

LAND SUITABILITY MAP

CACAO

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

PROVINCE OF AGUSAN DEL NORTE

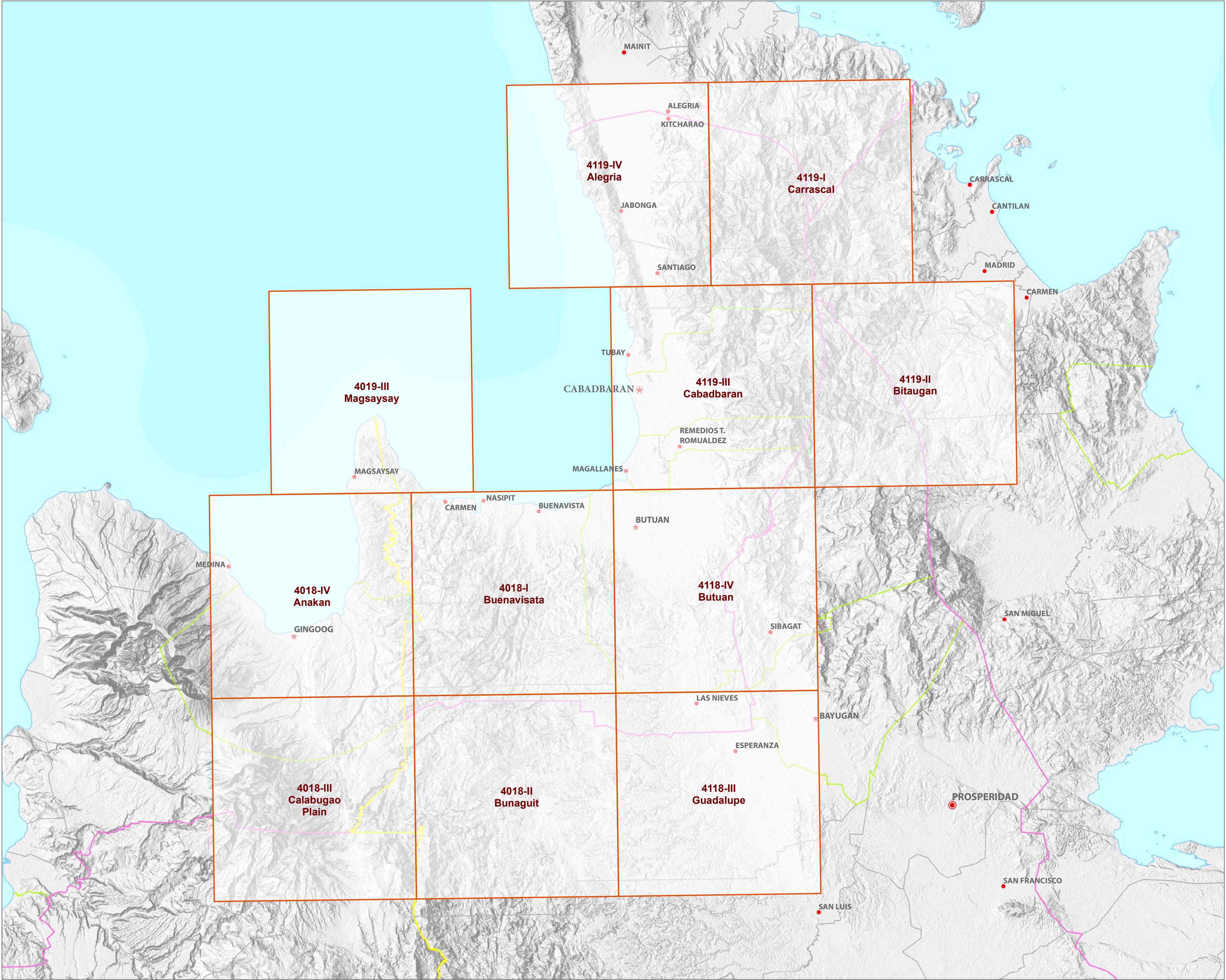


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DEPARTMENT OF AGRICULTURE
BUREAU OF SOILS AND WATER MANAGEMENT

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LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS PROVINCE OF AGUSAN DEL NORTE



LEGEND

Places

- ★ Capital City
- ★ City
- Capital Town
- Town

Administrative Boundary

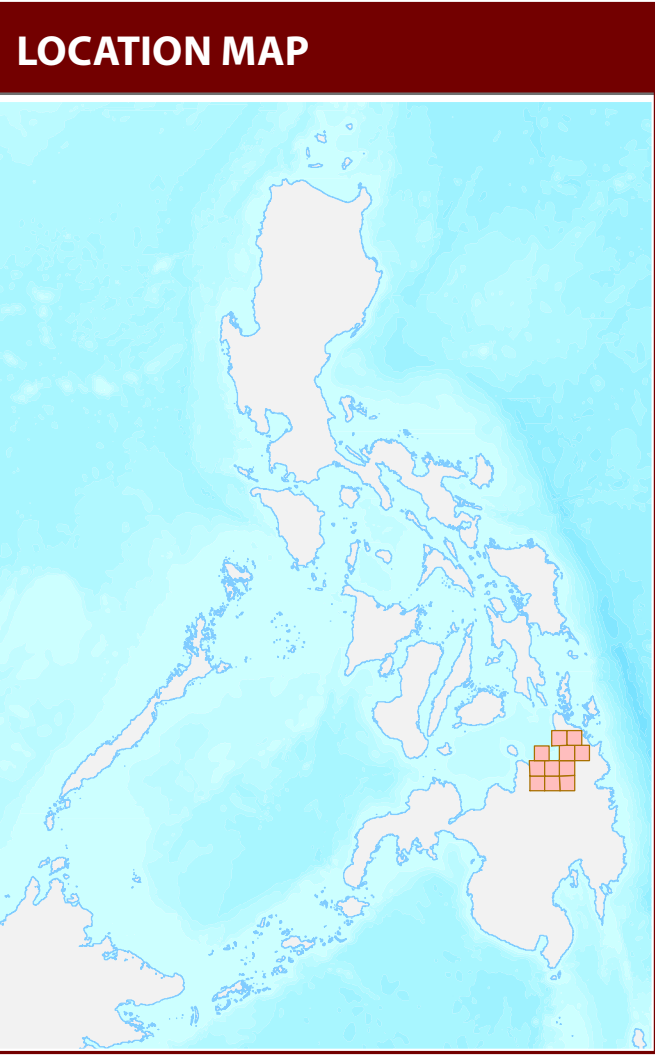
- Regional
- Provincial
- City
- Municipal

Map Index

- Index grid

Topographic Relief

Bathymetry



MISCELLANEOUS INFORMATION

Land suitability information produced by the Bureau of Soils and Water Management (BSWM) through the **Land Resources Evaluation and Suitability Assessment of Strategic Production Areas for Major Commodities Project** duly supported by the Philippine Council on Agriculture and Fisheries (PCAF) and funded by the Bureau of Agricultural Research (BAR).

Map produced by the Geomatics and Soil Information Technology Division, Bureau of Soils and Water Management (BSWM).

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LAND SUITABILITY MAP FOR CACAO

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS AGUSAN DEL NORTE, REGION XIII

EXTENT OF SUITABILITY FOR CACAO PRODUCTION BY MUNICIPALITY

MUNICIPALITY	EXISTING CACAO (Ha)			TOTAL EXISTING AREA (Ha)	EXPANSION AREA (Ha)						CONFLICT RESOLUTION AREA (Ha)						TOTAL POTENTIAL EXPANSION AREA (Ha)
					Coconut		Shrubland, unmanaged*		Grassland, unmanaged*		Corn		Paddy rice, non-irrigated		Other crops		
	S1	S2	S3		S1	S2	S1	S2	S1	S2	S1	S2	S1	S2			
BUENAVISTA	1	-	-	1	7,898	103	434	130	892	80	680	-	-	-	-	-	10,216
BUTUAN CITY	-	-	-	-	20,582	2	249	4	200	-	7,145	-	-	-	-	-	28,181
CARMEN	-	-	-	-	1,839	26	-	-	362	1	141	-	-	-	-	-	2,370
CITY OF CABADBARAN	-	-	-	-	3,703	-	-	-	199	-	2,974	-	-	-	-	-	6,876
JABONGA	-	-	1	1	1,031	221	-	-	109	16	820	-	-	-	-	-	2,197
KITCHARAO	1	-	-	1	1,038	29	15	1	24	6	307	-	-	-	-	-	1,420
LAS NIEVES	-	1	-	1	6,345	365	450	-	319	-	1,381	7	-	-	-	-	8,868
MAGALLANES	-	-	1	1	815	-	-	-	-	-	183	-	-	-	-	-	997
NASIPIT	-	-	-	-	1,175	23	-	-	616	29	420	-	-	-	-	-	2,262
REMEDIOS T. ROMUALDEZ	1	-	-	1	874	-	-	-	-	-	543	-	-	-	-	-	1,417
SANTIAGO	2	-	-	2	1,417	-	-	-	159	-	460	-	-	-	-	-	2,036
TUBAY	1	-	-	1	1,996	338	-	-	13	164	445	-	-	-	-	-	2,955
TOTAL	6	1	2	8	48,714	1,107	1,148	134	2,893	296	15,498	7	-	-	-	-	69,795

Note: Delivery of cacao planting materials must be started on the onset of rainy season.
*establishment of shade trees prior to planting of cacao.

SUITABILITY CLASSES:

<div></div> Highly Suitable (S1) Land having no significant limitation to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.	<div></div> Marginally Suitable (S3) Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.
<div></div> Moderately Suitable (S2) Land having limitation which in aggregate are moderately severe for sustained application of a given use; the limitation will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on class S1 land.	<div></div> Not Suitable / Not Relevant Land having limitations which may be surmountable in time but which cannot be corrected with existing knowledge at currently acceptable cost; the limitations are so severe as to preclude successful sustained use of the land in the given manner. Existing forest, shrubland greater than 18% slope, irrigated paddy rice and miscellaneous land types such as built up areas, roads, etc are considered as not relevant.

AGRONOMIC REQUIREMENT OF CACAO PRODUCTION

LAND UTILIZATION TYPE	SUITABILITY RATING	SLOPE (%)	SOIL DEPTH (cm)	SOIL TEXTURE	SOIL DRAINAGE	SOIL REACTION (pH)	INHERENT FERTILITY	FLOODING CLASS	EROSION CLASS	ROCK OUTCROPS	ELEVATION (masl)	ANNUAL RAINFALL (mm)	CLIMATIC TYPE
Cacao	S1	<8	>100	CL, SICL, SCL, SC, SiC, C, HC	WD,MWD	5.6 -7.2	high	none-slight	none-slight	none-few	<1000	2001-4500	I, III, IV
	S2	8 - 30	50 - 100	FSL, L, SiL	SPD,PD	5.1 - 5.5 7.3 - 7.8	medium	moderate	moderate	common	1000-1500	1000-2000	I, II
	S3	>30	<50	S, LS, CSL, SL	VPD,ED	<5.0 - > 7.9	low	severe	severe	many	>1500	<1000 >4500	

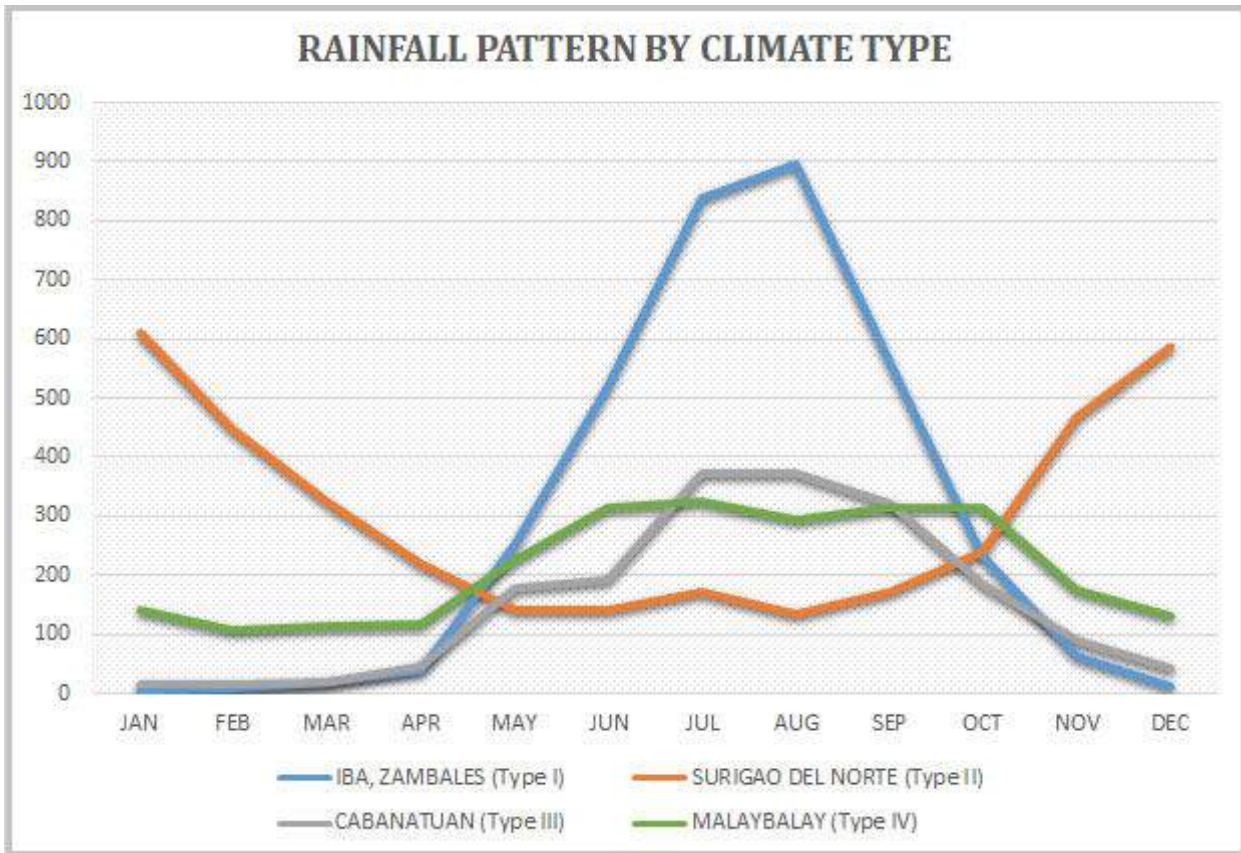
SLOPE (%) 0 - 3 - level to gently sloping 3 - 8 - gently sloping to undulating 8 - 18 - undulating to rolling 18 - 30 - rolling to moderately steep 30 - 50 - steep > 50 - very steep	SOIL DRAINAGE ED - excessively drained WD - well drained MWD - moderately well drained SPD - somewhat poorly drained PD - poorly drained VPD - very poorly drained	SOIL REACTION (pH) < 4.5 - extremely acid 4.5 - 5.0 - very strongly acid 5.1 - 5.5 - strongly acid 5.6 - 6.0 - medium acid 6.1 - 6.5 - slightly acid 6.6 - 7.2 - neutral 7.3 - 7.8 - mildly alkaline 7.9 - 8.4 - moderately alkaline > 8.5 - strongly alkaline	SOIL TEXTURE Coarse S - sand LS - loamy sand CSL - coarse sandy loam SL - sandy loam Medium FSL - fine sandy loam L - loam SiL - silt loam CL - clay loam SiCL - silty clay loam SCL - sandy clay loam	Fine SC - sandy clay SiC - silty clay C - clay HC - heavy clay
SOIL DEPTH (cm) 0 - 30 - very shallow 30 - 50 - shallow 50 - 100 - moderately deep > 100 - deep to very deep	SURFACE IMPEDIMENT ROCK OUTCROPS < 10% - none - few 10 - 30% - common > 30% - many			

LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

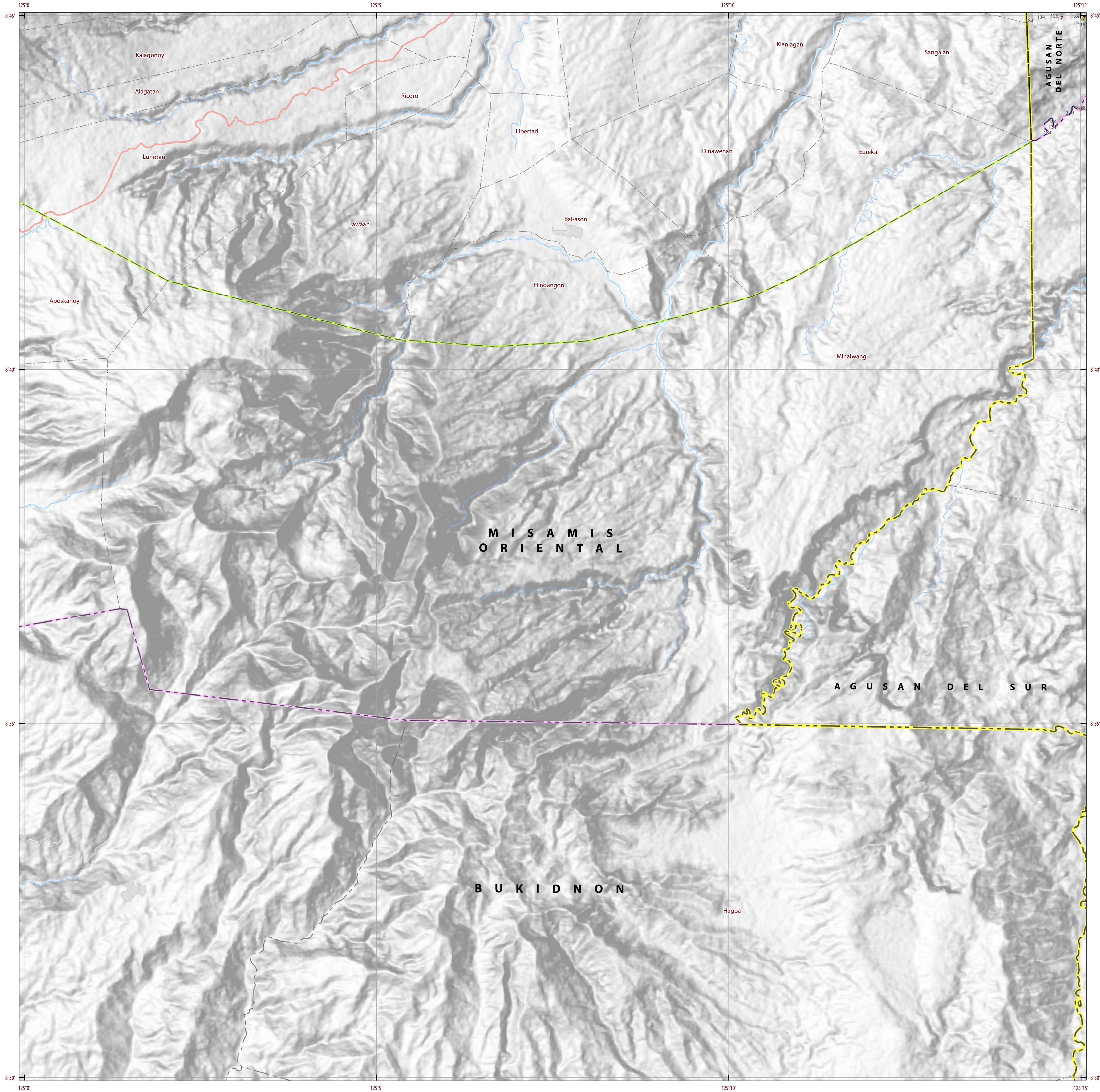
ELEVATION EI2 - 1000m - 1500m EI3 - > 1500m	SOIL DRAINAGE D2 - Somewhat poorly drained to poorly drained D3 - Very poorly drained or excessively drained	SOIL DEPTH Sh2 - Moderately deep (50 - 100cm) Sh3 - Very shallow to shallow (< 50cm)	SOIL EROSION E2 - Moderate erosion E3 - Severe erosion
SLOPE/TOPOGRAPHY T2 - Undulating to moderately steep T3 - Steep to very steep	SOIL TEXTURE Tc - Coarse texture	ROCK OUTCROPS Rc2 - Common Rc3 - Many	FLOODING F2 - Moderate seasonal flooding F3 - Severe seasonal flooding

CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION	CODE	LIMITATION
1	E2	11	F2-D2	21	T2-EI2	31	T2-F3-D2	41	T3-EI2-E3-Sh3-Rc2	51	T3-EI2-E3-Rc3
2	E2-Sh2-Rc2	12	F2-Tc	22	T2-EI2-E3	32	T3	42	T3-EI2-E3-Sh3-Rc3	52	T3-EI2-E3-Sh3-Rc3
3	EI2	13	F3-D2	23	T2-EI2-E3-Rc2	33	T3-E3	43	T3-EI3-E3-Sh2-Rc3	53	T3-EI3
4	EI2-E2-Rc3	14	Sh2	24	T2-EI2-E3-Rc3	34	T3-E3-Sh2-Rc3	44	T3-EI3-E3-Sh3-Rc2	54	T3-EI3-E3-Sh3-Rc3
5	EI2-E3-Rc3	15	Sh2-Rc2	25	T2-EI2-E3-Sh2-Rc2	35	T3-E3-Sh3-Rc2	45	T3-F3-D2	55	T3-EI3
6	EI2-E3-Sh2-Rc3	16	T2	26	T2-EI2-E3-Sh2-Rc3	36	T3-E3-Sh3-Rc3	46	T3		
7	EI2-Rc2	17	T2-E3	27	T2-EI3-E3-Rc2	37	T3-EI2	47	T3-E3		
8	EI2-Sh2-Rc2	18	T2-E3-Rc3	28	T2-EI3-E3-Rc3	38	T3-EI2-E3	48	T3-E3-Sh3-Rc3		
9	EI3-E3-Rc3	19	T2-E3-Sh2-Rc2	29	T2-EI3-E3-Sh2-Rc2	39	T3-EI2-E3-Rc2	49	T3-EI2		
10	EI3-Sh2-Rc2	20	T2-E3-Sh2-Rc3	30	T2-F2-D2	40	T3-EI2-E3-Sh2-Rc3	50	T3-EI2-E3		

CODE	LANDUSE
4	Corn
81	Coffee
82	Cacao
116	Coconut
126	Grassland
130	Bare areas, unmanaged
134	Shrubs, unmanaged



Source: PAGASA 2018, *Climatological Normals (Rainfall)*, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), accessed 27 July 2018, <<https://www1.pagasa.dost.gov.ph/index.php/climate/climatological-normals>>.



LAND SUITABILITY MAP CACAO

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000



Universal Transverse Mercator Zone 51 N, PRS 1992 Datum
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LEGEND

SUITABILITY CLASSES

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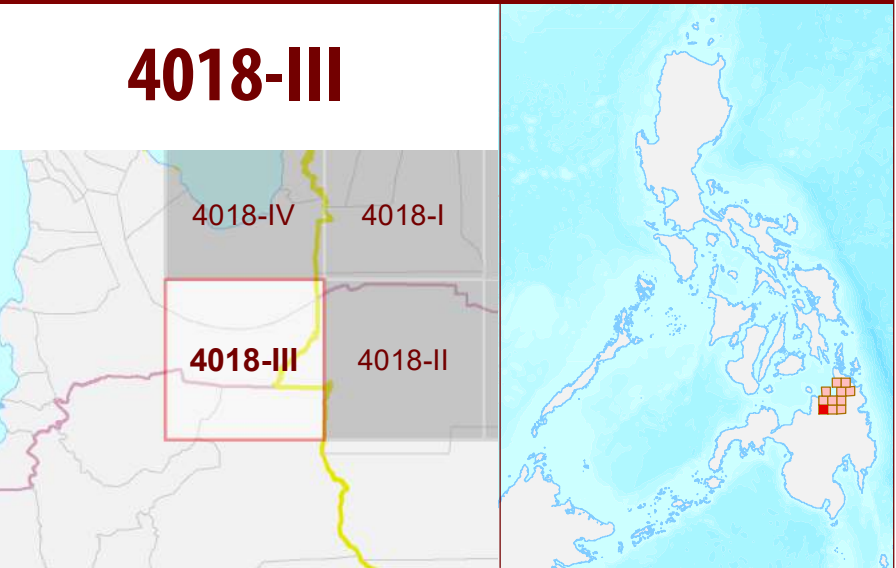
OTHER SIGNS

- NGP Areas
- Cacao
- Land limitation
- Land use

CONVENTIONAL SIGNS

- ROADS**
 - Expressway
 - Trunk line
 - Primary
 - Secondary
 - Tertiary
- BOUNDARY**
 - Region
 - Province
 - District
 - Municipality
 - Barangay
- HYDROLOGY**
 - Sea / Shoreline
 - Lakes / Rivers
- PLACES**
 - Capital City / City
 - Capital Town / Town
- LAND USE**
 - Built-up
 - Fishpond
 - Mangrove

ADJOINING SHEETS



MISCELLANEOUS INFORMATION

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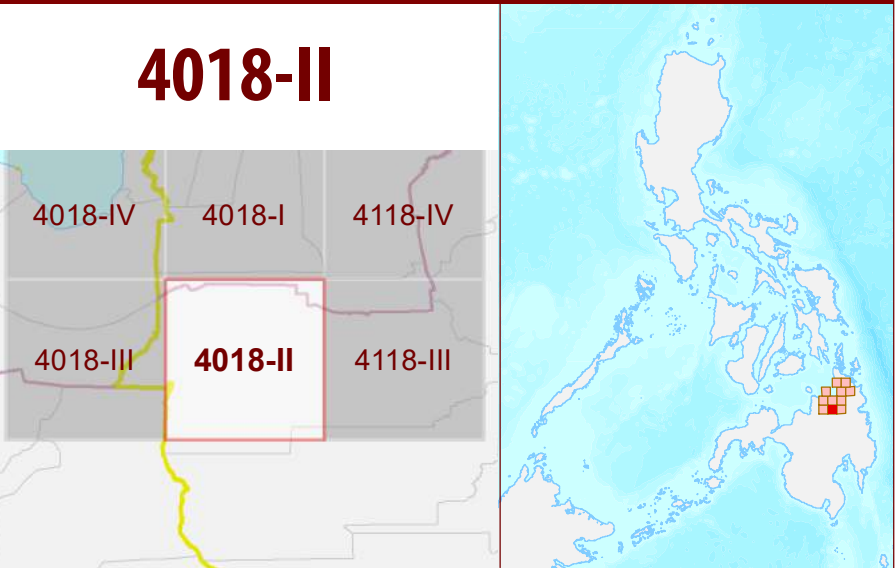
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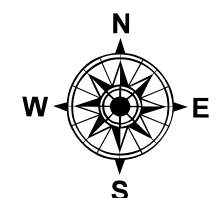
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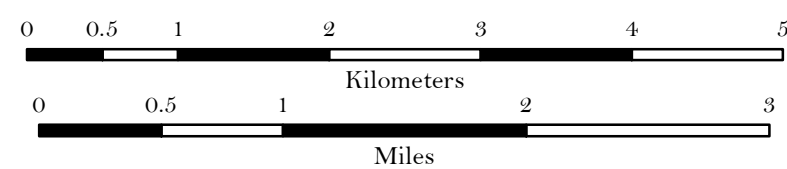
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SCALE 1 : 50 000



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☐ Not Suitable/ Not Relevant

OTHER SIGNS

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CONVENTIONAL SIGNS

ROADS

- Express
Trunk line
Primary
Secondary
Tertiary

BOUNDARY



Sea / Shoreline
Lakes / Rivers

PLACES

★ Capital City / City
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LAND USE

 Built-up Fishpond Mangrove


ADJOINING SHEETS

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4018-II **4118-III**

INDEX MAP




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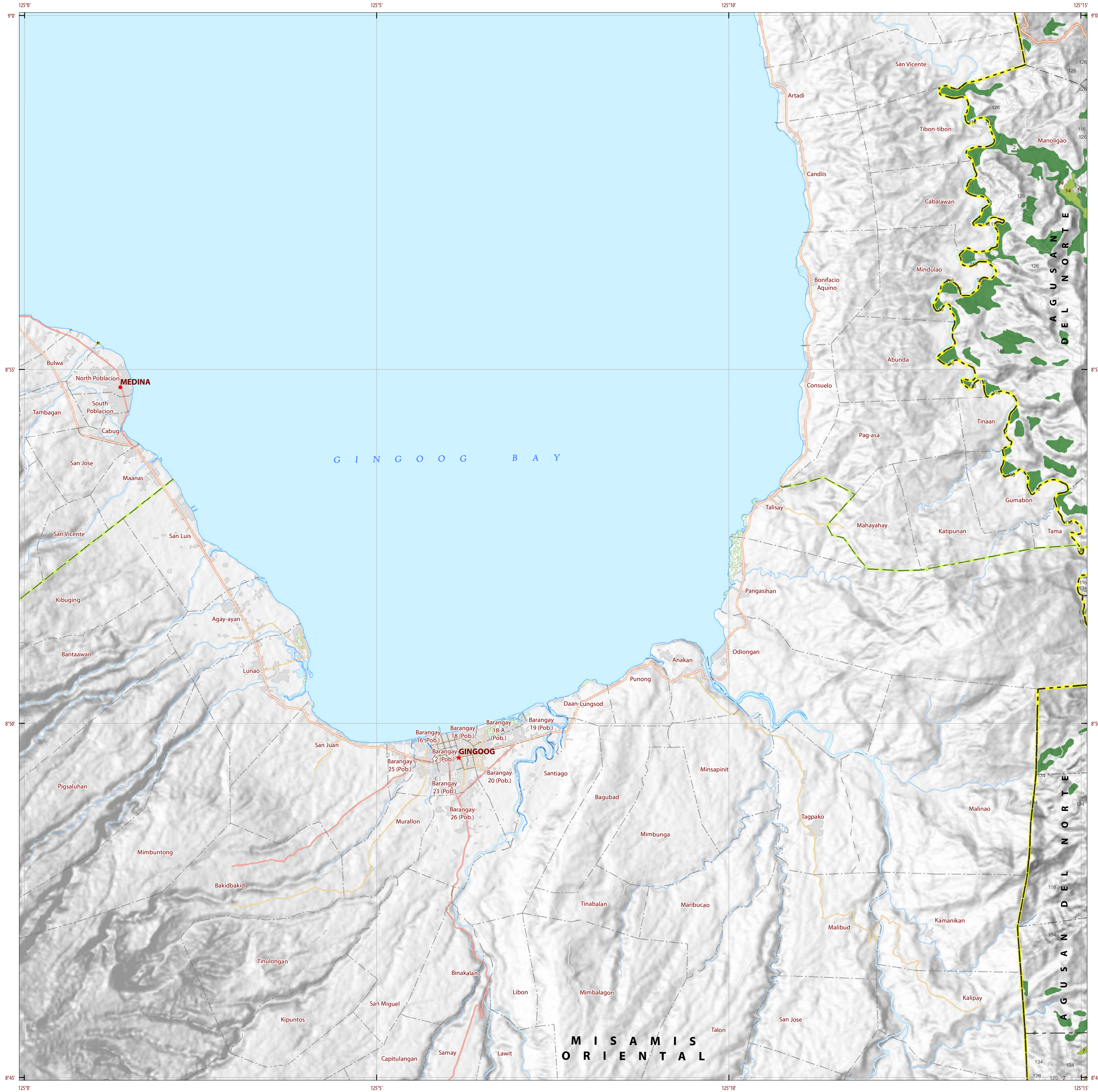
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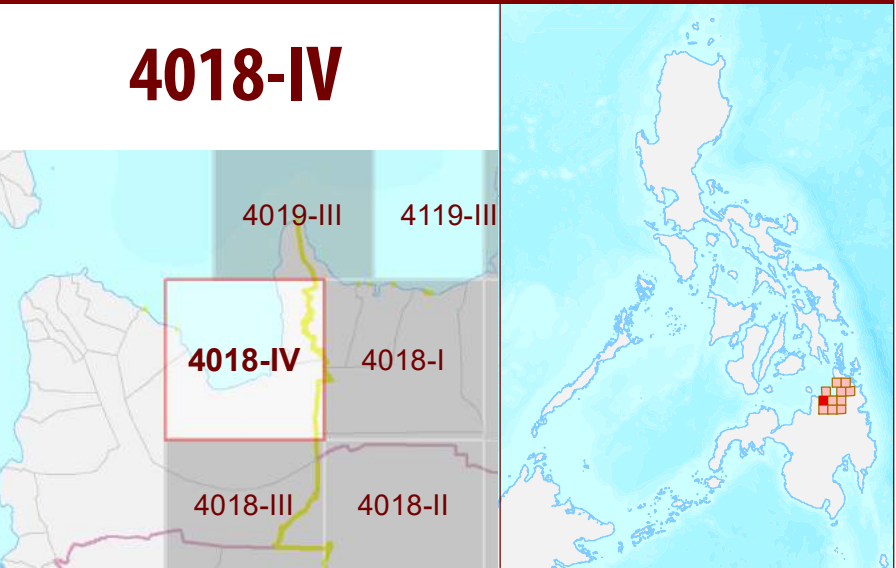
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4018-I

PROVINCE OF AGUSAN DEL NORTE

Buenavisata



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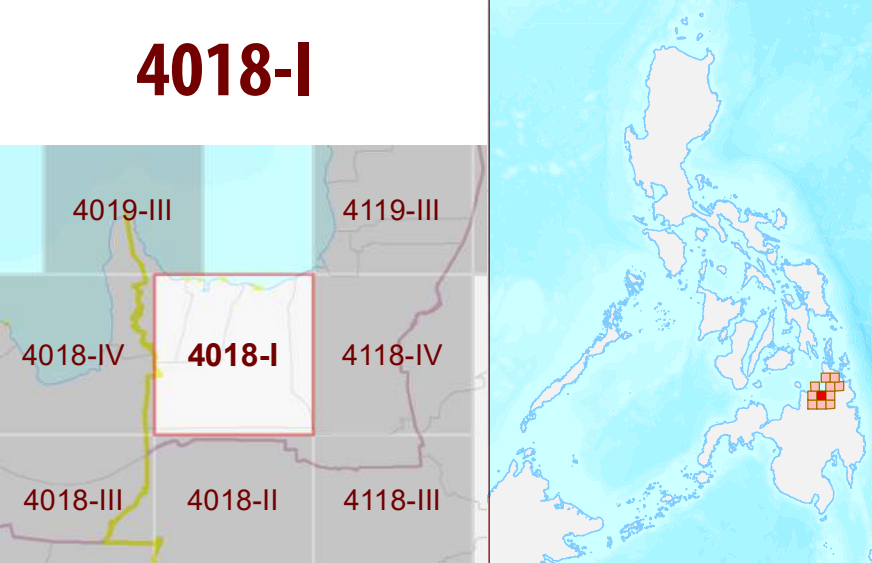
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- ROADS**
 - Expressway
 - Trunk line
 - Primary
 - Secondary
 - Tertiary
- BOUNDARY**
 - Region
 - Province
 - District
 - Municipality
 - Barangay
- HYDROLOGY**
 - Sea / Shoreline
 - Lakes / Rivers
- PLACES**
 - Capital City / City
 - Capital Town / Town
- LAND USE**
 - Built-up
 - Fishpond
 - Mangrove

ADJOINING SHEETS



MISCELLANEOUS INFORMATION

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Project Leader : BERNARDO B. PASCUA
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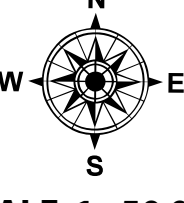
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LAND SUITABILITY MAP
CACAO

LAND RESOURCES EVALUATION AND SUITABILITY
ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000

0 0.5 1 2 3 4 5
Kilometers

0 0.5 1 2 3
Miles

Universal Transverse Mercator Zone 51 N, PRS 1992 Datum
DISCLAIMER : All political boundaries are not authoritative.

LEGEND

SUITABILITY CLASSES

S1

Highly Suitable - Land having no significant limitations to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.

S2

Moderately Suitable - Land having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on class S1 land.

S3

Marginally Suitable - Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.

Not Suitable/ Not Relevant

OTHER SIGNS

NGP Areas

Cacao

Land limitation

Land use

CONVENTIONAL SIGNS

ROADS

Expressway

Trunk line

Primary

Secondary

Tertiary

BOUNDARY

Region

Province

District

Municipality

Barangay

HYDROLOGY

Sea / Shoreline

Lakes / Rivers

PLACES

Capital City / City

Capital Town / Town

LAND USE

Built-up

Fishpond

Mangrove

ADJOINING SHEETS

4118-IV

4019-III 4119-III 4119-II

4018-I 4118-IV

4018-II 4118-III

INDEX MAP

MISCELLANEOUS INFORMATION

SOURCES OF INFORMATION

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Project Leader

IRVIN K. SAMALCA

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Collaborating Agencies

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PROVINCE OF AGUSAN DEL NORTE

Sheet 6 of 11 Sheet No. 4118-IV



LAND SUITABILITY MAP CACAO

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000



Universal Transverse Mercator Zone 51 N, PRS 1992 Datum
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LEGEND

SUITABILITY CLASSES

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Not Suitable/ Not Relevant

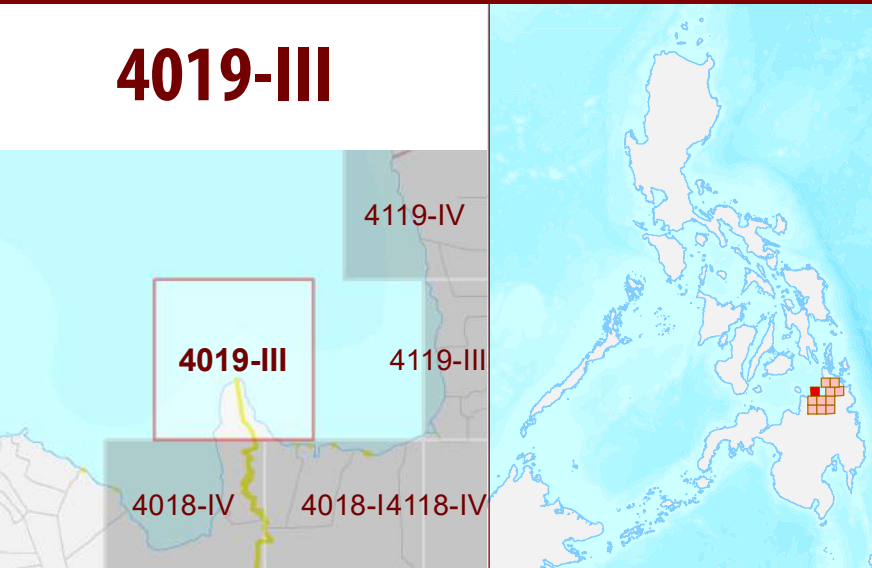
OTHER SIGNS

- NGP Areas
- Cacao
- Land limitation
- Land use

CONVENTIONAL SIGNS

- ROADS**
 - Expressway
 - Trunk line
 - Primary
 - Secondary
 - Tertiary
- BOUNDARY**
 - Region
 - Province
 - District
 - Municipality
 - Barangay
- HYDROLOGY**
 - Sea / Shoreline
 - Lakes / Rivers
- PLACES**
 - Capital City / City
 - Capital Town / Town
- LAND USE**
 - Built-up
 - Fishpond
 - Mangrove

ADJOINING SHEETS



MISCELLANEOUS INFORMATION

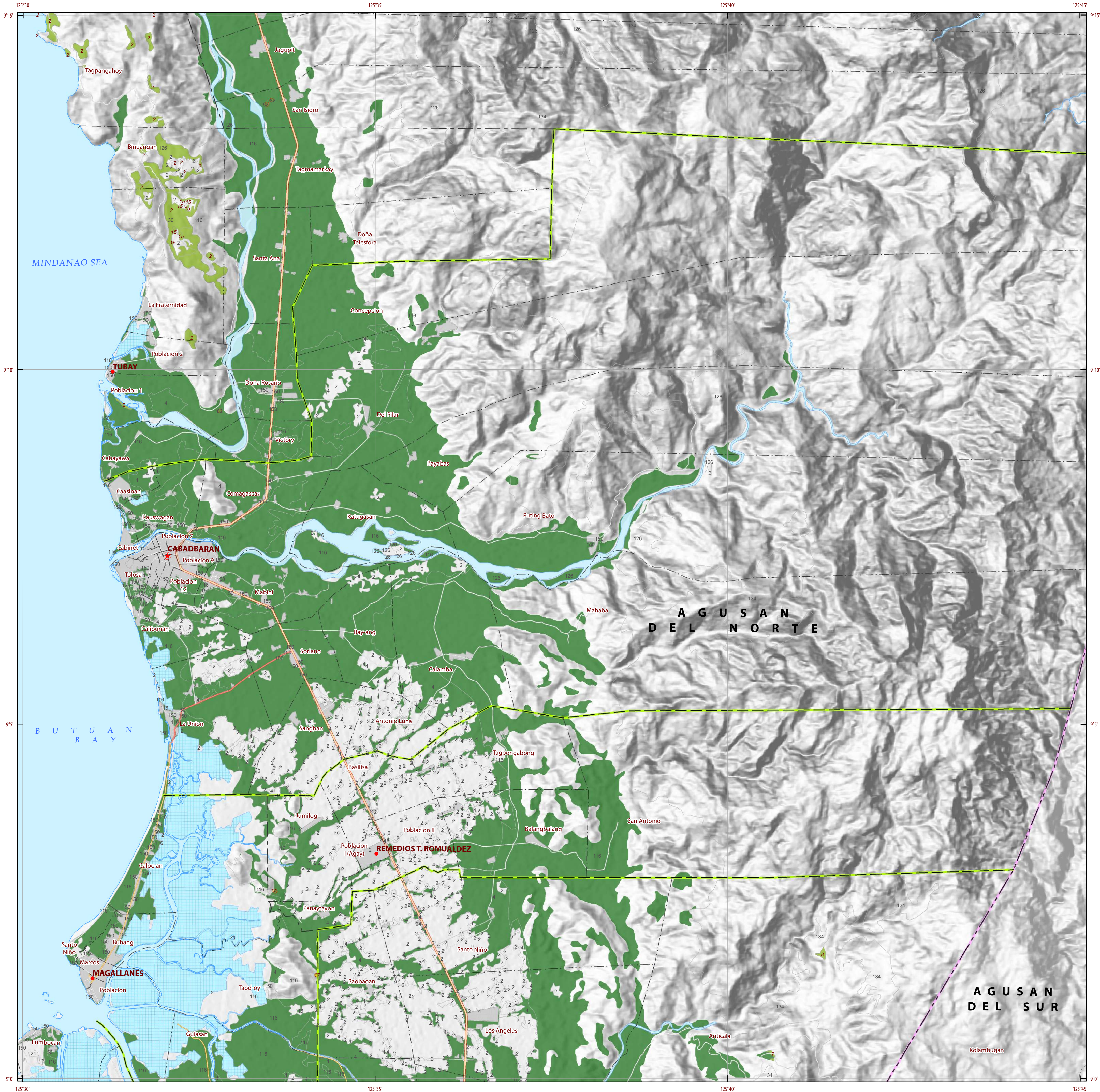
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LAND SUITABILITY MAP
CACAO

LAND RESOURCES EVALUATION AND SUITABILITY
ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000



Universal Transverse Mercator Zone 51 N, PRS 1992 Datum
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LEGEND

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Not Suitable/ Not Relevant

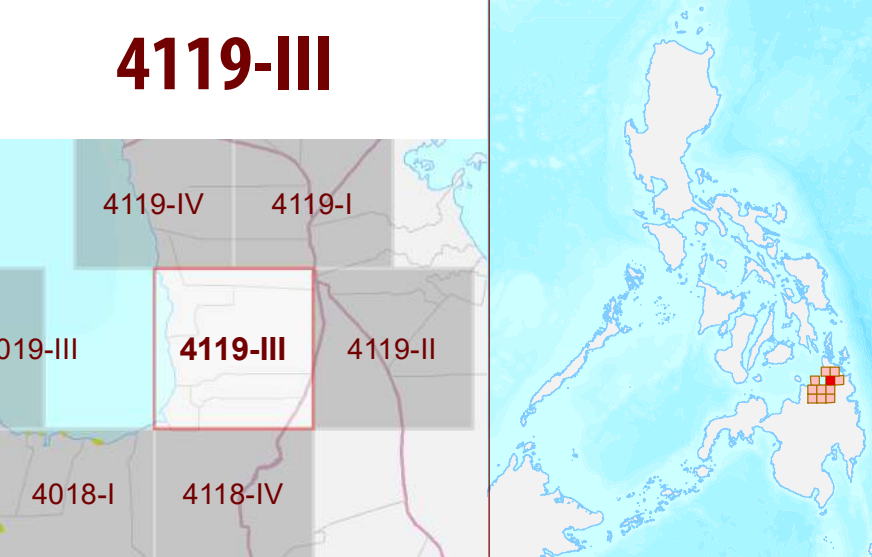
OTHER SIGNS

- NGP Areas
Cacao
Land limitation
Land use

CONVENTIONAL SIGNS

- ROADS**
Expressway
Trunk line
Primary
Secondary
Tertiary
- BOUNDARY**
Region
Province
District
Municipality
Barangay
- HYDROLOGY**
Sea / Shoreline
Lakes / Rivers
- PLACES**
Capital City / City
Capital Town / Town
- LAND USE**
Built-up
Fishpond
Mangrove

ADJOINING SHEETS



MISCELLANEOUS INFORMATION

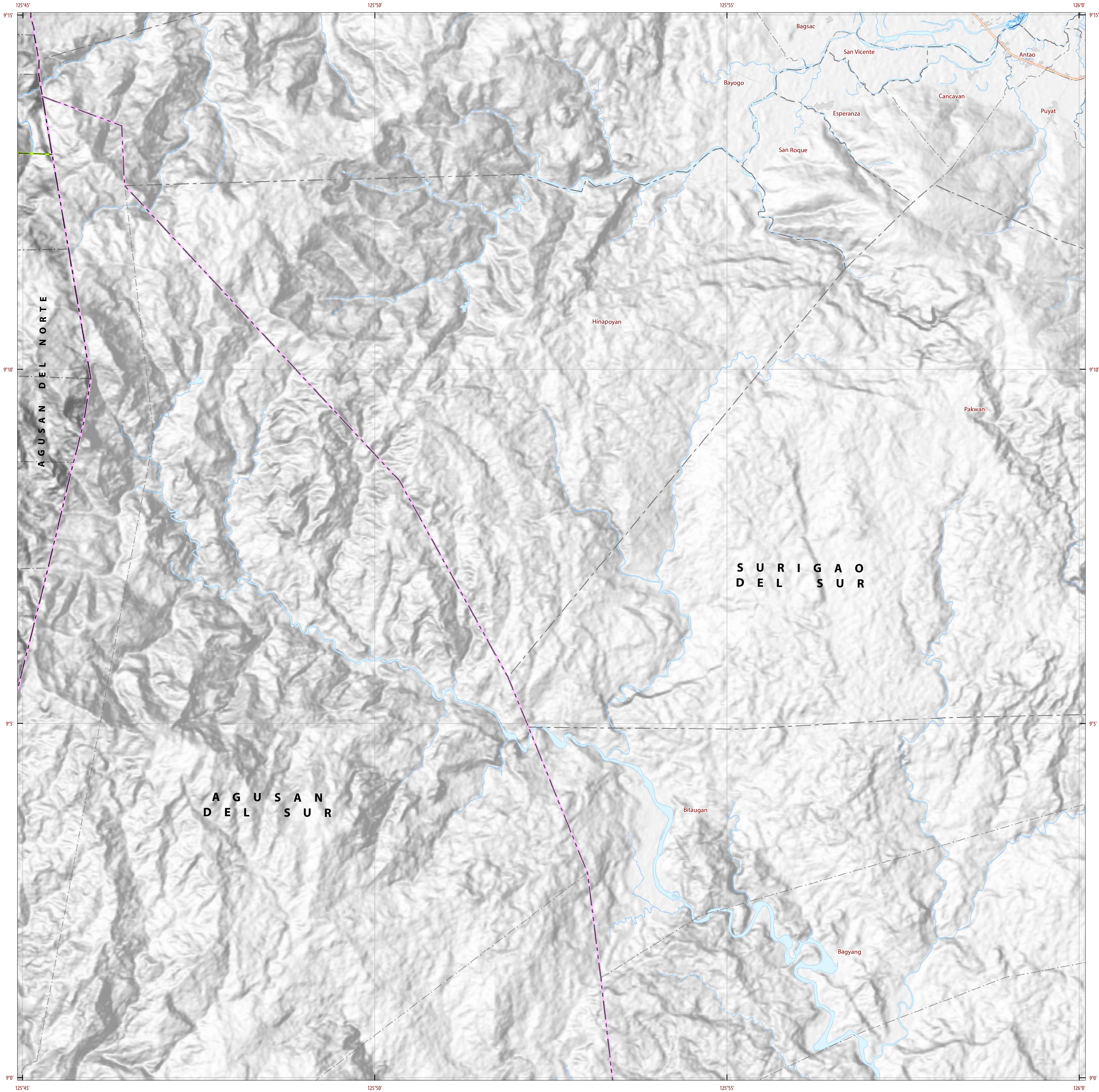
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LAND SUITABILITY MAP CACAO

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000



Universal Transverse Mercator Zone 51 N, PRS 1992 Datum
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LEGEND

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Not Suitable/ Not Relevant

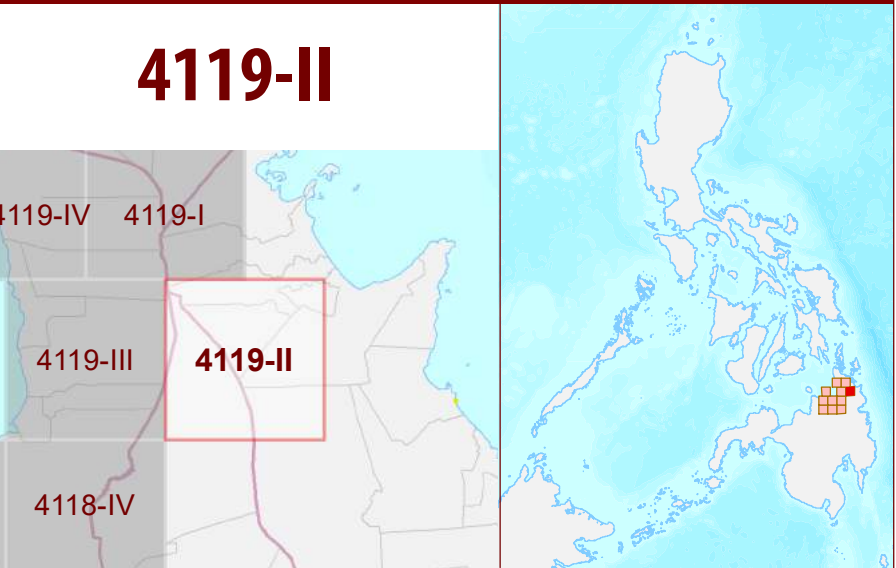
OTHER SIGNS

- NGP Areas
- Cacao
- Land limitation
- Land use

CONVENTIONAL SIGNS

- ROADS**
 - Expressway
 - Trunk line
 - Primary
 - Secondary
 - Tertiary
- BOUNDARY**
 - Region
 - Province
 - District
 - Municipality
 - Barangay
- HYDROLOGY**
 - Sea / Shoreline
 - Lakes / Rivers
- PLACES**
 - Capital City / City
 - Capital Town / Town
- LAND USE**
 - Built-up
 - Fishpond
 - Mangrove

ADJOINING SHEETS



MISCELLANEOUS INFORMATION

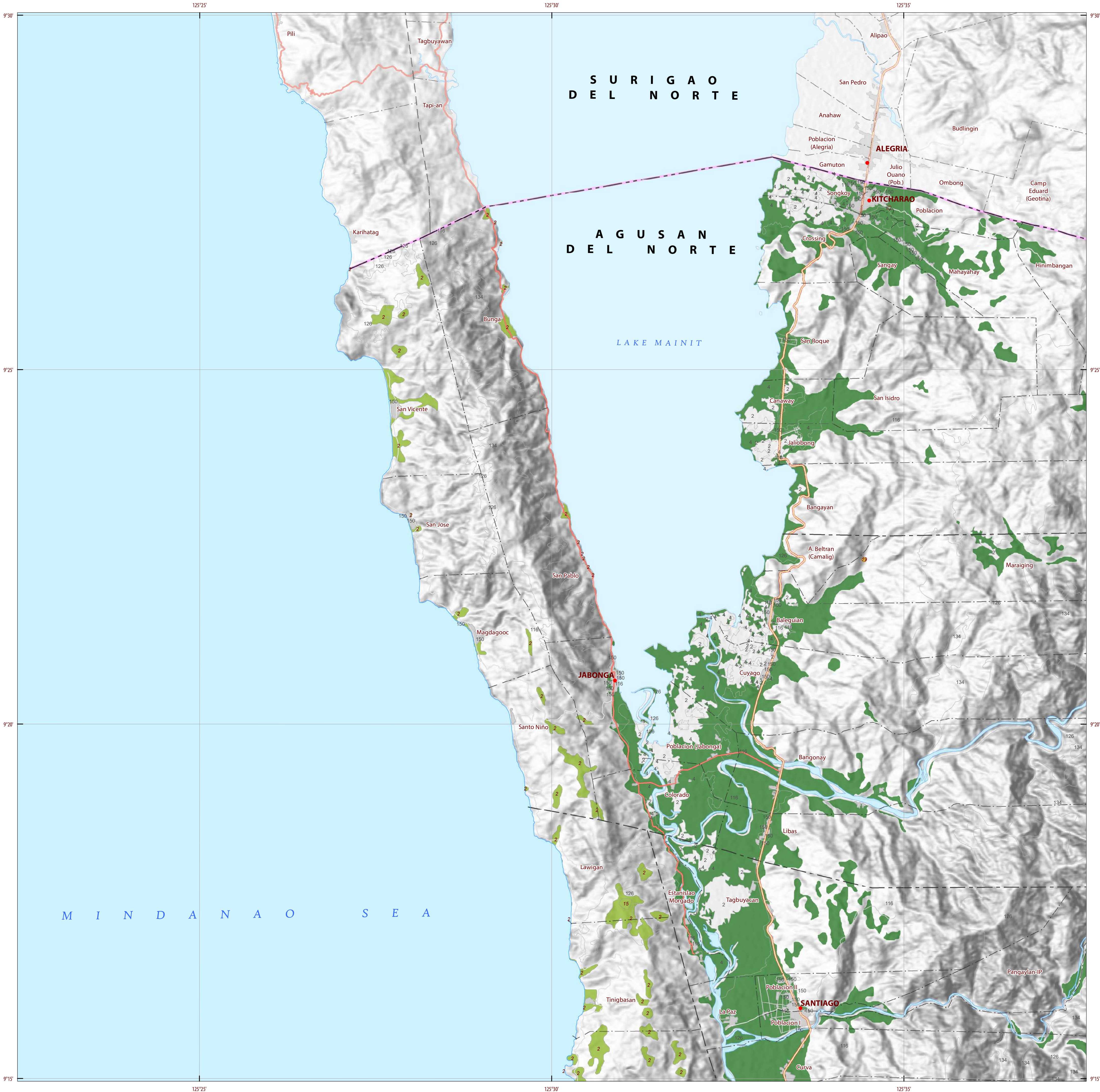
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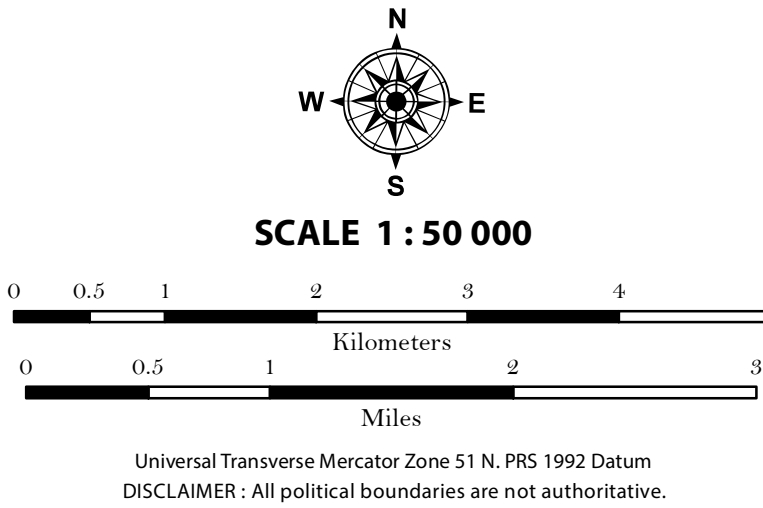
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LAND SUITABILITY MAP
CACAO

LAND RESOURCES EVALUATION AND SUITABILITY
ASSESSMENT OF STRATEGIC PRODUCTION AREAS



LEGEND

SUITABILITY CLASSES

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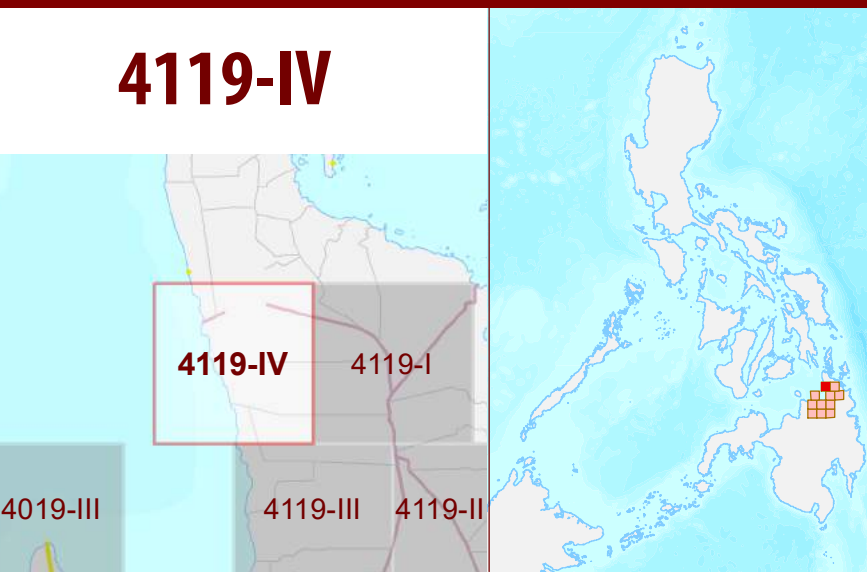
OTHER SIGNS

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CONVENTIONAL SIGNS

- ROADS**
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ADJOINING SHEETS



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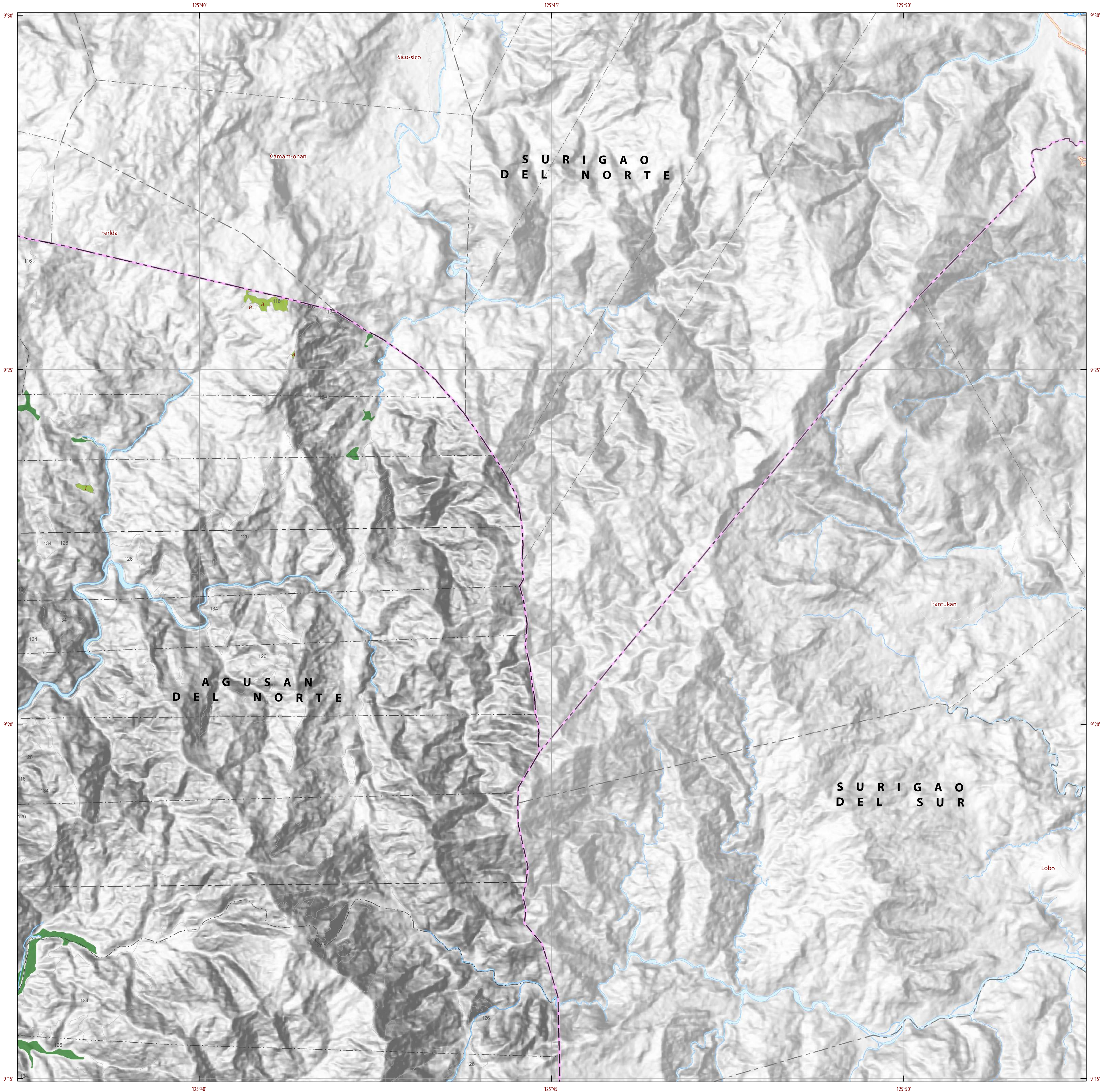
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LAND SUITABILITY MAP CACAO

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000



Universal Transverse Mercator Zone 51 N, PRS 1992 Datum
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LEGEND

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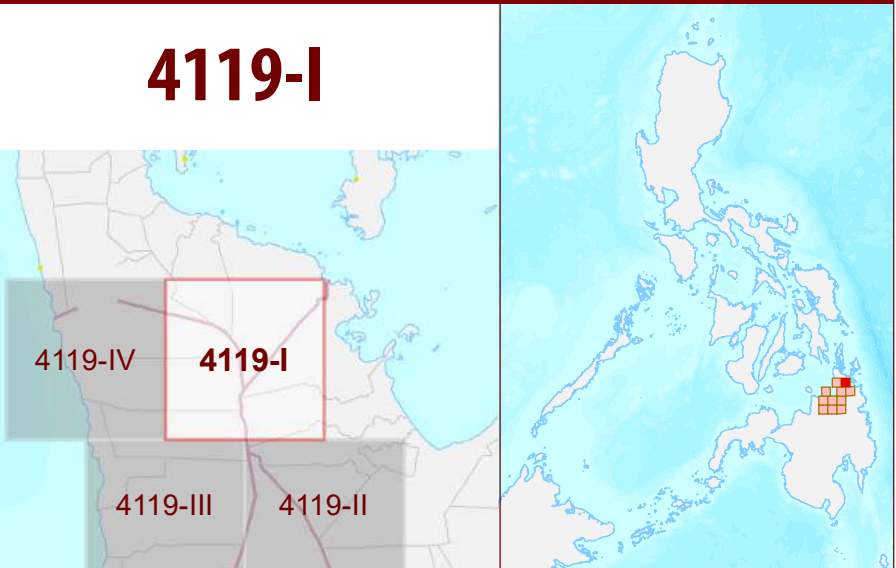
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 - Mangrove

ADJOINING SHEETS



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