

# LAND SUITABILITY MAP

## ARABICA COFFEE

**LAND RESOURCES EVALUATION AND SUITABILITY  
ASSESSMENT OF STRATEGIC PRODUCTION AREAS**

## **PROVINCE OF KALINGA**



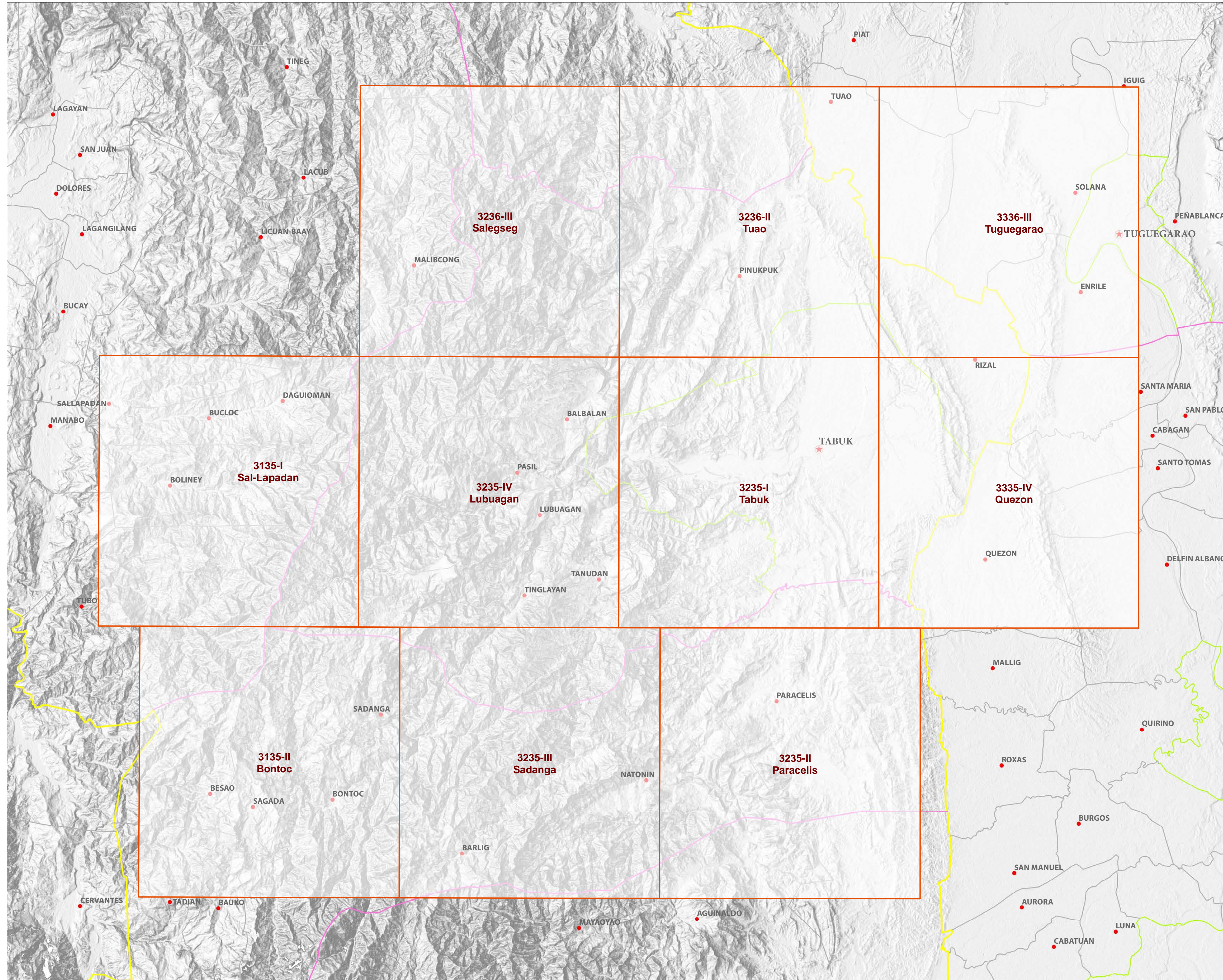
**REPUBLIC OF THE PHILIPPINES**  
**DEPARTMENT OF AGRICULTURE**  
**BUREAU OF SOILS AND WATER MANAGEMENT**

SRDC Bldg., Elliptical Road Cor. Visayas Avenue, Diliman, Quezon City 1101  
Tel/Fax No.: (+632) 332-9534 E-mail: [bswmclientcenter@yahoo.com](mailto:bswmclientcenter@yahoo.com)

# MAP INDEX

LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS

## PROVINCE OF KALINGA



**LEGEND**

**Places**

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

**Administrative Boundary**

- Regional
- Provincial
- City
- Municipal

**Map Index**

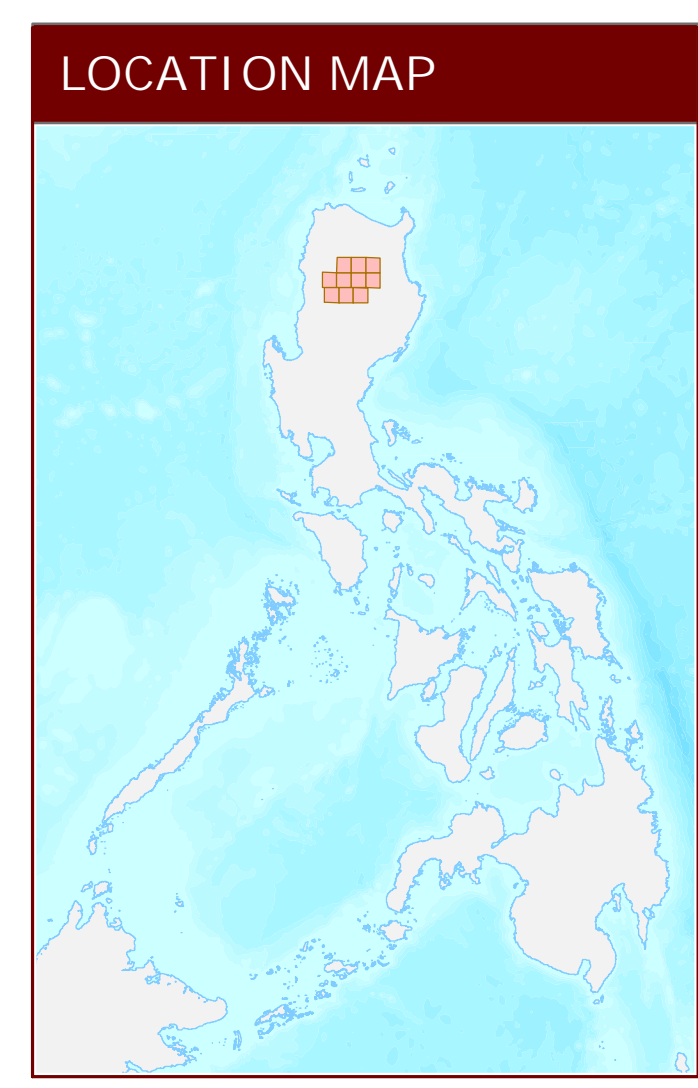
- Index grid

**Topographic Relief**

- Topographic Relief

**Bathymetry**

- Bathymetry



# LAND SUITABILITY MAP FOR ARABICA COFFEE

## LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS KALINGA, CAR

### EXTENT OF SUITABILITY FOR ARABICA COFFEE PRODUCTION BY MUNICIPALITY

MUNICIPALITY	EXISTING COFFEE (Ha)			TOTAL EXISTING AREA (Ha)	EXPANSION AREA (Ha)						CONFLICT RESOLUTION (Ha)						TOTAL POTENTIAL EXPANSION AREA (Ha)
	S1	S2	S3		Coconut		Shrubland, unmanaged*		Grassland, unmanaged*		Corn		Rice paddy, non-irrigated		Other crops		
					S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	S1	S2	
BALBALAN	-	2	227	229	-	-	-	-	-	-	42	-	-	-	-	42	
CITY OF TABUK	-	255	664	919	-	-	8	-	66	-	-	-	-	-	-	74	
LUBUAGAN	-	-	130	130	-	-	-	8	-	-	11	-	-	-	-	18	
PASIL	-	-	128	128	-	-	-	-	-	-	-	-	-	-	-	-	
PINUKPUK	-	244	1,020	1,264	-	-	12	-	9	-	90	-	24	-	-	135	
RIZAL	-	33	90	123	-	-	-	-	-	-	-	-	-	-	-	-	
TANUDAN	-	44	382	426	-	-	50	-	58	-	128	-	7	-	-	242	
TINGLAYAN	-	-	256	256	-	-	9	-	-	-	23	-	-	-	-	32	
<b>TOTAL</b>	-	<b>578</b>	<b>2,897</b>	<b>3,475</b>	-	-	<b>79</b>	<b>8</b>	<b>133</b>	-	<b>293</b>	-	<b>31</b>	-	-	<b>543</b>	

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

### SUITABILITY CLASSES:

**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.

**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.

**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.

**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 ARABICA COFFEE 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
Coffee (Arabica)	S1	<8	>100	CL, SiCL, SCL, SC, SIC, C, HC	WD, MWD	5.6 - 7.2	high	none-slight	none-slight	none-few	1000-2000	2001-4500	I, III, IV
	S2	8 - 30	30 - 100	FSL, L, SiL	SPD, PD	5.1 - 5.5 7.3 - 7.8	medium	moderate	moderate	common	500-1000 2000-2500	1000-2000	I, II
	S3	>30	<30	S, LS, CSI, SL	VPD, ED	<5.0 - > 7.9	low	severe	severe	many	<500 >2500	<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

**SOIL DEPTH**  
Sh2 - Shallow to moderately deep (30 - 100cm)  
Sh3 - Very shallow (< 30cm)

**SOIL EROSION**  
E2 - Moderate erosion  
E3 - Severe erosion

### LAND LIMITATIONS DESCRIPTION AND COMBINATIONS

**ELEVATION**  
EI2 - 500 - 1000m or 2000 - 2500m  
EI3 - < 500m or > 2500m

**SOIL DRAINAGE**  
D2 - Somewhat poorly drained to poorly drained  
D3 - Very poorly drained or excessively drained

**ROCK OUTCROPS**  
Rc2 - Common  
Rc3 - Many

**FLOODING**  
F2 - Moderate seasonal flooding  
F3 - Severe seasonal flooding

**SLOPE/TOPOGRAPHY**  
T2 - Undulating to moderately steep  
T3 - Steep to very steep

**SOIL TEXTURE**  
Tc - Coarse texture

CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION	CODE	LAND LIMITATION
1	E3-Sh2-Rc3	11	Sh2-Rc3	21	T2-EI2-E3-Sh2-Rc2	31	T3-EI2-E3
2	EI2	12	T2	22	T2-EI2-E3-Sh2-Rc3	32	T3-EI2-E3-Rc2
3	EI2-E2-Sh2-Rc2	13	T2-E3	23	T3	33	T3-EI2-E3-Rc3
4	EI2-E3-Sh2-Rc3	14	T2-E3-Rc2	24	T3-E3	34	T3-EI2-E3-Sh3-Rc2
5	EI2-Rc2	15	T2-E3-Rc3	25	T3-E3-Rc2	35	T3-EI2-E3-Sh3-Rc3
6	EI2-Sh2	16	T2-E3-Sh2-Rc2	26	T3-E3-Rc3		
7	EI2-Sh2-Rc2	17	T2-E3-Sh2-Rc3	27	T3-E3-Sh2-Rc3		
8	EI2-Sh2-Rc3	18	T2-EI2	28	T3-E3-Sh3-Rc2		
9	Rc2	19	T2-EI2-E3	29	T3-E3-Sh3-Rc3		
10	Sh2-Rc2	20	T2-EI2-E3-Rc2	30	T3-EI2		

CODE	LAND USE
2	Non-irrigated rice
4	Corn
81	Coffee
82	Cacao
105	Fruit trees, mixed
115	Mixed crops
116	Coconut
126	Grassland
134	Shrubland, unmanaged

### CLIMATE TYPE

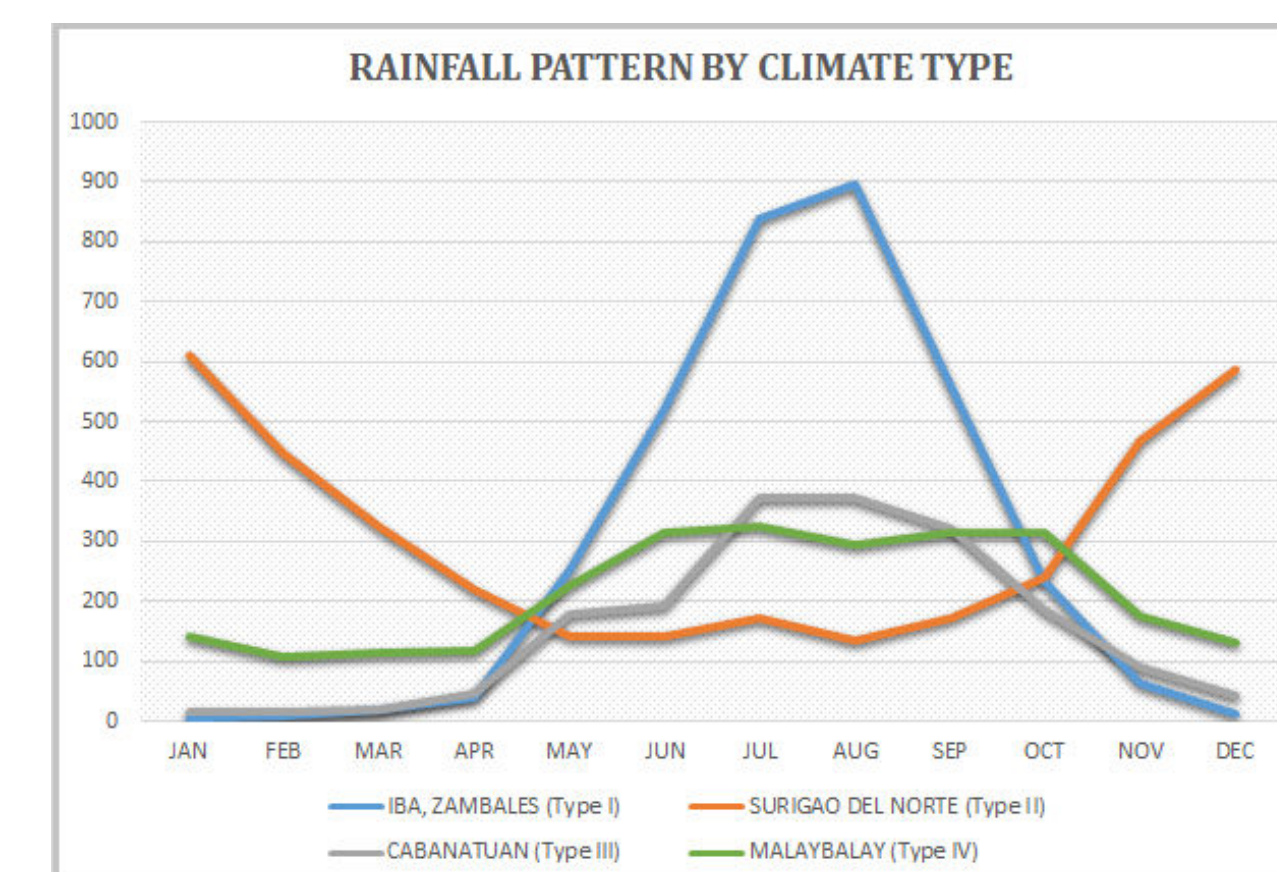
**TYPE I** : Two pronounced season, dry from November to April and wet during the rest of the year. Maximum rain period is from June to September

**TYPE II** : No dry season with a very pronounced maximum rain period from December to February. There is not a single dry month. Maximum monthly rainfall occurs during the period from March to May.

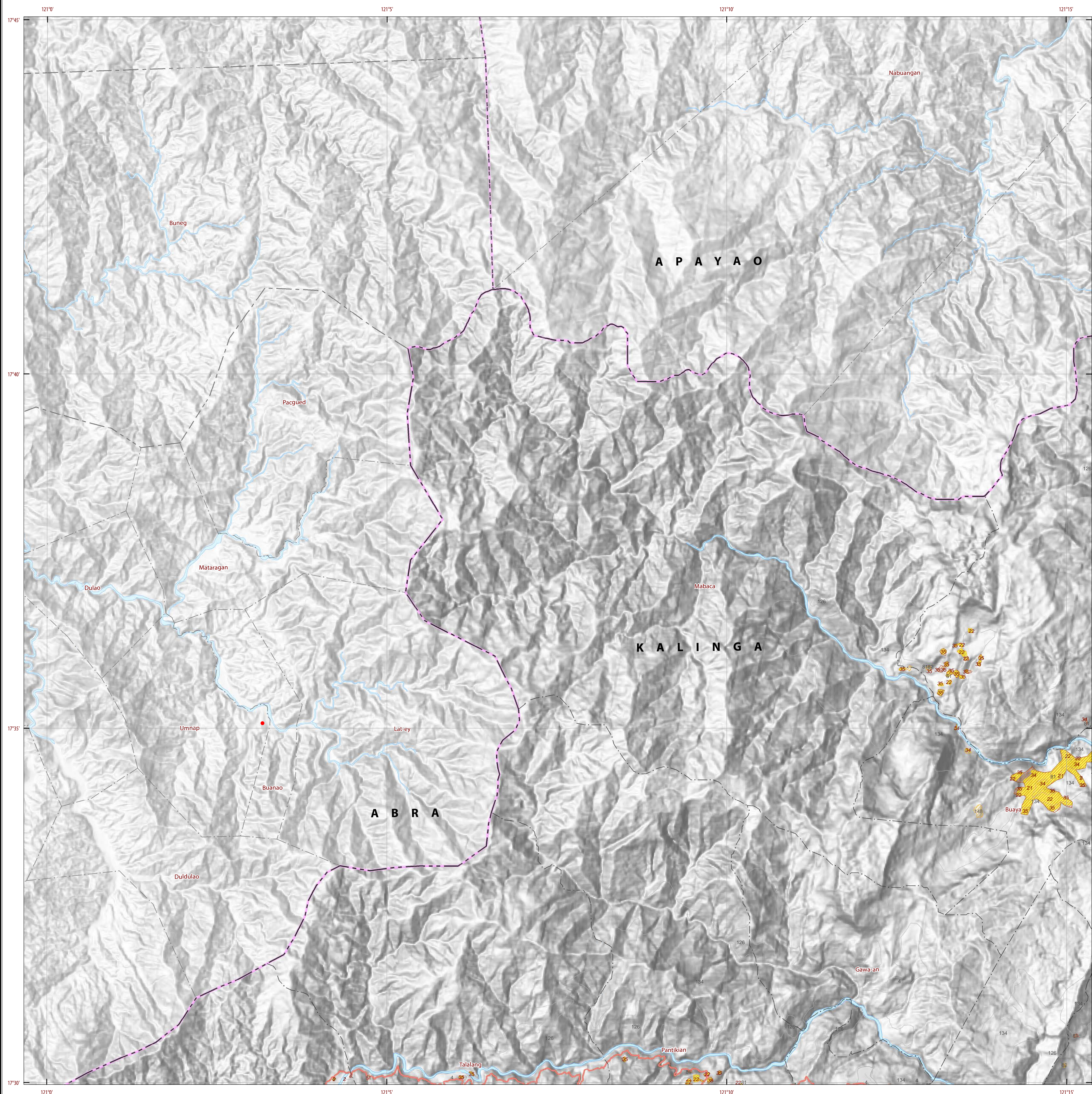
**TYPE III** : No very pronounced maximum rain period, with a dry season lasting only from one to three months, either during the period from December to February or from March to May. This type resembles Type I since it has a short dry season.

**TYPE IV** : Rainfall is more or less evenly distributed throughout the year. This type resembles Type II since it has no dry season.

Northeastern part of Kalinga mostly belongs to Type III climate classification and partly in the Western part belongs to Type I.

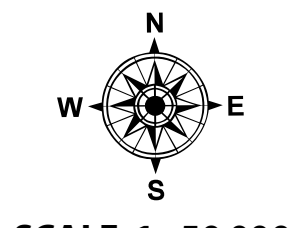


Source: PAGASA 2018, *Climatological Normals (Rainfall)*, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), accessed 27 July 2018, <<https://www1.pagasa.dost.gov.ph/index.php/climate/climatological-normals>>.



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LAND RESOURCES EVALUATION AND SUITABILITY  
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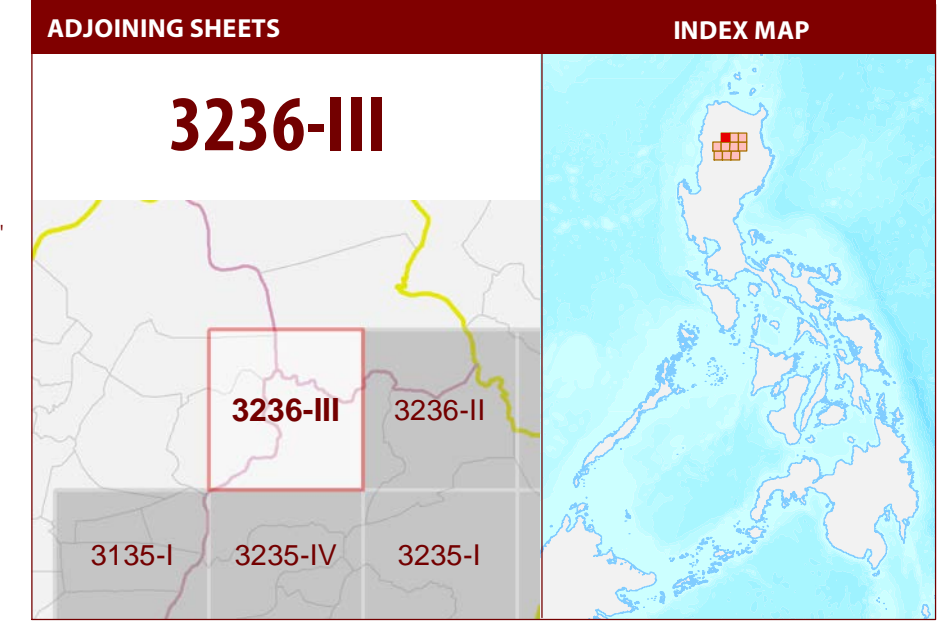


SCALE 1 : 50 000  
Universal Transverse Mercator Zone 51 N, PRS 1992 Datum  
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### LEGEND

- SUITABILITY CLASSES**
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  - 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
  - Coffee
  - Land limitation
  - Land use

- CONVENTIONAL SIGNS**
- |              |                 |                       |
|--------------|-----------------|-----------------------|
| <b>ROADS</b> | <b>BOUNDARY</b> | <b>HYDROLOGY</b>      |
| Expressway   | Region          | Sea / Shoreline       |
| Trunk line   | Province        | Lakes / Rivers        |
| Primary      | District        | <b>PLACES</b>         |
| Secondary    | Municipality    | ★ Capital City / City |
| Tertiary     | Barangay        | ● Capital Town / Town |
- LAND USE**
- Built-up
  - Fishpond
  - Mangrove



### MISCELLANEOUS INFORMATION

**SOURCES OF INFORMATION:** Topographic information taken from NAMRIA Topographic Map at 1:50,000 scale. Land resources information from the Agricultural Land Management and Evaluation Division (ALMED), Soils Survey Division (SSD) and Laboratory Services Division (LSD) of BSWM. Rice areas obtained from the Land Use System (FAO, 2015) and Philippine Rice Information System (PRISM) (IRRI, 2015). Data analysis and compilation through the Land Resources Evaluation and Suitability Assessment of Strategic Production Areas for Coffee and Cacao Project implemented by BSWM (2017).

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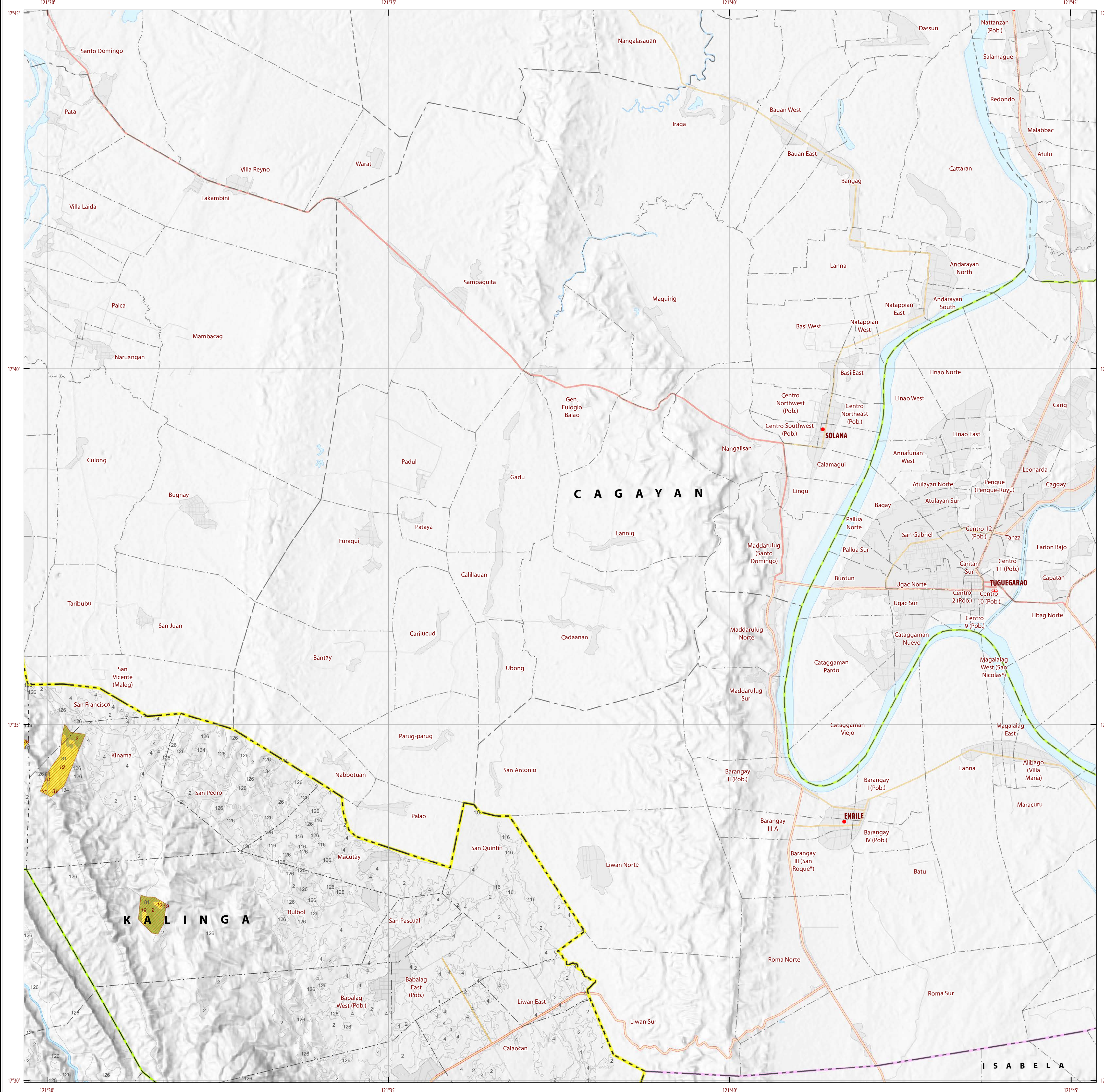
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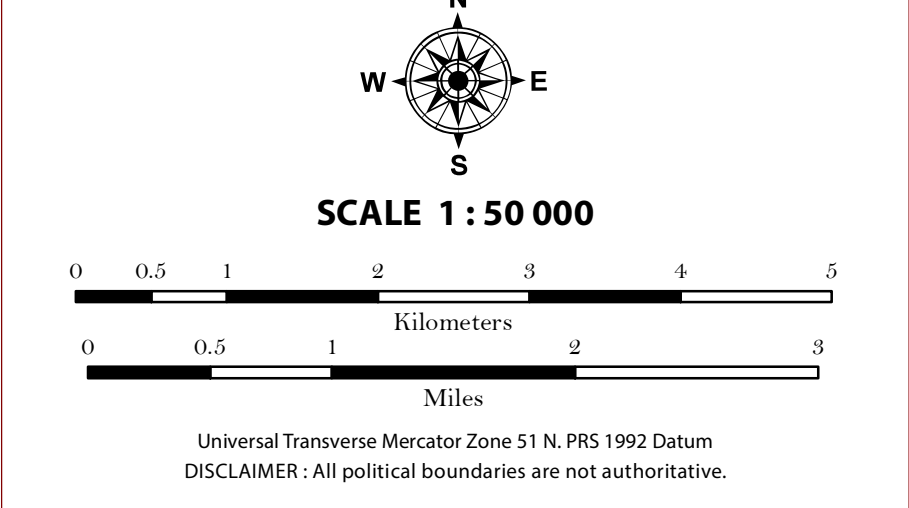
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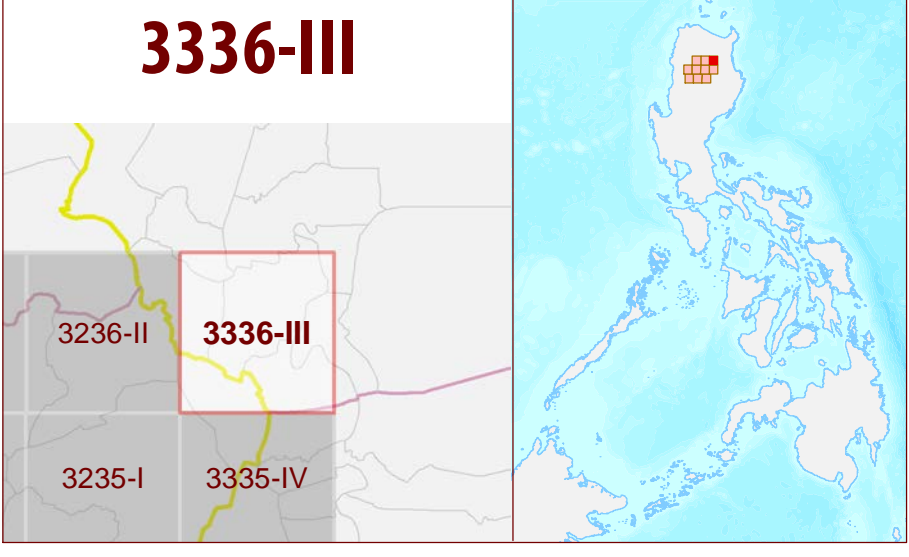
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#### CONVENTIONAL SIGNS

- ROADS**
- Expressway
  - Trunk line
  - Primary
  - Secondary
  - Tertiary
- BOUNDARY**
- Region
  - Province
  - District
  - Municipality
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#### ADJOINING SHEETS



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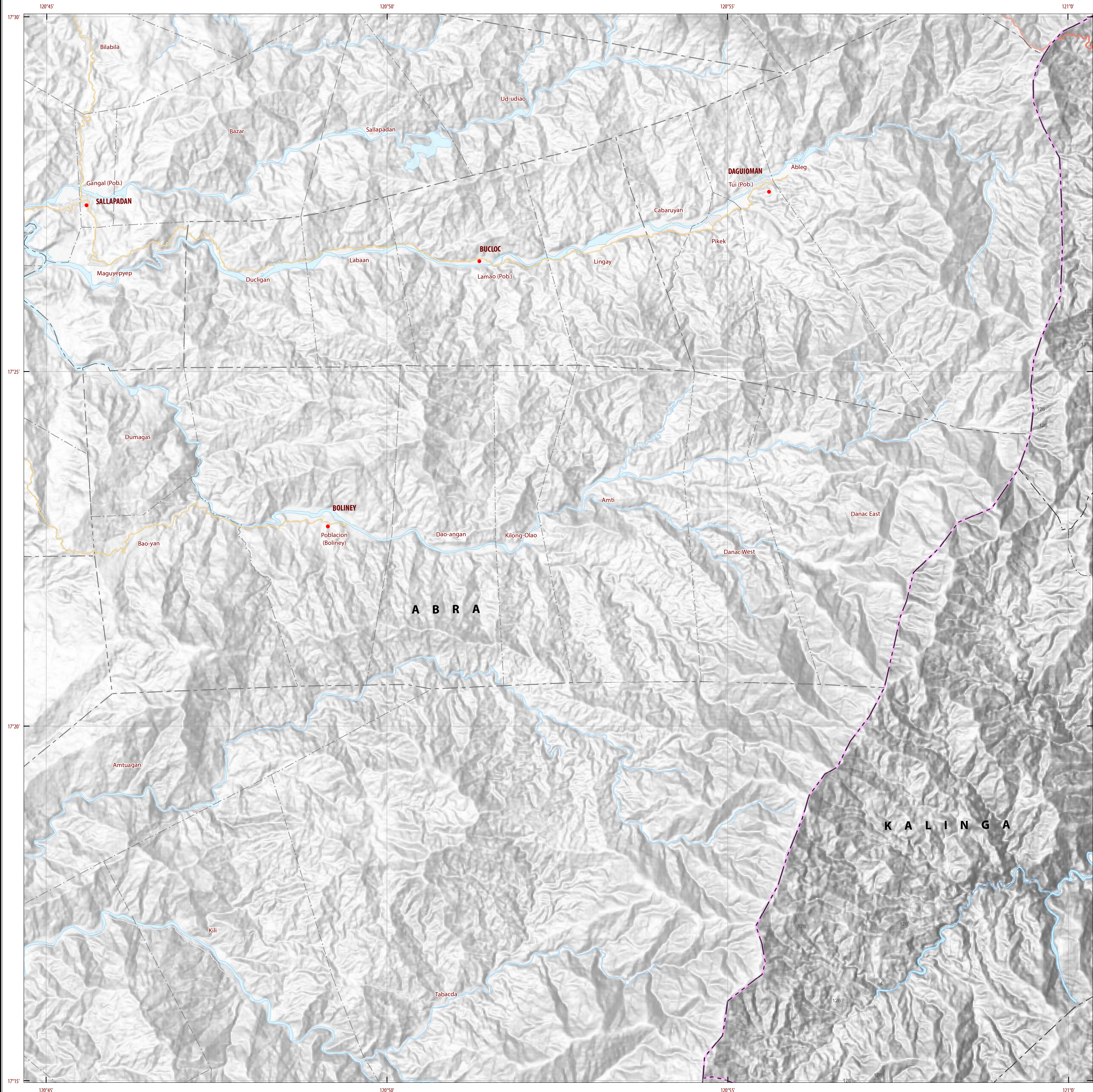
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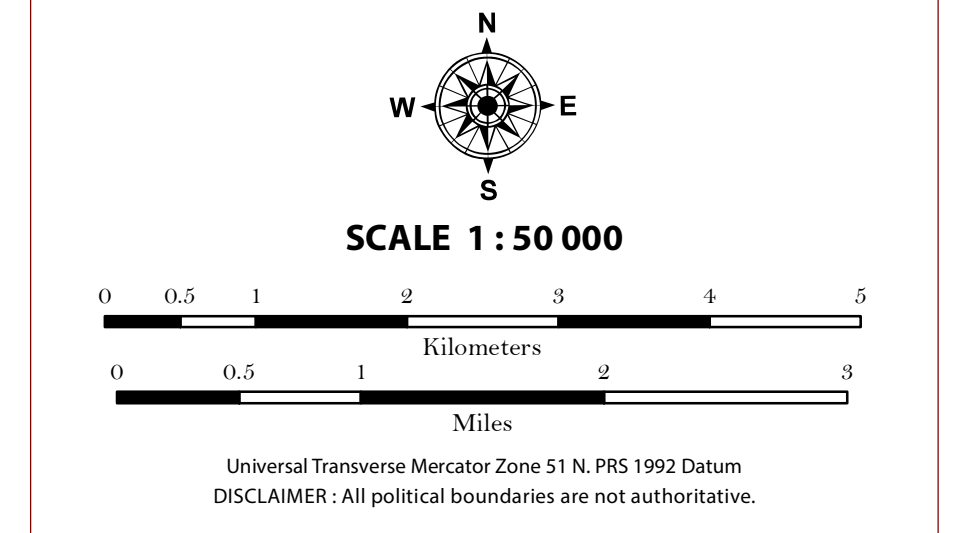
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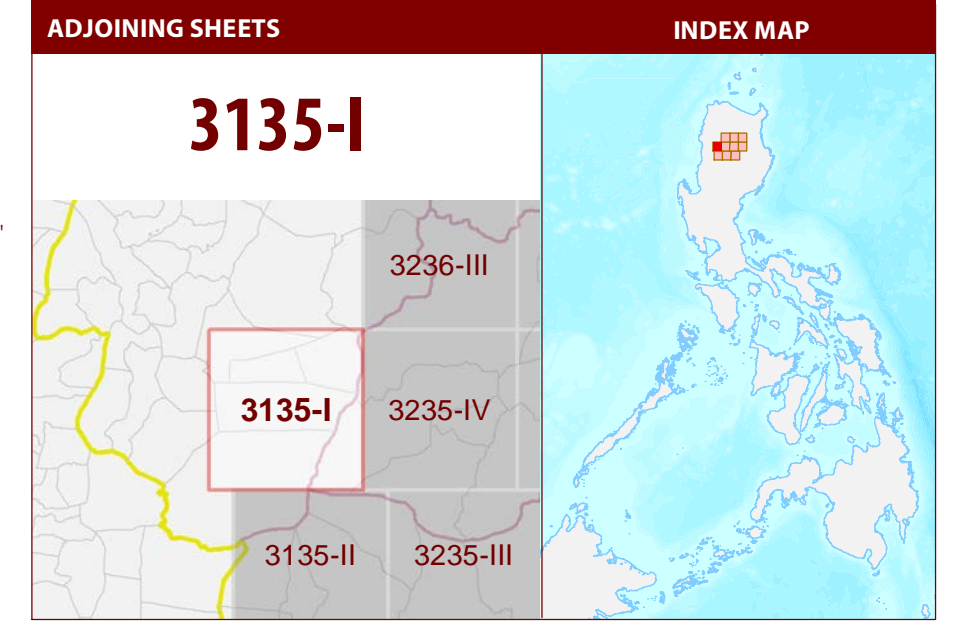
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- OTHER SIGNS**
- NGP Areas
  - Coffee
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- CONVENTIONAL SIGNS**
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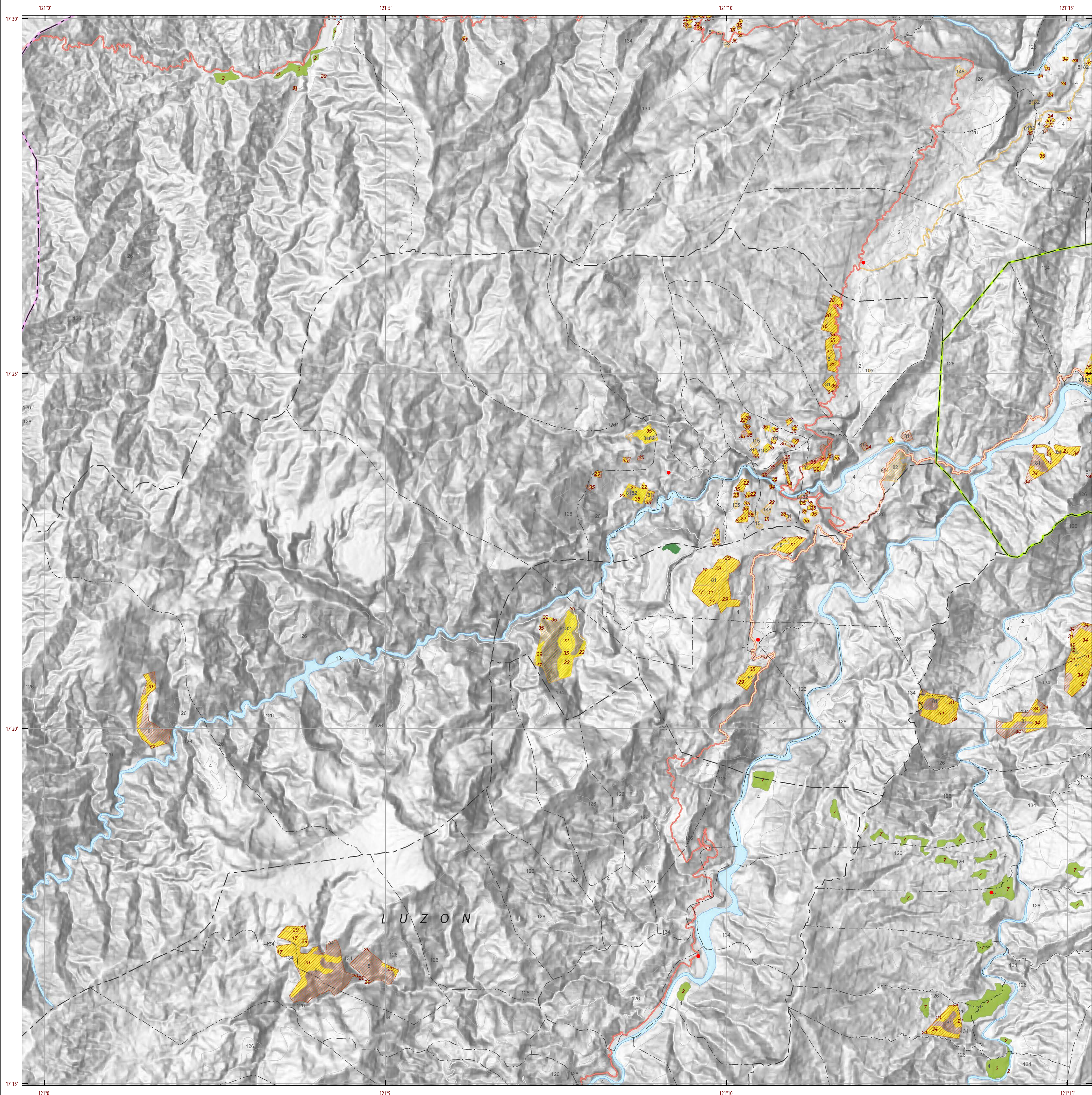
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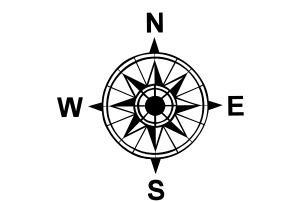
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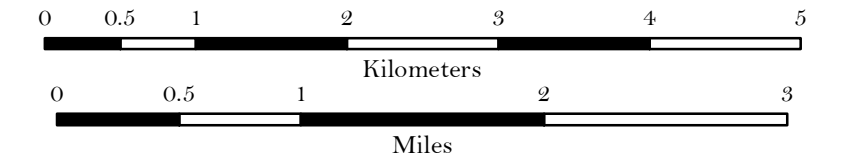


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SCALE 1 : 50 000

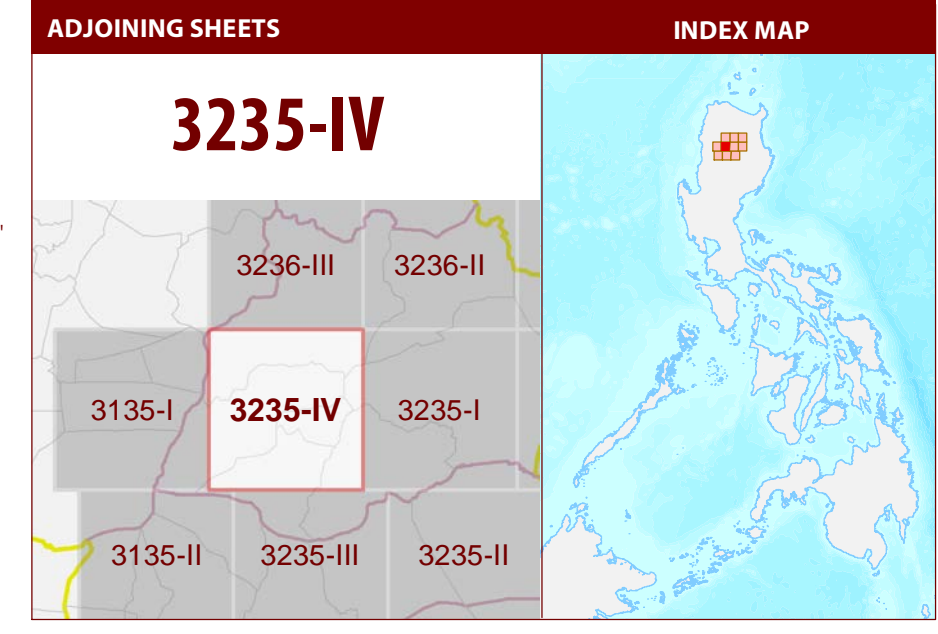


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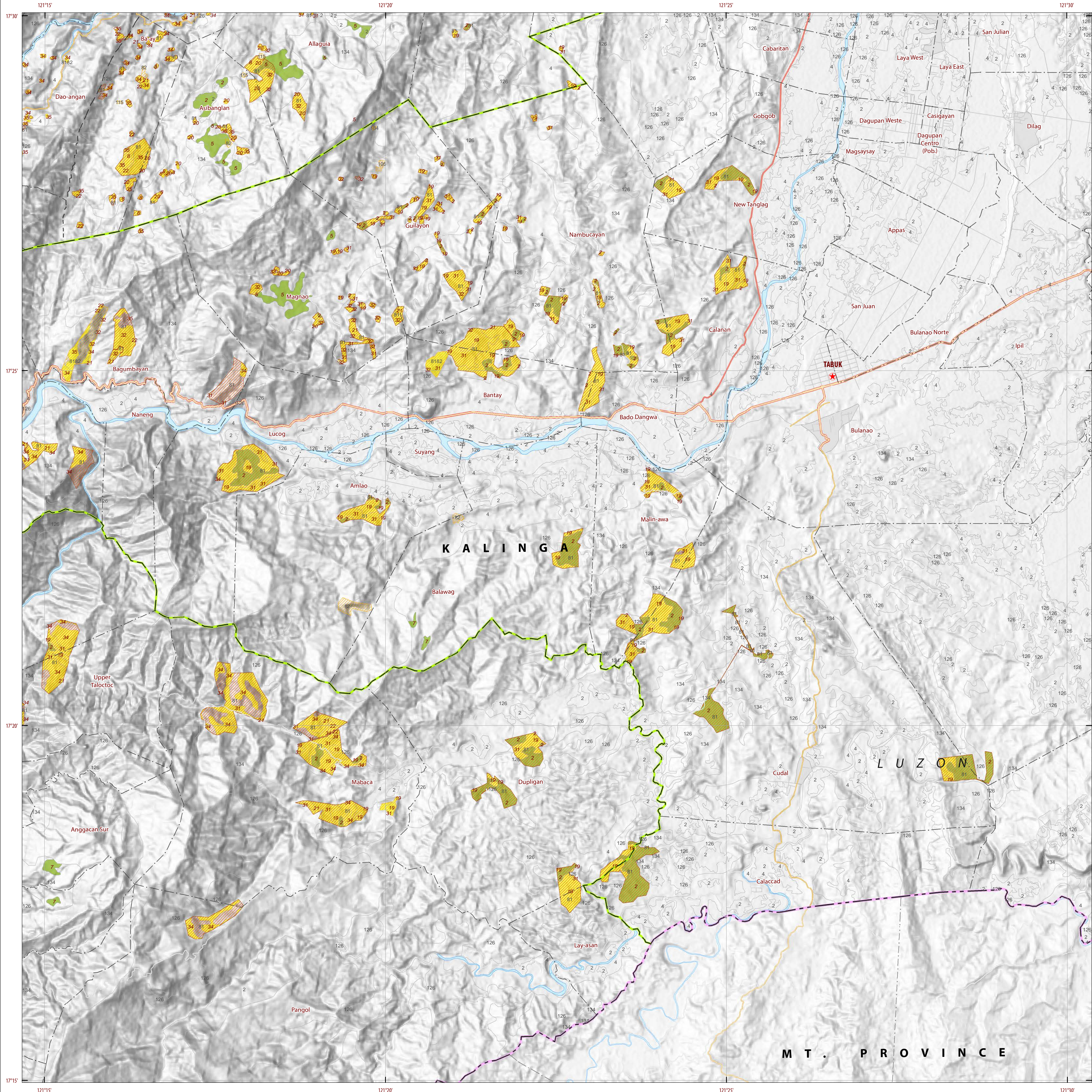
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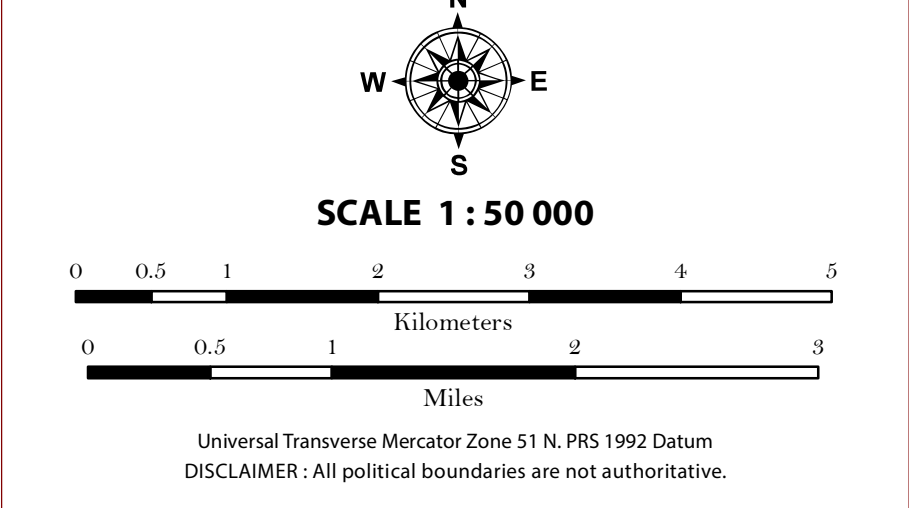
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BUREAU OF SOILS AND WATER MANAGEMENT  
SRDC Bldg, Elliptical Road Cor. Visayas Avenue, Diliman, Quezon City 1101  
Tel/Fax No.: (+632) 332-9534 E-mail: bswmcenter@yahoo.com





## LAND SUITABILITY MAP ARABICA COFFEE

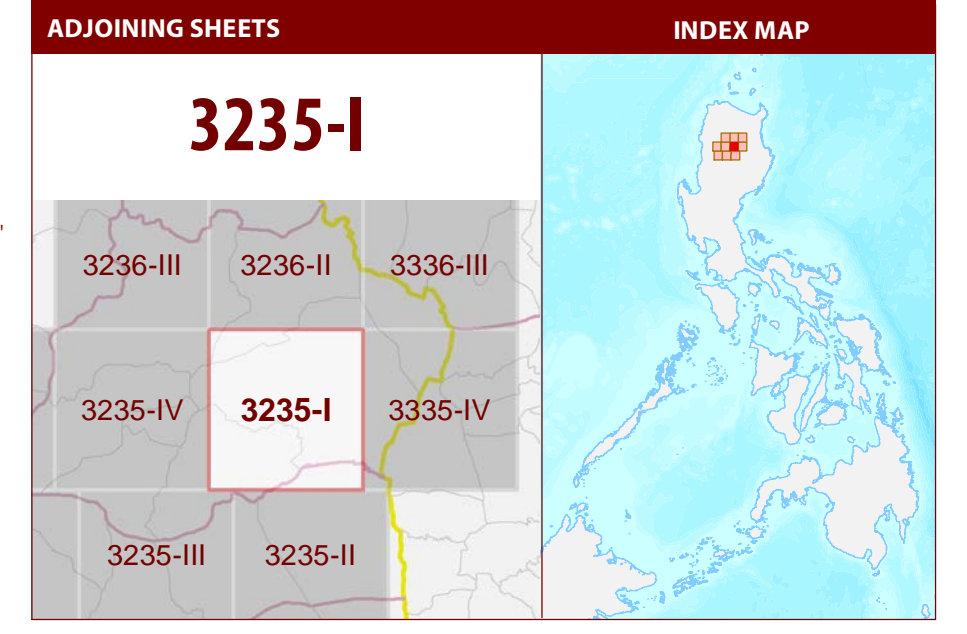
### LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



#### 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
  - Coffee
  - Land limitation
  - Land use

- CONVENTIONAL SIGNS**
- | ROADS      | BOUNDARY     | HYDROLOGY             |
|------------|--------------|-----------------------|
| Expressway | Region       | Sea / Shoreline       |
| Trunk line | Province     | Lakes / Rivers        |
| Primary    | District     | <b>PLACES</b>         |
| Secondary  | Municipality | ★ Capital City / City |
| Tertiary   | Barangay     | ● Capital Town / Town |
- LAND USE**
- Built-up
  - Fishpond
  - Mangrove



#### MISCELLANEOUS INFORMATION

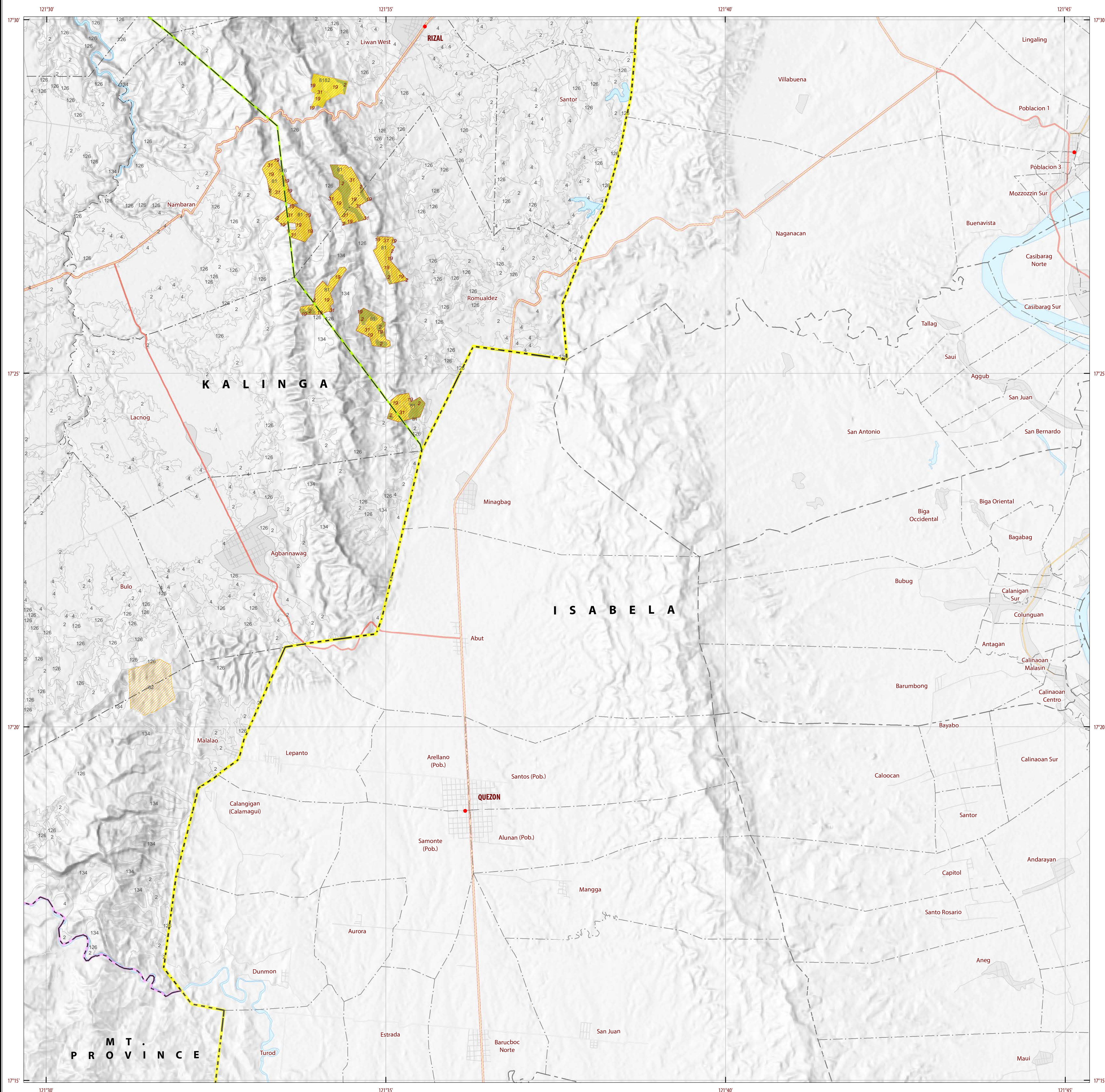
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GIS and Cartography : IRWIN K. SAMALCA

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Local Government Unit (LGU) of covered provinces and municipalities

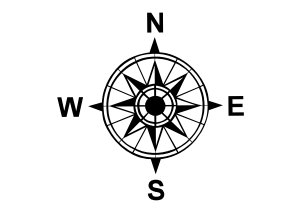
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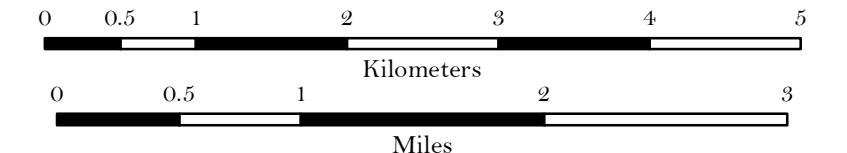


## LAND SUITABILITY MAP ARABICA COFFEE

### LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000

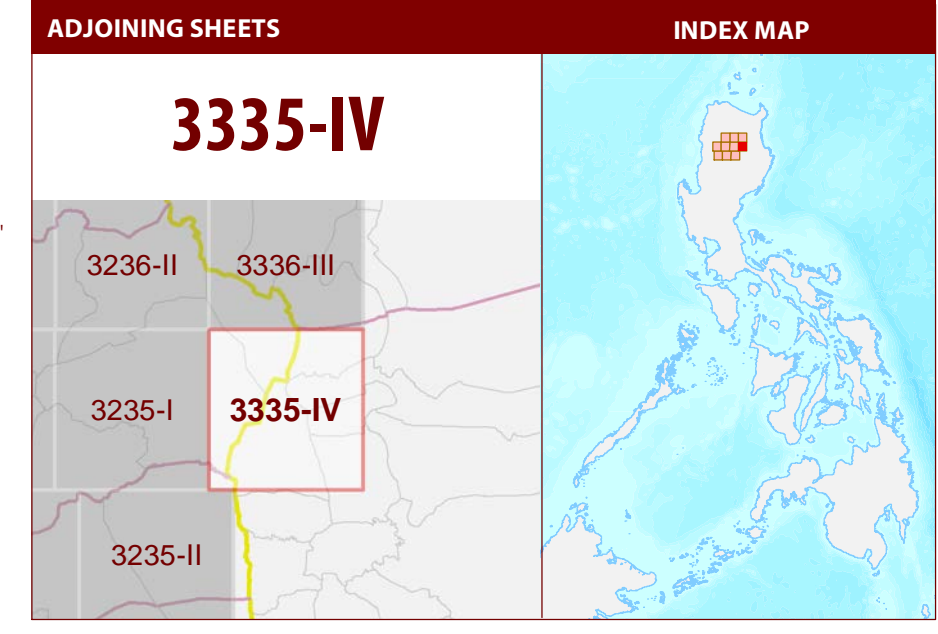


Universal Transverse Mercator Zone 51 N, PRS 1992 Datum  
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#### LEGEND

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- OTHER SIGNS**
- NGP Areas
  - Coffee
  - Land limitation
  - Land use

- CONVENTIONAL SIGNS**
- |                 |                 |                       |
|-----------------|-----------------|-----------------------|
| <b>ROADS</b>    | <b>BOUNDARY</b> | <b>HYDROLOGY</b>      |
| Expressway      | Region          | Sea / Shoreline       |
| Trunk line      | Province        | Lakes / Rivers        |
| Primary         | District        | <b>PLACES</b>         |
| Secondary       | Municipality    | ★ Capital City / City |
| Tertiary        | Barangay        | ● Capital Town / Town |
| <b>LAND USE</b> |                 |                       |
| Built-up        | Fishpond        | Mangrove              |



#### MISCELLANEOUS INFORMATION

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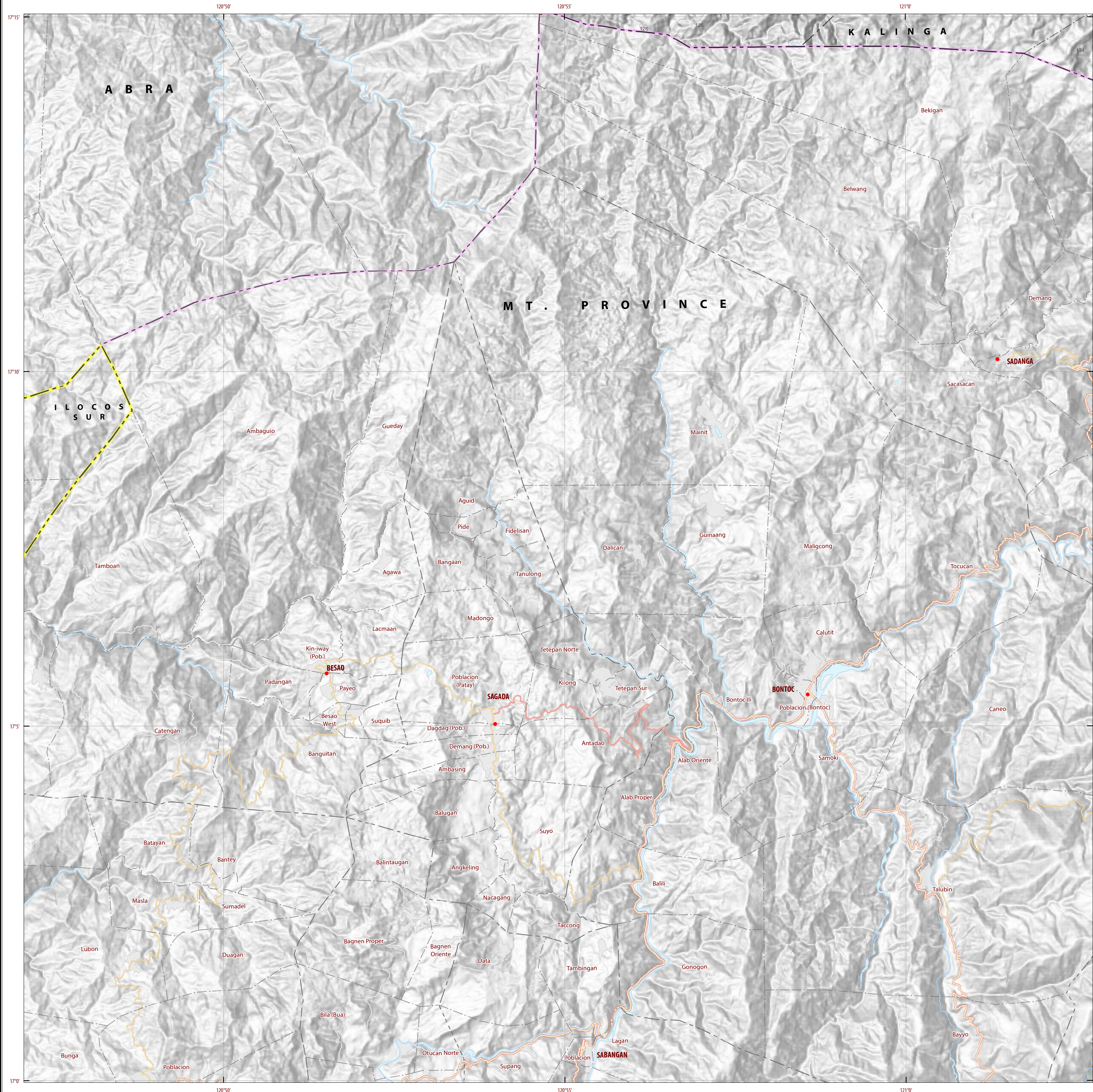
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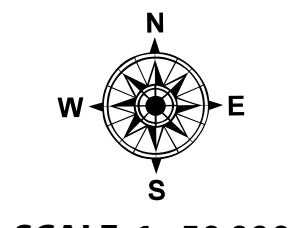
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SRDC Bldg, Elliptical Road Cor. Visayas Avenue, Diliman, Quezon City 1101  
Tel/Fax No.: (+632) 332-9534 E-mail: bswmcenter@da.gov.ph



## LAND SUITABILITY MAP ARABICA COFFEE

### LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



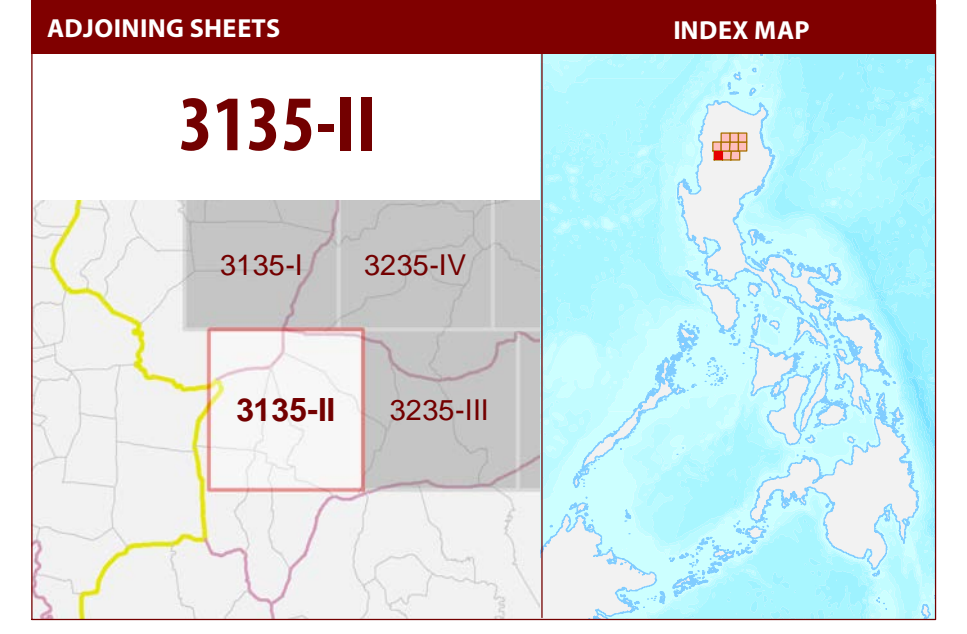
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- OTHER SIGNS**
- NGP Areas
  - Coffee
  - Land limitation
  - Land use

- CONVENTIONAL SIGNS**
- | ROADS      | BOUNDARY     | HYDROLOGY             |
|------------|--------------|-----------------------|
| Expressway | Region       | Sea / Shoreline       |
| Trunk line | Province     | Lakes / Rivers        |
| Primary    | District     |                       |
| Secondary  | Municipality | <b>PLACES</b>         |
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- LAND USE**
- Built-up
  - Fishpond
  - Mangrove



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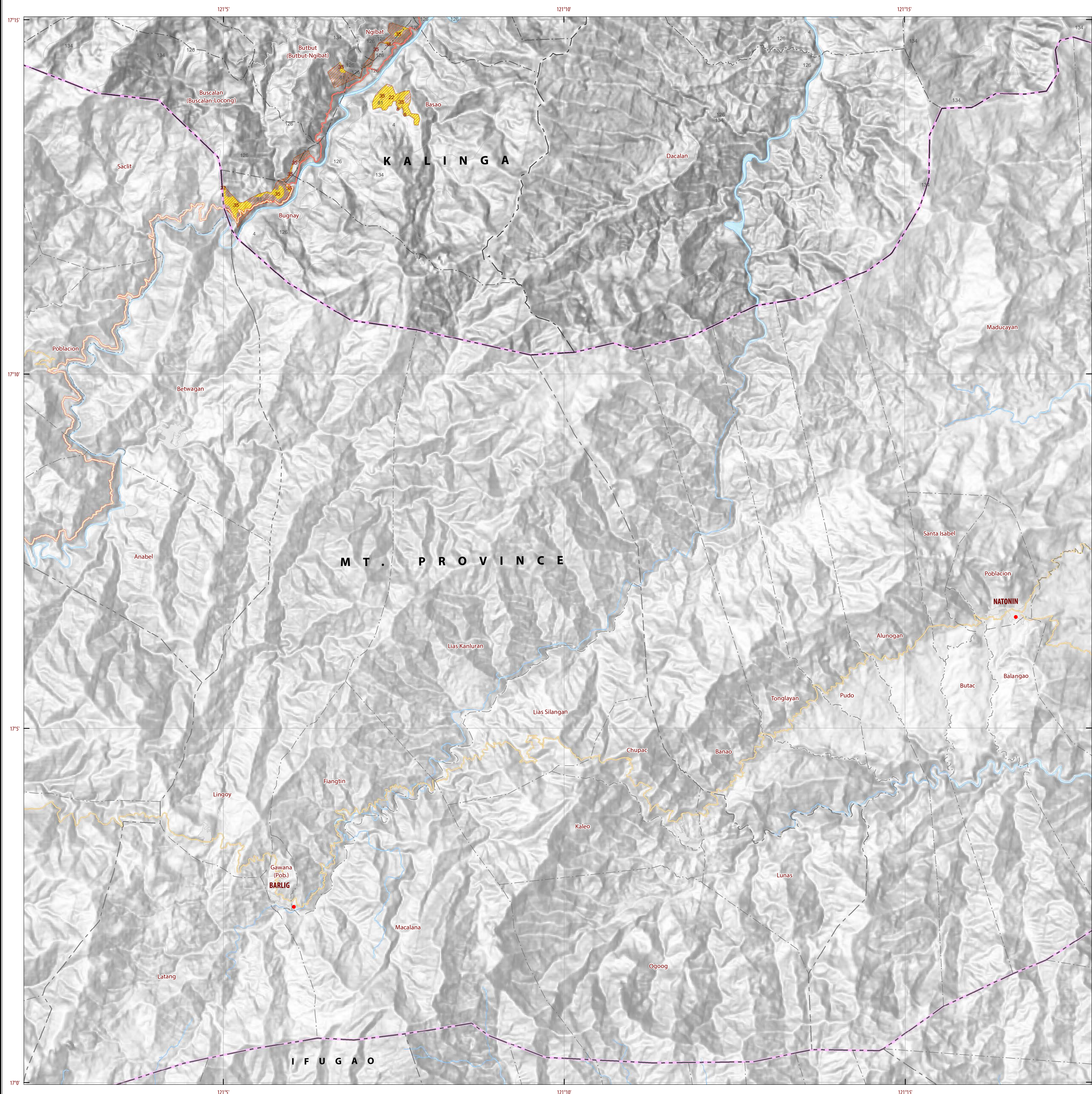
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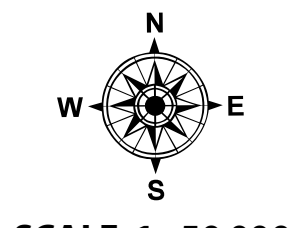
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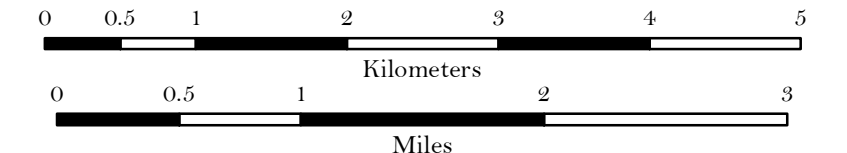


## LAND SUITABILITY MAP ARABICA COFFEE

### LAND RESOURCES EVALUATION AND SUITABILITY ASSESSMENT OF STRATEGIC PRODUCTION AREAS



SCALE 1 : 50 000

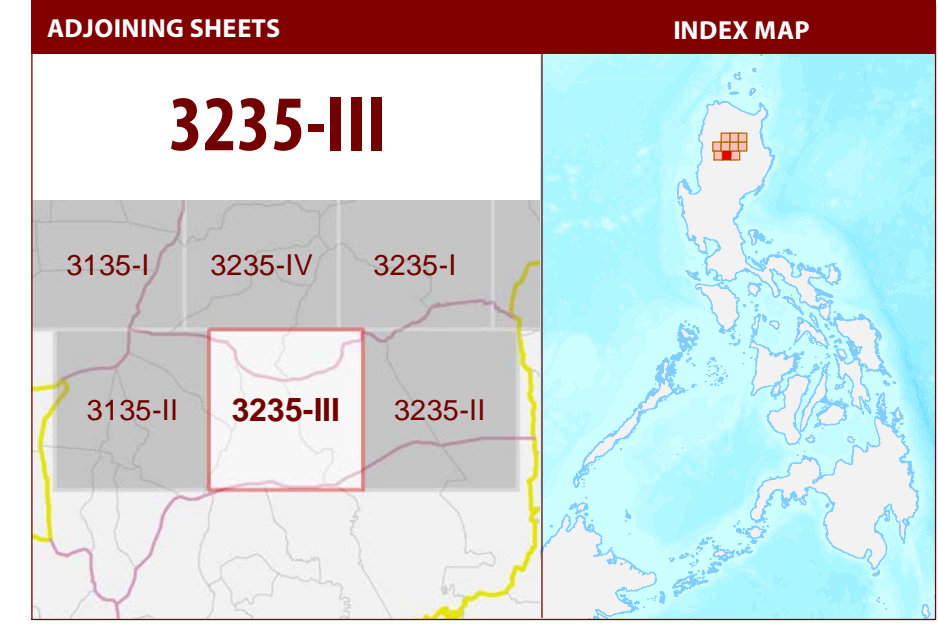


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- OTHER SIGNS**
- NGP Areas
  - Coffee
  - Land limitation
  - Land use

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



#### MISCELLANEOUS INFORMATION

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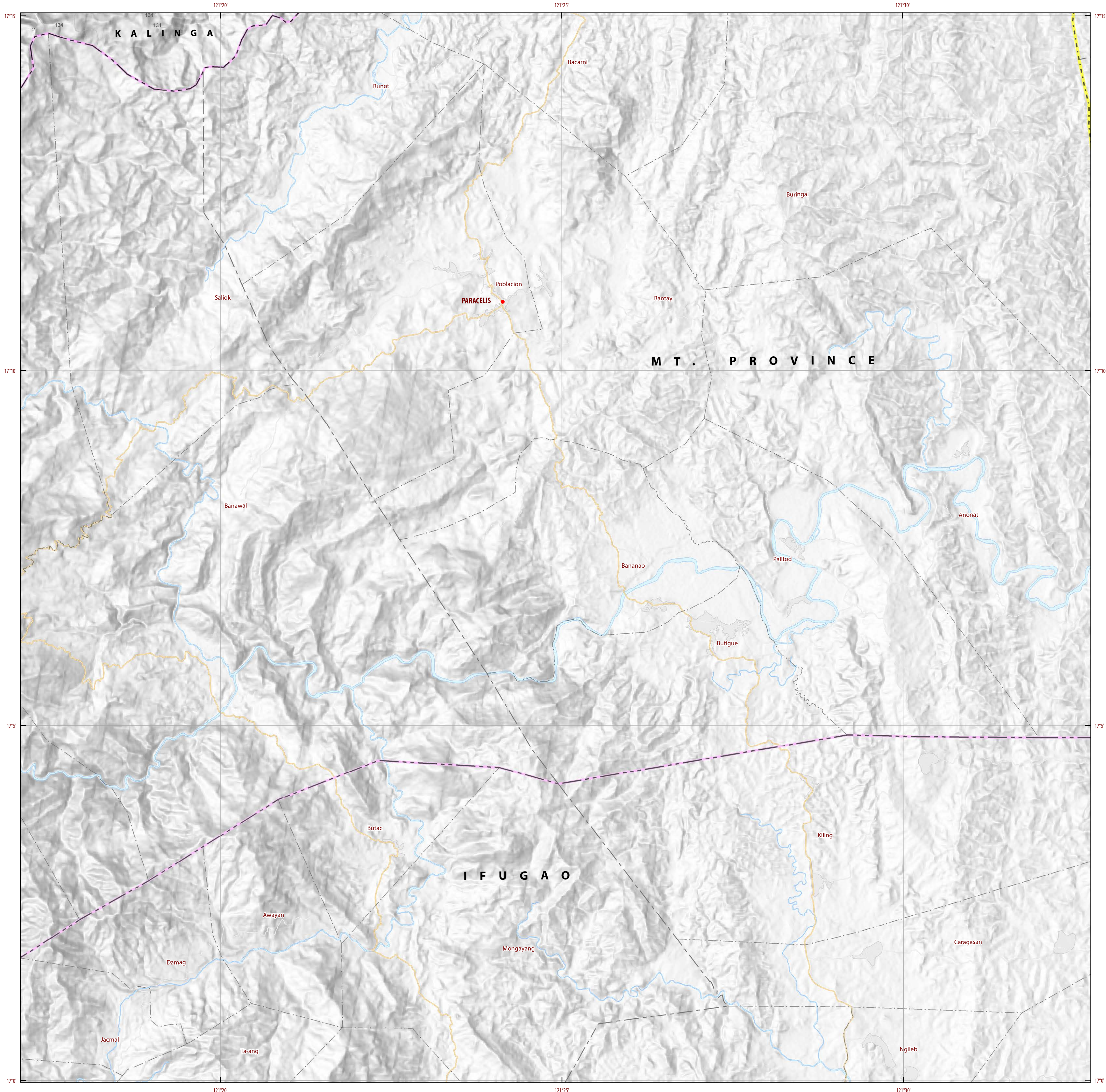
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### LAND SUITABILITY MAP ARABICA COFFEE

**LAND RESOURCES EVALUATION AND SUITABILITY  
ASSESSMENT OF STRATEGIC PRODUCTION AREAS**

SCALE 1 : 50 000

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**LEGEND**

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**Not Suitable/ Not Relevant**

**OTHER SIGNS**

- NGP Areas
- Coffee
- Land limitation
- Land use

**CONVENTIONAL SIGNS**

ROADS	BOUNDARY	HYDROLOGY
Expressway	Region	Sea / Shoreline
Trunk line	Province	Lakes / Rivers
Primary	District	<b>PLACES</b>
Secondary	Municipality	★ Capital City / City
Tertiary	Barangay	● Capital Town / Town

**LAND USE**

- Built-up
- Fishpond
- Mangrove

**ADJOINING SHEETS**

**INDEX MAP**

**3235-II**

**MISCELLANEOUS INFORMATION**

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PROVINCE OF KALINGA Sheet 10 of 10 Sheet No. 3235-II