysay	Barangay Road	**LOW**	2	2.25	4.5	**LOW**
	Barangay Road	**MODERATE**	2	3.233	6.466	**LOW**
	Provincial Roads	**LOW**	2	2.25	4.5	**LOW**
	Provincial Roads	**MODERATE**	2	3.483	6.966	**LOW**
	Electrical Post 187, 80, and 99	**MODERATE**	2	2.5	5	**LOW**
	Electrical posts 61-79, 81-98, 183-186	**LOW**	2	2.317	4.634	**LOW**

	Magsaysay Bridge	**LOW**	2	3.05	6.1	**LOW**
	Palate P.R. Bridge	**LOW**	2	3.05	6.1	**LOW**
	Palate B.R. Bridge	**LOW**	2	3.05	6.1	**LOW**
Mat-i	Barangay Road	**LOW**	2	2.25	4.5	**LOW**
	Barangay Road	**MODERATE**	2	3.233	6.466	**LOW**
	Provincial Roads	**LOW**	2	3.233	6.466	**LOW**
	Provincial Roads	**MODERATE**	2	3.464	6.928	**LOW**
	Electrical posts 19-23	**MODERATE**	2	2.5	5	**LOW**
	Electrical posts 1-5, 7-10, 12-18	**LOW**	2	2.317	4.634	**LOW**
Pandan	Barangay Road	**LOW**	2	2.5	5	**LOW**
	Barangay Road	**MODERATE**	2	3.233	6.466	**LOW**
	Barangay Road	**HIGH**	4	3.233	12.932	**HIGH**
	Provincial Roads	**LOW**	2	3.233	6.466	**LOW**
	Provincial Roads	**MODERATE**	2	3.464	6.928	**LOW**
	Electrical posts 24-30 and 21	**MODERATE**	2	2.5	5	**LOW**
	Electrical posts 31-36, 38-40	**LOW**	2	2.317	4.634	**LOW**
	Pandan Bridge	**LOW**	2	3.267	6.534	**LOW**
Poblacion	Barangay Road	**LOW**	2	2.5	5	**LOW**
	Barangay Road	**MODERATE**	2	3.233	6.466	**LOW**
	Municipal Roads	**LOW**	2	2.25	4.5	**LOW**
	Provincial Roads	**LOW**	2	2.317	4.634	**LOW**
	Electrical posts 41-60	**LOW**	2	2.317	4.634	**LOW**
	Bulangan Bridge	**LOW**	2	3.05	6.1	**LOW**
	Longa-og Bridge	**LOW**	2	3.67	7.34	**Low**
Tabugon	Barangay Roads	**LOW**	2	3.1	6.2	**LOW**
	Provincial Road	**MODERATE**	2	3	6	**LOW**
	Provincial Road	**LOW**	2	3.25	6.5	**LOW**
	Electrical posts 199-207, 188-196	**LOW**	2	2.317	4.634	**LOW**

Appendix Table 17. Lifeline Utilities Risk Table (tsunami)

Name	Classification	Likelihood of Occurrence Score	Severity of Consequence Score	RISK SCORE	RISK CATEGORY
Agmanic	Barangay Road	2	3.200	6.400	LOW
	Provincial Road	2	2.333	4.666	LOW
	Electrical posts 215-216, 218-223	2	2.333	4.667	LOW
	Agmanic Bridge	2	3.050	6.100	LOW
Canyayo	Barangay Road	2	3.317	6.633	LOW
Guinbirayan	Barangay Road	2	3.317	6.634	LOW
	Guba Footbridge	2	3.670	7.340	LOW
Magsaysay	Barangay Road	2	2.600	5.200	LOW
Pandan	Provincial Road	2	2.933	5.867	LOW
	Barangay Road	2	3.100	6.200	LOW
	Electrical posts 33-38	2	2.267	4.533	LOW
Poblacion	Provincial Road	2	2.933	5.867	LOW
	Municipal Road	2	3.100	6.200	LOW
	Barangay Road	2	3.183	6.367	LOW
	Electrical posts 41-50 and 52	2	2.133	4.267	LOW
	Bulangan Bridge	2	3.050	6.100	LOW
Tabugon	Barangay Road	2	3.150	6.300	LOW
	Provincial Road	2	3.150	6.300	LOW
	Electrical posts 203-206, 199-200, 195-196	2	2.267	4.533	LOW

Appendix Table 18. Critical Point Facilities Risk Table (flood)

Barangay	Facility Type	Flood Susceptibility	Likelihood of Occurrence	Severity of Consequence Score	RISK SCORE	RISK CATEGORY
Canyayo	Catholic Church	HIGH	5	2.68333	13.41665	MODERATE
	Barangay Hall	HIGH	5	2.61667	13.08335	MODERATE
	Health Center	HIGH	5	2.56667	12.83335	MODERATE
Guinbirayan	Puro Catholic Church	HIGH	5	2.63333	13.16665	MODERATE

	Puro Barangay Health Station	HIGH	5	2.25000	11.25000	MODERATE
	Vicente Antaran Montiel Memorial School	HIGH	5	2.18333	10.91665	MODERATE
Guintigbasan	Guintigbasan Catholic Church	MODERATE	5	2.70000	13.50000	MODERATE
	Guintigbasan Barangay Hall	HIGH	5	2.45000	12.25000	MODERATE
	Guintigbasan Elementary School	LOW	3	2.15000	10.75000	MODERATE
	Guintigbasan Health Center	MODERATE	3	2.06667	6.20001	MODERATE
Magsaysay	Magsaysay Barangay Hall	HIGH	5	1.93333	5.79999	MODERATE
	Magsaysay Kingdom of God	HIGH	5	2.43333	7.29999	MODERATE
Mat-i	Mat-i Health Center	MODERATE	3	2.00000	10.00000	MODERATE
	Mat-i Catholic Church	MODERATE	3	2.50000	12.5	MODERATE
Pandan	Pandan Barangay Hall	HIGH	5	2.16667	10.83335	MODERATE
	Pandan Saint Joseph Chapel	HIGH	5	2.96667	14.83335	MODERATE
	Foursquare Church	HIGH	5	3.03333	15.16665	HIGH
Poblacion	Rural Health Unit	MODERATE	3	2.31667	6.95001	MODERATE
Tabugon	Tabugon Barangay Hall	HIGH	5	2.53333	12.66665	MODERATE
	Tabugon Elementary School	HIGH	5	2.36667	11.83335	MODERATE
	Tabugon Health Center	HIGH	5	2.53333	12.66665	MODERATE
	Tabugon Catholic Church	HIGH	5	2.78333	8.34999	MODERATE

Appendix Table 19. Critical Point Facilities Risk Table (landslide)

Barangay	Facility Type	Landslide Susceptibility	Likelihood of Occurrence	Severity of Consequence Score	RISK SCORE	Risk Category
Agmanic	Barangay Hall	**LOW**	3	1.96667	5.90001	**MODERATE**
	Catholic Church	**LOW**	3	2.28333	6.84999	**MODERATE**
	Agmanic Elementary School	**LOW**	3	2.15000	6.45	**MODERATE**
	Barangay Health Center	**LOW**	3	2.05000	6.15	**MODERATE**
	Capdang Catholic Church	**LOW**	3	2.28333	6.84999	**MODERATE**
	Agmanic Baptist Church	**LOW**	3	2.28333	6.84999	**MODERATE**
Canyayo	Canyayo Catholic Church	**LOW**	3	2.48333	7.44999	**MODERATE**
	Canyayo Baptist Church	**LOW**	3	2.55000	7.65	**MODERATE**
	Barangay Hall	**LOW**	3	2.33333	6.99999	**MODERATE**
	Lamberto Antaran Memorial School	**LOW**	3	2.41667	7.25001	**MODERATE**
	Canyayo Elementary School	**LOW**	3	2.26667	6.80001	**MODERATE**
	Health Center	**LOW**	3	2.01667	6.05001	**MODERATE**
	Campong Health Center	**LOW**	3	1.85000	5.55	**MODERATE**
	Lunoc Born Again Church	**LOW**	3	2.28333	6.84999	**MODERATE**
	Lunoc Catholic Church	**LOW**	3	2.28333	6.84999	**MODERATE**
	Campong Catholic Church	**LOW**	3	2.28333	6.84999	**MODERATE**
	Campong Born Again Church	**LOW**	3	2.28333	6.84999	**MODERATE**

	Campong Christian Church	**LOW**	3	2.28333	6.84999	**MODERATE**
Danao Norte	Baptist Church	**LOW**	3	2.70000	13.5	**MODERATE**
	Barangay Hall	**LOW**	3	2.40000	7.2	**MODERATE**
	Catholic Church	**LOW**	3	2.81667	8.45001	**MODERATE**
	Danao Norte Elementary School	**LOW**	3	2.60000	7.8	**MODERATE**
	Foursquare Church	**LOW**	3	2.48333	7.44999	**MODERATE**
	Health Center	**LOW**	3	2.43333	7.29999	**MODERATE**
	Seventh Day Adventist	**LOW**	3	2.73333	8.19999	**MODERATE**
Danao Sur	Barangay Hall	**LOW**	3	2.31667	6.95001	**MODERATE**
	Catholic Church	**LOW**	3	2.38333	7.14999	**MODERATE**
	Christian Church	**LOW**	3	2.83333	8.49999	**MODERATE**
	Danao Sur Elementary School	**LOW**	3	2.20000	6.600	**MODERATE**
	Foursquare Church	**LOW**	3	2.00000	6.000	**MODERATE**
	Health Center	**LOW**	3	2.31667	6.95001	**MODERATE**
Guinbirayan	Catholic Church	**LOW**	3	2.16667	6.50001	**MODERATE**
	Baptist Church	**LOW**	3	2.10000	6.3	**MODERATE**
	Barangay Hall	**LOW**	3	2.66667	8.00001	**MODERATE**
	Puro Catholic Church	**LOW**	3	2.75000	8.25	**MODERATE**
	Guinbirayan Elementary School	**LOW**	3	2.28333	6.84999	**MODERATE**
	Foursquare Church	**LOW**	3	2.15000	6.45	**MODERATE**
	Vicente Antaran Montiel Memorial School	**LOW**	3	2.40000	7.2	**MODERATE**
	Puro Health Station	**LOW**	3	1.81667	5.45001	**MODERATE**
	Health Center	**LOW**	3	2.23333	6.69999	**MODERATE**

	Guinbirayan National High School	**LOW**	3	2.33333	6.99999	**MODERATE**
	Philippine Independent Church	**LOW**	3	2.40000	7.2	**MODERATE**
	Guinbirayan Good News Church	**LOW**	3	2.40000	7.2	**MODERATE**
	True Vine Gospel Church	**LOW**	3	2.40000	7.2	**MODERATE**
Guintigbasan	Barangay Hall	**LOW**	3	1.88333	5.64999	**MODERATE**
	Catholic Church	**LOW**	3	2.16667	6.50001	**MODERATE**
	Guintigbasan Elementary School	**LOW**	3	2.08333	6.24999	**MODERATE**
	Health Center	**LOW**	3	1.85000	5.55	**MODERATE**
Magsaysay	Baptist Church	**LOW**	3	2.18333	6.54999	**MODERATE**
	Barangay Hall	**LOW**	3	1.95000	5.85	**MODERATE**
	Catholic Church	**LOW**	3	2.73333	8.19999	**MODERATE**
	Magsaysay Elementary School	**LOW**	3	2.51667	7.55001	**MODERATE**
	Health Center	**LOW**	3	1.76667	5.30001	**MODERATE**
	Magsaysay Kingdom of God	**LOW**	3	2.28333	6.84999	**MODERATE**
	Iglesia ni Cristo	**LOW**	3	2.28333	6.84999	**MODERATE**
Mat-I	Catholic Church	**MODERATE**	3	2.36667	7.10001	**MODERATE**
	Barangay Hall	**LOW**	3	2.10000	6.3	**MODERATE**
	Mat-i Health Center	**LOW**	3	2.26667	6.80001	**MODERATE**
	Foursquare Church	**LOW**	3	2.28333	6.84999	**MODERATE**
	Mat-i Elementary	**LOW**	3	2.10000	6.3	**MODERATE**
	Iglesia ni Cristo	**LOW**	3	2.28333	6.84999	**MODERATE**
	Mat-i Catholic Church	**LOW**	3	2.28333	6.84999	**MODERATE**
Pandan	Barangay Hall (Ilaya)	**LOW**	3	2.10000	6.3	**MODERATE**

	Barangay Hall	LOW	3	1.93333	5.79999	MODERATE
	Pandan Elementary School	LOW	3	2.35000	7.05	MODERATE
	Foursquare Church	MODERATE	3	2.48333	7.44999	MODERATE
	Health Center	LOW	3	1.85000	5.55	MODERATE
	Saint Joseph Chapel	LOW	3	2.26667	6.80001	MODERATE
Poblacion	Assembly of God	LOW	3	2.10000	6.3	MODERATE
	Baptist Church	LOW	3	2.01667	6.05001	MODERATE
	Barangay Hall	LOW	3	2.03333	6.09999	MODERATE
	Catholic Church	LOW	3	2.13333	6.39999	MODERATE
	Seventh Day Adventist	LOW	3	2.18333	6.54999	MODERATE
	Rural Health Unit	LOW	3	2.03333	6.09999	MODERATE
	Santa Fe National High School	LOW	3	2.10000	6.3	MODERATE
	Santa Fe Central Elementary School	LOW	3	3.06667	9.20001	MODERATE
	Tipolo Catholic Church	LOW	3	2.28333	6.84999	MODERATE
Tabugon	Baptist Church	LOW	3	2.10000	6.3	MODERATE
	Barangay Hall	LOW	3	2.03333	6.09999	MODERATE
	Tabugon Elementary School	LOW	3	2.16667	6.50001	MODERATE
	Guinpoingan Health Center	LOW	3	1.83333	5.49999	MODERATE
	Guinpoingan Elementary School	LOW	3	2.16667	6.50001	MODERATE
	Health Center	LOW	3	2.26667	6.80001	MODERATE
	Tabugon Catholic Church	LOW	3	2.28333	6.84999	MODERATE

Appendix Table 20. Critical Point Facilities Risk Table (tsunami)

Barangay	Facility Type	Likelihood of Occurrence Score	Severity of Consequence Score	RISK SCORE	REMARKS
Agmanic	Capdang Catholic Church	2	2.81667	5.63334	LOW
	Agmanic Catholic Church	2	2.81667	5.63334	LOW
Canyayo	Catholic Church	2	2.68333	5.36666	LOW
	Barangay Hall	2	2.81667	5.63334	LOW
	Canyayo Health Station	2	2.81667	5.63334	LOW
Guinbirayan	Puro Catholic Church	2	2.56667	5.13334	LOW
	Vicente Antaran Montiel Memorial School	2	2.71667	5.43334	LOW
Pandan	Saint Joseph Chapel	2	2.75	5.5	LOW
	Barangay Hall (new)	2	2.81667	5.63334	LOW
Poblacion	Assembly of God	2	2.66667	5.33334	LOW
	Baptist Chrurch	2	2.51667	5.03334	LOW
	Barangay Hall	2	2.45	4.9	LOW
	Catholic Church	2	2.61667	5.23334	LOW
	Seventh Day Adventist	2	2.51667	5.03334	LOW
	Rural Health Unit	2	2.48333	4.96666	LOW
	Santa Fe National High School	2	2.05	4.1	LOW
Tabugon	Guinpoingan Health Center	2	2.18333	4.36666	LOW
	Baptist Church	2	3.05	6.1	LOW
	Barangay Hall	2	2.58333	5.16666	LOW
	Tabugon Health Center	2	2.26667	4.53334	LOW
	Tabugon Elementary School	2	2.33333	4.66666	LOW

EXPOSURE AND RISK DATABASE

Appendix Table 21. Population Exposure and Risk Database

Barangay	Barangay Population	EXPOSURE			VULNERABILITY						ADAPTIVE CAPACITY
		Population Exposed to Flood	Population Exposed to Landslide	Population Exposed to Tsunami	Percentage of Informal Settlers	Percentage living in dwelling units with walls made from light materials	Percentage of young and old dependents	Percentage of persons with disabilities	Percentage below the Poverty Threshold	Percentage Malnourished Individuals	
Agmanic	1489	519	1489	482	1.52%	53.33%	26%	2%	46.06%	4.17%	Seawall construction, riprapping damaged river banks, installation of early warning device, Establishment of early warning system in all barangays, Information, Education Campaign
Canyayo	1511	462	1510		0.58%	59.37%	21%	0.60%	87.32%	0.95%	
Danao Norte	1163	155	1163		0.40%	56.52%	29.78%	1.46%	66.01%	3.37%	
Danao Sur	712	18	712		1.16%	35.26%	22.19%	1.40%	50.29%	2.02%	
Guinbirayan	1571	516	1568	69	3.05%	40.20%	28.38%	1.78%	50.89%	3.06%	
Guintigbasan	696	281	696		2.84%	53.41%	24.21%	1.58%	53.41%	2.47%	
Magsaysay	1322	146	1322		0.33%	40.13%	27.60%	1.29%	55.92%	3.85%	
Mat-i	1033	210	1033		1.63%	51.43%	24.66%	1.84%	68.16%	0.78%	

Barangay	Barangay Population	EXPOSURE			VULNERABILITY						ADAPTIVE CAPACITY
		Population Exposed to Flood	Population Exposed to Landslide	Population Exposed to Tsunami	Percentage of Informal Settlers	Percentage living in dwelling units with walls made from light materials	Percentage of young and old dependents	Percentage of persons with disabilities	Percentage below the Poverty Threshold	Percentage Malnourished Individuals	
Pandan	1282	1098	1282	529	4.58%	54.93%	24.94%	0.70%	69.37%	1.14%	
Poblacion	2147	1270	2147	760	5.61%	48.44%	26.19%	1.54%	57.80%	0.98%	
Tabugon	1851	1426	1844	85	2%	49.13%	25.58%	1.30%	51.12%	3.60%	

Appendix Table 22. Natural Resource-Based Production Areas Exposure and Risk Database

Barangay	Dominant Crop	EXPOSURE				VULNERABILITY							ADAPTIVE CAPACITY
		Affected Area (Flood)	Affected Area (Landslide)	Affected Area (Tsunami)	Average output per hectare (PHP)	Proportion of Farming Families who attended climate field school	Proportion of Farming Families using sustainable production technique	Number of Farmers with access to hazard information	Number of production areas with flood infrastructure coverage	% Areas with Irrigation Coverage	% Areas with Water Impoundment	Number of farming families with access to Early warning system	
AGMANIC	FRUIT BEARING TREES	33.415523	364.59028	77.04329	50000	24.77	15	65	8	0	0	56	Agricultural areas, especially rice fields, are prioritized in the construction of mitigating measures such as sea wall and flood control. The municipality also conducts regular IECs tackling issues which can increase the
	GRASSLANDS		89.23662		20000								
	NON IRRIGATED RICEFIELD	5.683247	52.63126	23.620174	70000								
	FISH PONDS	18.86876	20.29552	19.397546	375000								
CANY AYO	FRUIT BEARING TREES	33.870124	390.66294	32.506242	50000	16.74	12	43	6	0	0	45	
	GRASSLANDS	0.011293	41.02731	0.037393	20000								
DANAO NORTE	FRUIT BEARING TREES	13.144395	610.9642		50000	45.16	10	45	12	0	0	75	
	GRASSLANDS		212.97184		20000								
	NON IRRIGATED RICEFIELD	13.47732	35.15449		70000								
DANAO SUR	FRUIT BEARING TREES	11.998157	140.95275		50000	19.36	15	62	25	0	0	68	
	IRRIGATED RICEFIELDS	10.907516	32.19493		70000					100			

Barangay	Dominant Crop	EXPOSURE				VULNERABILITY							ADAPTIVE CAPACITY
		Affected Area (Flood)	Affected Area (Landslide)	Affected Area (Tsunami)	Average output per hectare (PHP)	Proportion of Farming Families who attended climate field school	Proportion of Farming Families using sustainable production technique	Number of Farmers with access to hazard information	Number of production areas with flood infrastructure coverage	% Areas with Irrigation Coverage	% Areas with Water Impoundment	Number of farming families with access to Early warning system	
	NON IRRIGATED RICEFIELD	0.302927	9.99961		70000					0			adaptation of crops to climates. Continuous identification of crops that are compatible with the soil type present are also done to increase the production.
GUINBIRAYAN	FRUIT BEARING TREES	46.728567	391.45714	41.267515	50000	12.37	12	72	16	0	0	69	
	IRRIGATED RICEFIELDS	0.000052	0.00335		70000					100			
	NON IRRIGATED RICEFIELD	1.492681	18.02641		70000					0			
	FISH PONDS	8.481713	9.72714		375000					0			
	GRASSLANDS		10.76309		20000					0			
GUINTIGBASAN	FOREST		133.82018		10000	46.75	10	68	14	0	0	58	
	FRUIT BEARING TREES	14.508098	262.31922		50000								
	GRASSLANDS		64.52126		20000								
	NON IRRIGATED RICEFIELD	4.340805	13.85081		70000								
MAGSAYSA	FRUIT BEARING TREES	21.575274	809.68494	11.466634	50000	39.78	20	73	10	0	0	71	
	GRASSLANDS		106.89543		20000					0			

Barangay	Dominant Crop	EXPOSURE				VULNERABILITY							ADAPTIVE CAPACITY
		Affected Area (Flood)	Affected Area (Landslide)	Affected Area (Tsunami)	Average output per hectare (PHP)	Proportion of Farming Families who attended climate field school	Proportion of Farming Families using sustainable production technique	Number of Farmers with access to hazard information	Number of production areas with flood infrastructure coverage	% Areas with Irrigation Coverage	% Areas with Water Impoundment	Number of farming families with access to Early warning system	
	IRRIGATED RICEFIELDS	2.496845	14.0793		70000					100			
	NON IRRIGATED RICEFIELD	1.900302	26.55583	2.498868	70000					0			
	FISHPONDS	6.319828	6.32741	0.980494	375000					0			
MAT-I	FRUIT BEARING TREES	34.682405	706.03424		50000								
	GRASSLANDS	0.51106	57.19789		20000	67	12	68	4	0	0	69	
	NON IRRIGATED RICEFIELD	10.885044	46.51867		70000								
	FISHPONDS	1.319223	13.76844		375000								
PANDAN	FRUIT BEARING TREES	21.927261	520.13522	14.095183	50000					0			
	GRASSLANDS		148.41818		20000					0			
	IRRIGATED RICEFIELDS	1.158717	9.05386		70000	40	10	53	6	100	0	72	
	NON IRRIGATED RICEFIELD	2.747414	5.99619		70000					0			
	FISHPONDS	1.447882	1.44788	1.444091	375000					0			

Barangay	Dominant Crop	EXPOSURE				VULNERABILITY							ADAPTIVE CAPACITY
		Affected Area (Flood)	Affected Area (Landslide)	Affected Area (Tsunami)	Average output per hectare (PHP)	Proportion of Farming Families who attended climate field school	Proportion of Farming Families using sustainable production technique	Number of Farmers with access to hazard information	Number of production areas with flood infrastructure coverage	% Areas with Irrigation Coverage	% Areas with Water Impoundment	Number of farming families with access to Early warning system	
POBLACION	FRUIT BEARING TREES	9.979538	247.39248	28.527125	50000	20.93	12	69	9	0	0	89	
	GRASSLANDS		49.34089		20000								
	IRRIGATED	0.016395	0.06537		70000								
	NON IRRIGATED RICEFIELD	7.902258	40.39906	7.33318	70000								
	FISH PONDS	0.511246	0.6056	0.348451	375000								
TABUGON	FRUIT BEARING TREES	18.821803	342.38457	43.400345	50000	21.56	10	79	25	0	0	79	
	NON IRRIGATED RICEFIELD	1.456718	17.31512	3.372858	70000								
	FISH PONDS	1.143601	1.25916	0.645804	375000								
	GRASSLANDS		11.68891		20000								

Appendix Table 23. Urban Use Areas Exposure and Risk Database

Barangay	TYPE	EXPOSURE				SENSITIVITY				ADAPTIVE CAPACITY		
		Affected Area (Flood)	Affected Area (Landslide)	Affected Area (Tsunami)	Replacement Cost per Sq. Meter (PHP)	Proportion of building walls with light to salvageable materials	Structure employing hazard resistant building design	Structures with access/area coverage to infrastructure related mitigation measures	Capacity and Willingness to Retrofit or Relocate or conform with New Regulations	Insurance Coverage	Available alternative sites	Government Regulations and Government investments
AGMANIC	**RESIDENTIAL**	3.363334	37.194935	6.217285	5,000.00	53%	16%	36%	32%	0%	Yes	Presence and imposition of government regulations and government investments are considered as moderate in the municipality primarily due to the source of fund. Santa Fe follows the National Building Code with a regular Maintenance check up On structures specially Buildings used For social services.
	COMMERCIAL	0.000722	0.00458	0.003858	3,000.00							
	INSTITUTIONAL		0.350561	0.172274	10,000.00							
CANYAYO	**RESIDENTIAL**	1.072344	5.61414	0.420886	5,000.00	60%	18%	28%	21%	0%	Yes	
	COMMERCIAL	0.018616	0.081518	0.018616	3,000.00							
	INSTITUTIONAL	0.026003	0.488245	0050068	10,000.00							
DANAO NORTE	**RESIDENTIAL**	0.44251	8.420856		5,000.00	57%	13%	22%	17%	0%	Yes	
	COMMERCIAL	0.000019	0.077847		3,000.00							
	INSTITUTIONAL		0.319577		10,000.00							
DANAO SUR	**RESIDENTIAL**	0.29966	2.773543		5,000.00	35%	8%	39%	12%	0%	Yes	
	COMMERCIAL		0.008241		3,000.00							
	INSTITUTIONAL	0.007228	0.192438		10,000.00							
GUINBIRAYAN	**RESIDENTIAL**	0.247212	8.08807	0.03417	6,000.00	40%	11%	35%	35%	0%	Yes	
	COMMERCIAL	0.00156	0.098738		4,000.00							
	INSTITUTIONAL		2.728889		10,000.00							
	CEMETERY		0.656292		2,500.00							
GUINTIGBASAN	**RESIDENTIAL**	0.962729	3.138886		5,000.00	53%	10%	43%	22%	0%	Yes	
	COMMERCIAL	0.006281	0.020695		3,000.00							
	INSTITUTIONAL	0.007798	0.007736		10,000.00							

Barangay	TYPE	EXPOSURE				SENSITIVITY				ADAPTIVE CAPACITY		
		Affected Area (Flood)	Affected Area (Landslide)	Affected Area (Tsunami)	Replacement Cost per Sq. Meter (PHP)	Proportion of building walls with light to salvageable materials	Structure employing hazard resistant building design	Structures with access/area coverage to infrastructure related mitigation measures	Capacity and Willingness to Retrofit or Relocate or conform with New Regulations	Insurance Coverage	Available alternative sites	Government Regulations and Government investments
MAGSAYSAY	**RESIDENTIAL**	1.889769	14.733277		5,000.00	40%	16%	46%	26%	0%	Yes	
	COMMERCIAL	0.028054	0.120551		3,000.00							
	INSTITUTIONAL	0.01073	1.448846		10,000.00							
	MRF	0.035046	0.462045		3,000.00							
MAT-I	**RESIDENTIAL**	1.820452	15.511173		5,000.00	51%	12%	37%	18%	0%	Yes	
	COMMERCIAL	0.048581	0.115944		3,000.00							
	INSTITUTIONAL	0.057724	0.381943		10,000.00							
PANDAN	**RESIDENTIAL**	1.912747	6.258495	1.137358	5,000.00	54%	9%	31%	33%	0%	Yes	
	COMMERCIAL	0.016215	0.0405	0.02398	3,000.00							
	INSTITUTIONAL	0.003471	0.379016	0.003471	10,000.00							
POBLACION	**RESIDENTIAL**	3.305685	20.317767	7.803133	7,000.00	48%	18%	52%	39%	0%	Yes	
	COMMERCIAL		0.515277	0.515277	4,000.00							
	INSTITUTIONAL		0.94577	0.63314	10,000.00							
	INDUSTRIAL		0.008213	0.008213								
	CEMETERY	0.070422	0.802837		2,500.00							
	PARKS AND OPEN SPACES	0.116547	0.146091	0.029455	2,500.00							
TABUGON	**RESIDENTIAL**	0.180444	6.320885	0.227191	5,000.00	49%	11%	39%	32%	0%	Yes	
	COMMERCIAL	0.182796	0.300314	0.227568	3,000.00							
	INSTITUTIONAL	0.507826	1.053512	0.972198	10,000.00							

Appendix Table 24. Lifeline Utilities Exposure and Risk Database

Name	EXPOSURE				VULNERABILITY			ADAPTIVE CAPACITY
	Classification	Total Affected Length/ Posts (Flood)	Affected Length/ Posts (Landslide)	Affected Length/ Posts (Tsunami)	Surface Type	Existing Condition	Employing Hazard Resistant Design	Mitigating Measures
Agmanic	BARANGAY ROADS	2.57248 kilometers	6.67376 kilometers	4.983398 kilometers	Concrete & Gravel	Needs major repair	No	Elevation of roads; Installation of early warning devices; Information, Education, Campaign (IEC); Seawall construction, riprapping of damaged river banks
	PROVINCIAL ROAD		1.21895 kilometer	0.054153 kilometer	Concrete & Gravel	Good	No	
	ELECTRICAL POST	Electrical posts 222 and 223	Electrical posts 208-223	Electrical posts 215-216 218-223	Steel	Good	Yes	
	AGMANIC BRIDGE	3.159797 meters	3.1598 meters	5.027716 meters	Concrete	Needs minor repair	No	
	CAPDANG BRIDGE	5.021776 meters	5.03 meters		Concrete	Needs minor repair	No	
Canyayo	BARANGAY ROADS	0.80854 kilometer	5.51079 kilometers	1.120404 kilometer	Concrete & Gravel	Needs major repair	No	
Danao Norte	PROVINCIAL ROADS	0.00428 kilometer	4.15195 kilometers		Concrete & Gravel	Needs major repair	No	
	BARANGAY ROADS	0.10802 kilometer	2.78373 kilometers		Concrete & Gravel	Needs major repair	No	
	ELECTRICAL POST	Electrical posts 105,106, and 162	Electrical posts 102-105, 109 106, 162-164, 167, 168, 169, 170-174, 176-182		Steel	Good	Yes	

	SANTOL BRIDGE	6.46315 meters	6.46315 meters		Concrete	Good	No	
Danao Sur	**BARANGAY ROADS**	0.32618 kilometer	4.84162 kilometers		Concrete & Dirt Road	Needs major repair	No	
	PROVINCIAL ROADS	0.30059 kilometer	1.03444 kiometer		Concrete & Gravel	Needs major repair	No	
	ELECTRICAL POST	Electrical posts 107, 108, and 111	Electrical posts 100, 107-113, 154-161,		Steel	Good	Yes	
	DANAO SUR BRIDGE	4.87088 meters	4.87088 meters		Concrete	Good	Yes	
Guinbirayan	**BARANGAY ROADS**	0.20804 kilometer	4.48439 killometers	0.75322 kilometer	Concrete & Gravel, Dirt	Needs major repair	No	
	MUNICIPAL ROADS	0.08129 kilometer	1.25654 kilometer		Concrete	Good	No	
	PROVINCIAL ROADS	0.13229 kilometer	1.62611 kilometers		Concrete & Gravel	Needs minor repair	No	
	ELECTRICAL POST	Electrical posts 134, 135, and 136	Electrical posts 114-122, 124- 139, 138-139,		Steel	Good	Yes	
	GUINBIRAYAN BRIDGE	5.91917	5.89898 meters		Concrete	Good	Yes	
	ATIC BRIDGE		4.66651 meters		Concrete	Poor	No	
	GUBA FOOTBRIDGE		9.47518 meters	9.47518 meters	Lumber	Needs major repair	No	
Guintigbasan	**BARANGAY ROADS**	0.46748 kilometer	0.99666 kilometer		Concrete & Dirt Road	Good, Needs minor repair	No	
	PROVINCIAL ROADS	0.59925 kilometer	3.4679 kilometers		Gravel, Dirt Road	Needs minor repairs	No	

	ELECTRICAL POST	Electrical posts 148, 149, 150, 151, 152, and 153	Electrical posts 140-149, 151-153		Steel	Good	Yes	
Magsaysay	**BARANGAY ROADS**	0.81693 kilometer	7.58255 kilometers	1.19066 kilometer	Concrete & Gravel	Needs minor repairs	No	
	PROVINCIAL ROADS	0.69821 kilometer	5.28103 kilometers		Concrete & Gravel	Needs minor repairs	No	
	ELECTRICAL POST	Electrical posts 61, 62, 63, 68, and 69	Electrical posts 187, 186, 61-99, 183-185		Steel	Good	Yes	
	MAGSAYSAY BRIDGE	7.01544 meters	7.01544 meters		Concrete	Needs minor repairs	Yes	
	PALATE P.R. BRIDGE	1.59017	4.99187 meters		Concrete	Good	Yes	
	PALATE B.R. BRIDGE		6.7591 meters		Concrete	Good	Yes	
Mat-i	**BARANGAY ROADS**	0.31574 kilometer	5.95348 kilometers		Concrete & Gravel	Needs minor repair	No	
	PROVINCIAL ROADS	1.22052 kilometer	4.77702 kilometers		Concrete, Gravel	Good, Needs minor repair	No	
	ELECTRICAL POST	Electrical posts 4, 9, 11, 12, and 13	Electrical posts 1-5, 7-10, 12-20, 22-23		Steel	Good	Yes	
Pandan	**BARANGAY ROADS**	0.97075 kilometer	4.23171 kilometers	0.663891 kilometer	Concrete & Gravel	Needs minor repair	No	
	PROVINCIAL ROADS	0.74735 kilometer	3.06749 kilometers	0.975221 kilometer	Concrete & Gravel	Good, Needs major repair	No	
	ELECTRICAL POST	Electrical posts 31-37	Electrical posts 21, 24-36, 38-40	Electrical posts 33-38	Steel	Good	Yes	
	PANDAN BRIDGE	5.13678 meters	10.75299 meters		Steel	Poor	No	

Poblacion	**BARANGAY ROADS**	0.94719 kilometer	4.93375 kilometers	1.767291 kilometer	Concrete & Gravel	Needs minor repairs, needs major repair	No	
	MUNICIPAL ROADS		2.39165 kilometers	2.384381 kilometer	Concrete	Good	No	
	PROVINCIAL ROADS	0.57613 kilometer	1.19521 kilometer	0.346359 kilometer	Concrete	Good	No	
	ELECTRICAL POST	Electrical posts 53, 54, 55, 56, 59, and 60	Electrical posts 41-60	Electrical posts 41-50, 52	Steel	Good	Yes	
	BULANGAN BRIDGE	7.3369 meters	7.3369 meters	7.336904 meters	Concrete	Good	Yes	
	LONGA-OG BRIDGE	7.78359 meters	7.78359 meters		Concrete	Poor	Yes	
Tabugon	**BARANGAY ROADS**	0.92498 kilometer	4.4131 kilometers	3.553069 kilometers	Concrete & Gravel, Dirt Road	Needs major repair	No	
	PROVINCIAL ROADS	1.26884 kilometer	3.57034 kilometers	1.421928 kilometer	Dirt Road, Concrete and Gravel	Needs major repair	No	
	ELECTRICAL POST	Electrical posts 192-194, 199-205	Electrical posts 199-207, 188-196	Electrical posts 203-206, 199-200, 195-196	Steel	Good	Yes	

Appendix Table 25. Critical point Facilities Exposure and Risk Database

Barangay	Facility Type	EXPOSURE			VULNERABILITY			ADAPTIVE CAPACITY
		Storey	Area (Square Meter)	Number of Classrooms/ Rooms/Bed Capacity	Wall Materials	Existing Condition	Employing Hazard Resistant Design	
Agmanic	Barangay Hall	1	64	2	Concrete	Good	Yes	Elevation of facilities prone to flood; Construction of seawall, riprapping of damaged sea banks; Installation of early warning devices; Information, Education, Campaign
	Catholic Church	1	52	1	Concrete	Good	Yes	
	Agmanic Elementary School	1	504	8	Concrete	Good	Yes	
	Barangay Health Center	1	36	2	Concrete	Good	Yes	
	Capdang Catholic Church	1	50	1	Concrete	Good	Yes	
	Agmanic Baptist Church	1	50	1	Concrete	Good	Yes	
Canyayo	Canyayo Catholic Church	1	90	1	Concrete	Good	Yes	
	Canyayo Baptist Church	1	56	1	Concrete	Good	Yes	
	Barangay Hall	2	62	3	Concrete	Good	Yes	
	Lamberto Antaran Memorial School	1	441	7	Concrete	Good	Yes	
	Canyayo Elementary School	1	378	6	Concrete	Good	Yes	
	Health Center	1	15	1	Concrete	Good	Yes	
	Campong Health Center	1	30	1	Concrete	Good	Yes	
	Lunoc Born Again Church	1	50	1	Concrete	Good	Yes	
	Lunoc Catholic Church	1	50	1	Concrete	Good	Yes	
	Campong Catholic Church	1	52	1	Concrete	Good	Yes	
	Campong Born Again Church	1	50	1	Concrete	Good	Yes	

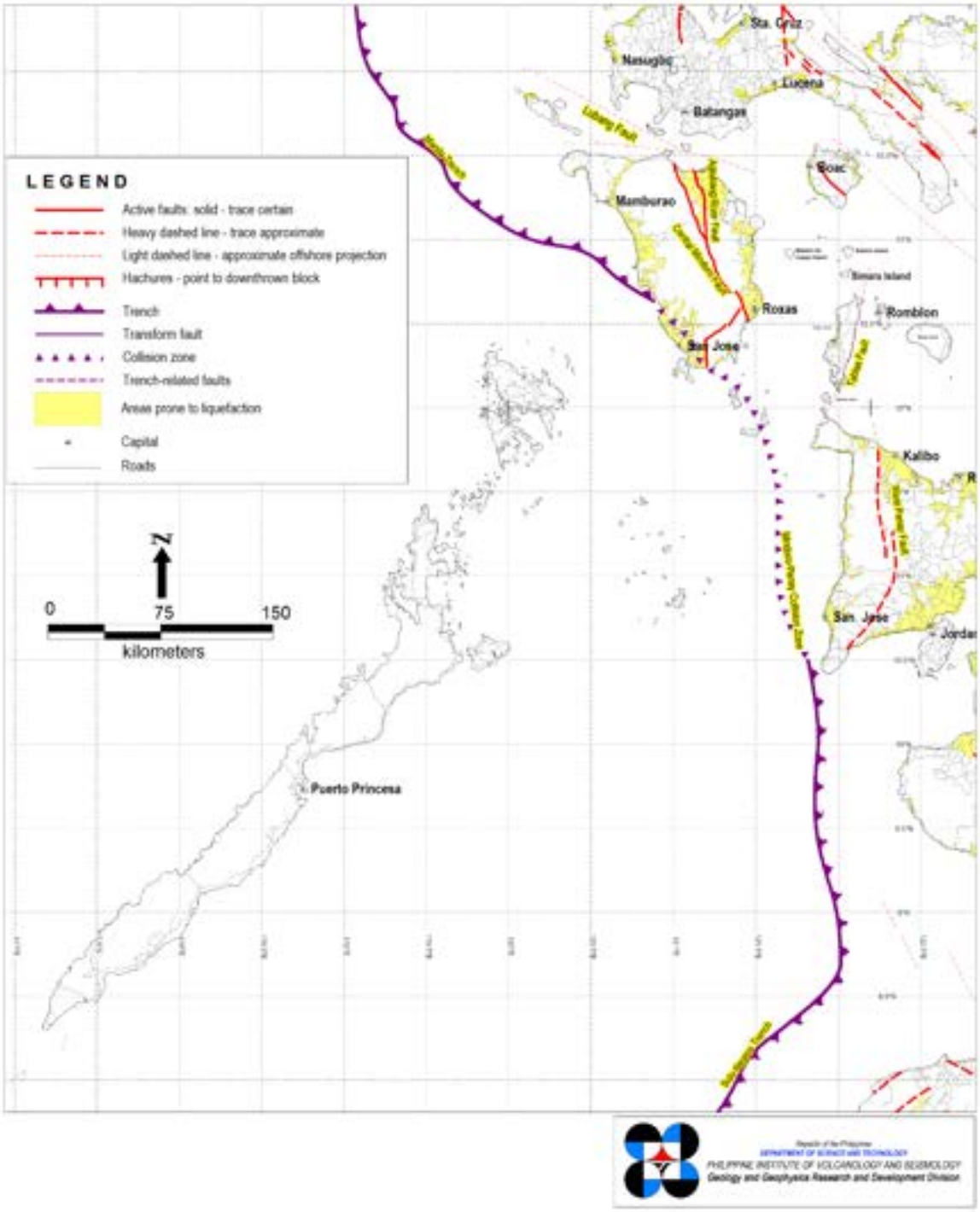
Barangay	Facility Type	EXPOSURE			VULNERABILITY			ADAPTIVE CAPACITY
		Storey	Area (Square Meter)	Number of Classrooms/ Rooms/Bed Capacity	Wall Materials	Existing Condition	Employing Hazard Resistant Design	
	Campong Christian Church	1	50	1	Concrete	Good	Yes	
Danao Norte	Baptist Church	1	30	1	Concrete	Good	Yes	
	Barangay Hall	2	78	5	Concrete	Good	Yes	
	Catholic Church	1	50	1	Concrete	Good	Yes	
	Danao Norte Elementary School	1	378	6	Concrete	Good	Yes	
	Foursquare Church	1	72	1	Concrete	Good	Yes	
	Health Center	1	15	1	Concrete	Good	Yes	
	Seventh Day Adventist	1	21	1	Concrete	Good	Yes	
Danao Sur	Barangay Hall	2	36	2	Concrete	Good	Yes	
	Catholic Church	1	40	1	Concrete	Good	Yes	
	Christian Church	1	52	1	Concrete	Good	Yes	
	Danao Sur Elementary School	1	504	8	Concrete	Good	Yes	
	Foursquare Church	1	48	1	Concrete	Good	Yes	
	Health Center	1	9	1	Concrete	Good	Yes	
Guinbirayan	Catholic Church	1	180	2	Concrete	Good	Yes	
	Baptist Church	1	120	1	Concrete	Good	Yes	
	Barangay Hall	2	70	3	Concrete	Good	Yes	
	Puro Catholic Church	1	40	1	Concrete	Good	Yes	

Barangay	Facility Type	EXPOSURE			VULNERABILITY			ADAPTIVE CAPACITY
		Storey	Area (Square Meter)	Number of Classrooms/ Rooms/Bed Capacity	Wall Materials	Existing Condition	Employing Hazard Resistant Design	
	Guinbirayan Elementary School	1	945	15	Concrete	Good	Yes	
	Foursquare Church	1	45	1	Concrete	Good	Yes	
	VAMS	1	452	4	Concrete	Good	Yes	
	Puro Health Station	1	42	1	Concrete	Good	Yes	
	Health Center	1	32	1	Concrete	Good	Yes	
	Guinbirayan National High School	1	1071	17	Concrete	Good	Yes	
	Philippine Independent Church	1	52	1	Concrete	Good	Yes	
	Guinbirayan Good News Church	1	52	1	Concrete	Good	Yes	
	True Vine Gospel Church	1	52	1	Concrete	Good	Yes	
Guintigbasan	Barangay Hall	2	52	3	Concrete	Good	Yes	
	Catholic Church	1	96	1	Concrete	Good	Yes	
	Guintigbasan Elementary School	1	693	11	Concrete	Good	Yes	
	Health Center	1	30	1	Concrete	Good	Yes	
Magsaysay	Baptist Church	1	60	1	Concrete	Good	Yes	
	Barangay Hall	2	60	3	Concrete	Good	Yes	
	Catholic Church	1	60	1	Concrete	Good	Yes	
	Magsaysay Elementary School	1	504	8	Concrete	Good	Yes	

Barangay	Facility Type	EXPOSURE			VULNERABILITY			ADAPTIVE CAPACITY
		Storey	Area (Square Meter)	Number of Classrooms/ Rooms/Bed Capacity	Wall Materials	Existing Condition	Employing Hazard Resistant Design	
	Health Center	1	20	1	Concrete	Good	Yes	
	Magsaysay Kingdom of God	1	50	1	Concrete	Good	Yes	
	Iglesia ni Cristo	1	50	1	Concrete	Good	Yes	
Mat-I	Catholic Church	1	70	1	Concrete	Good	Yes	
	Barangay Hall	2	30	3	Concrete	Good	Yes	
	Mat-i Health Center	1	30	1	Concrete	Good	Yes	
	Foursquare Church	1	50	1	Concrete	Good	Yes	
	Mat-i Elementary	1	943	6	Concrete	Good	Yes	
	Iglesia ni Cristo	1	50	1	Concrete	Good	Yes	
	Mat-i Catholic Church	1	50	1	Concrete	Good	Yes	
Pandan	Barangay Hall (Ilaya)	1	50	1	Concrete	Good	Yes	
	Barangay Hall	2	50	3	Concrete	Good	Yes	
	Pandan Elementary School	1	567	9	Concrete	Good	Yes	
	Foursquare Church	1	35	1	Light Materials	Fair	No	
	Health Center	1	30	1	Concrete	Good	Yes	
	Saint Joseph Chapel	1	72	1	Concrete	Good	Yes	
Poblacion	Assembly of God	1	96	1	Concrete	Good	Yes	
	Baptist Church	2	104	4	Concrete	Good	Yes	
	Barangay Hall	2	49	3	Concrete	Good	Yes	

Barangay	Facility Type	EXPOSURE			VULNERABILITY			ADAPTIVE CAPACITY
		Storey	Area (Square Meter)	Number of Classrooms/ Rooms/Bed Capacity	Wall Materials	Existing Condition	Employing Hazard Resistant Design	
	Catholic Church	2	508	2	Concrete	Good	Yes	
	Seventh Day Adventist	1	84	1	Concrete	Good	Yes	
	Rural Health Unit	1	440	10	Concrete	Good	Yes	
	Santa Fe National High School	1	1,260	28	Concrete	Good	Yes	
	Santa Fe Central Elementary School	1	1595	21	Concrete	Fair	No	
	Tipolo Catholic Church	1	50	1	Concrete	Good	Yes	
Tabugon	Baptist Church	1	48	2	Concrete	Good	Yes	
	Barangay Hall	1	48	2	Concrete	Good	Yes	
	Tabugon Elementary School	1	567	9	Concrete	Good	Yes	
	Guinpoingan Health Center	1	52	1	Concrete	Good	Yes	
	Guinpoingan Elementary School	1	378	6	Concrete	Good	Yes	
	Health Center	1	34	1	Concrete	Good	Yes	
	Tabugon Catholic Church	1	50	1	Concrete	Good	Yes	

Active Faults and Liquefaction Susceptibility Map of Region IV-B (MIMAROPA)



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