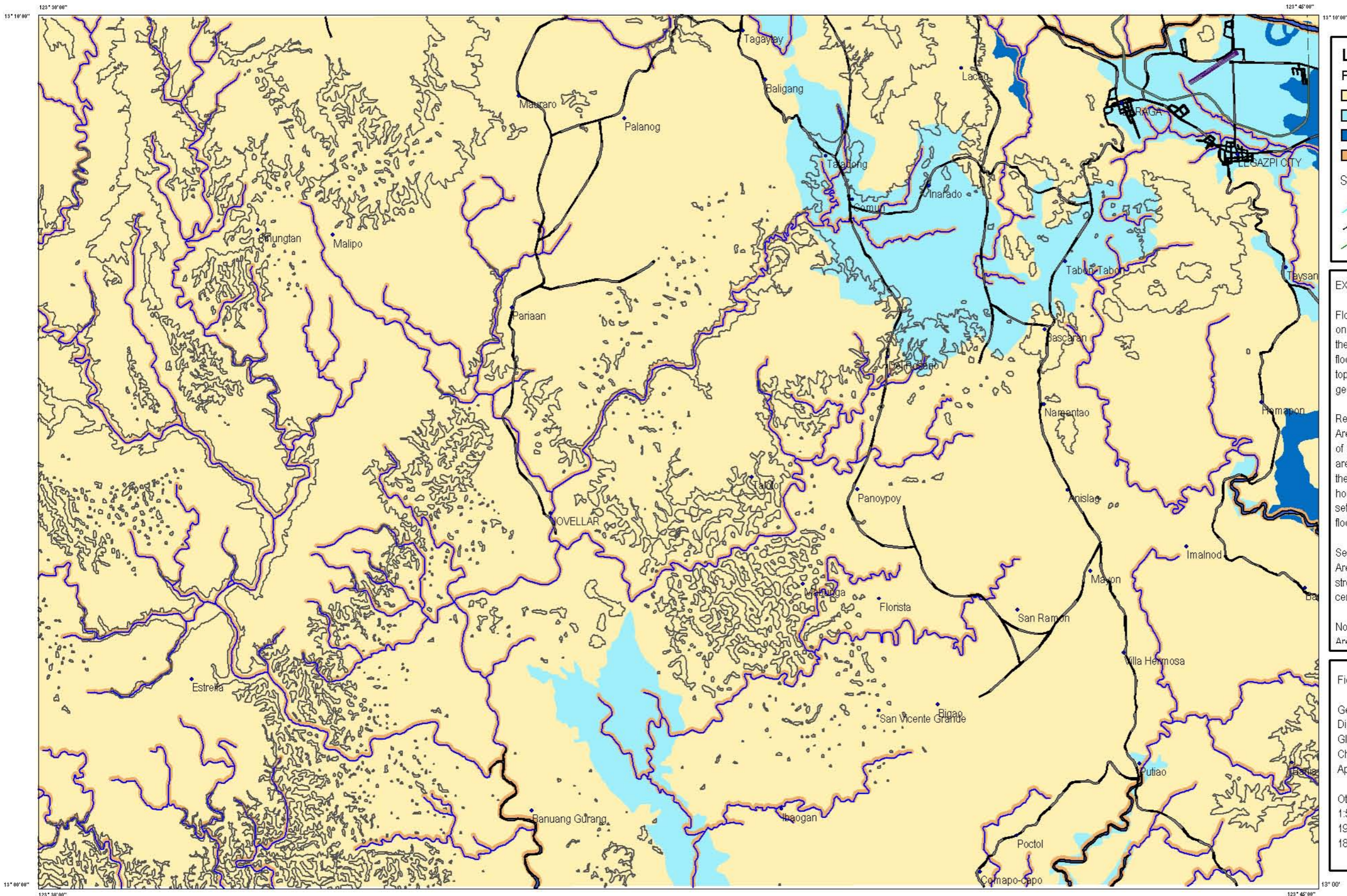


FLOOD HAZARD MAP OF LEGAZPI CITY QUADRANGLE



LEGEND:

Flood Hazard Zones:

- Non flood prone areas
- Occasionally to rarely flooded areas
- Regularly to frequently flooded areas
- Areas prone to bank erosion

Symbols:

- river
- road
- railroad

EXPLANATIONS:

Flood hazard susceptibility zones were derived based on the geomorphological analysis of landforms and the fluvial system. Information on flood occurrences, flood depths, duration of inundation as well as topographic information supported the geomorphologically-based flood hazard mapping

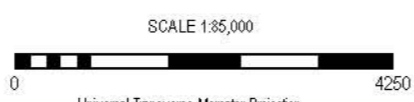
Regularly to Frequently Flooded Areas:
Areas that are frequently flooded. Mere heavy rains of 1 to 2 days could bring about flooding in these areas. Moderate to strong typhoons could submerge these areas 0.5 to 1.1 m. in flood waters for a few hours to a few days. Development of urban settlements in these areas need to consider both flood and liquefaction hazards.

Seasonally to Rarely Flooded Areas:
Areas that become inundated during moderate to strong typhoons. Flood depths vary from a few centimeters to 0.5 m. Floods last for a few hours.

Non Flood Prone Areas:
Areas with no reported flood occurrences

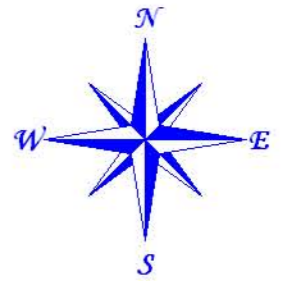
Field data collection by: A. E. Dayao, C.U. Carranza, A. L. Fernando and G.E. Bascos
 Geomorphological analysis by: A.E. Dayao
 Digital cartographic processing by: A.E. Dayao
 GIS processing by: A.E. Dayao
 Checked by: A.F. Jusi
 Approved by: R.A. Juan

Other sources of Information:
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 1951 B/W Aerial photos
 1888 B/W Aerial photos

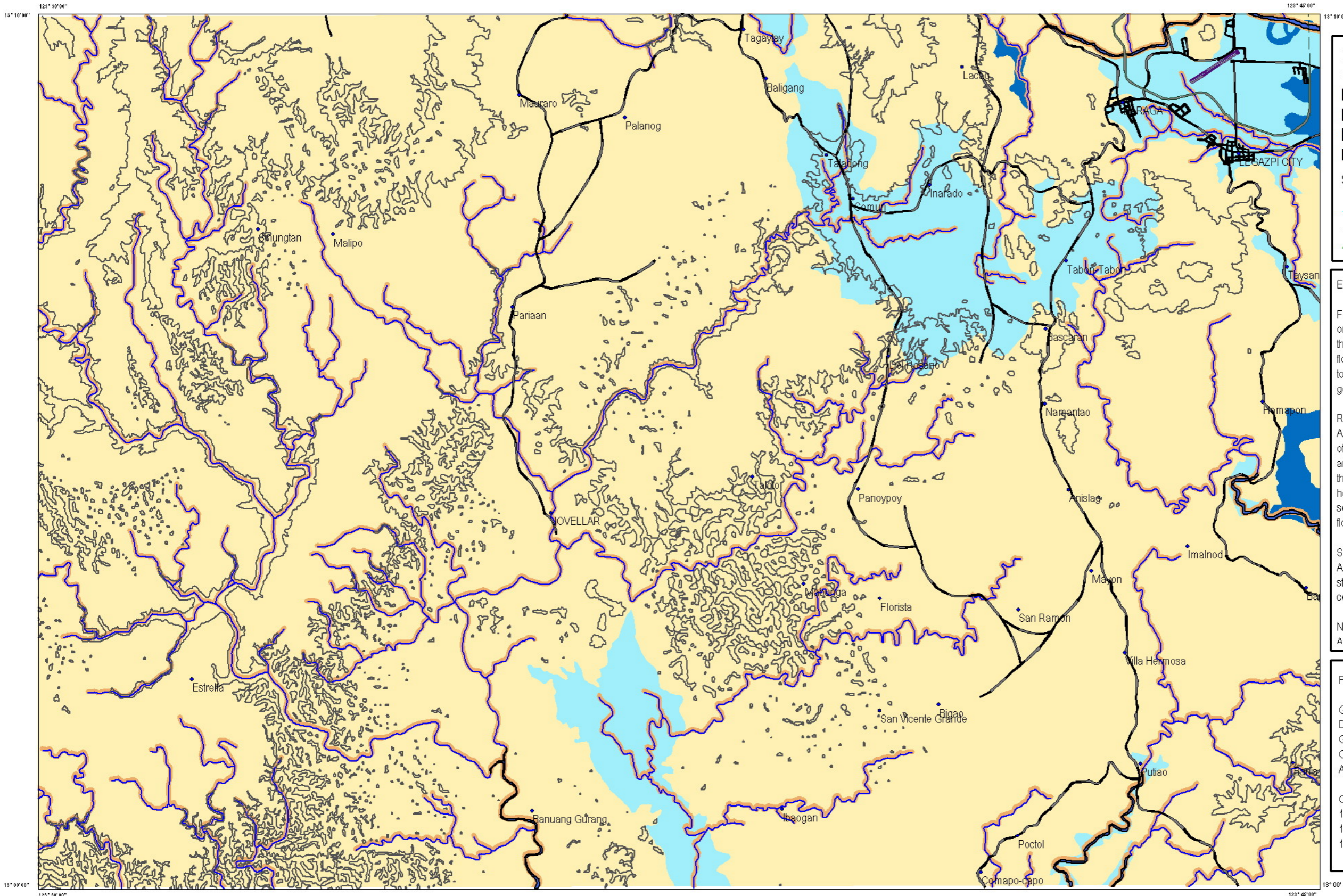


Universal Transverse Mercator Projection
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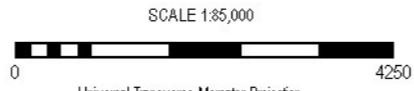
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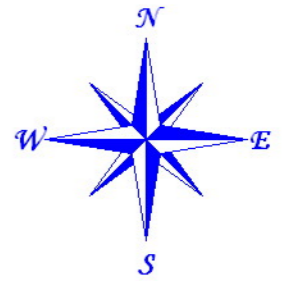
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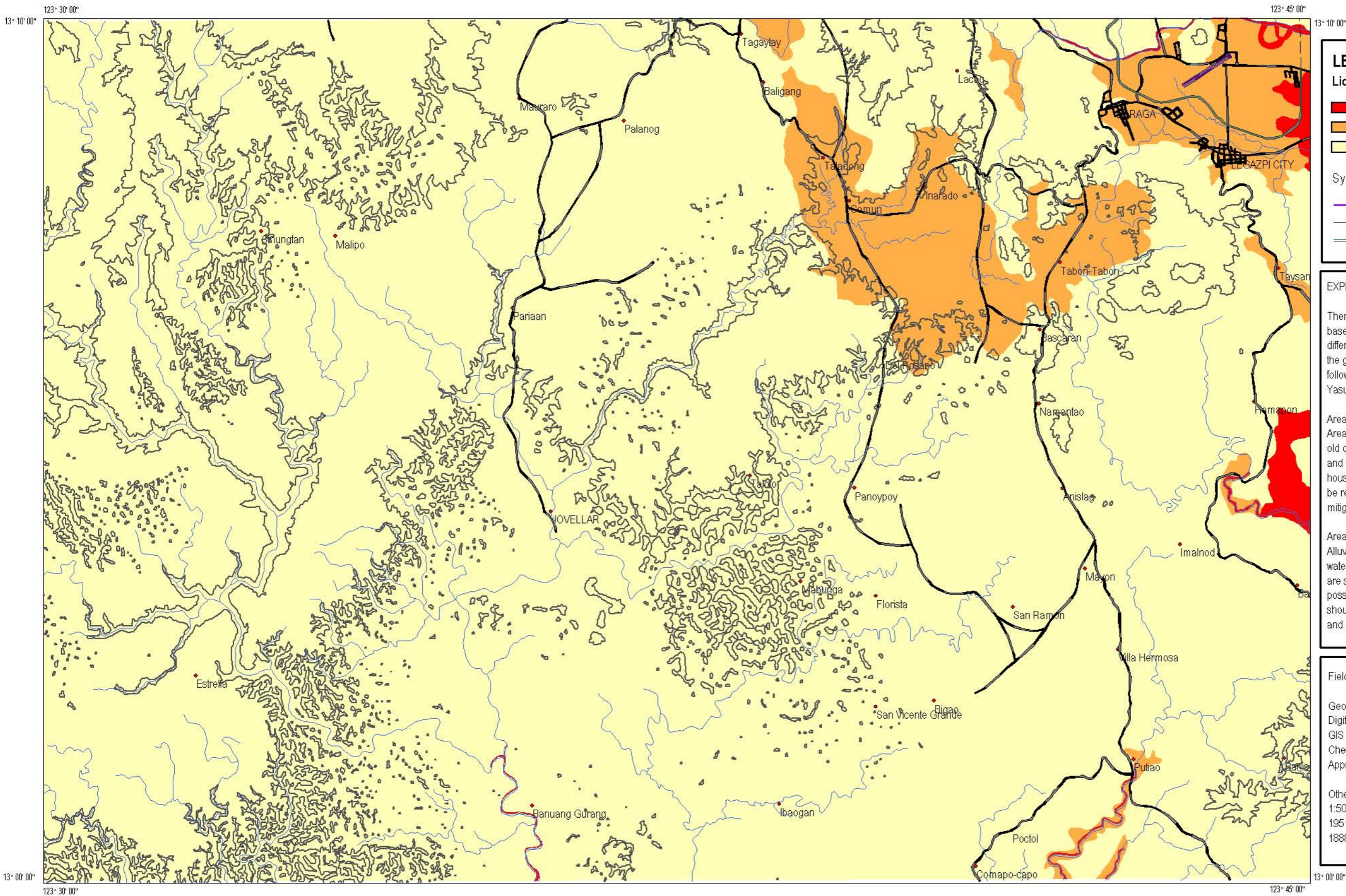


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LIQUEFACTION POTENTIAL MAP OF LEGAZPI CITY QUADRANGLE



LEGEND:

Liquefaction Potential Zones:

- Areas where liquefaction is likely
- Areas where liquefaction is possible
- Areas where liquefaction is not likely

Symbols:

- airstrip
- river
- frame
- road
- railroad

EXPLANATIONS:

There are no reported liquefaction occurrences based on several field interviews. However, zones of different liquefaction potential were derived based on the geomorphological analysis of the study area following previous studies made by Iwasaki and Yasuda.

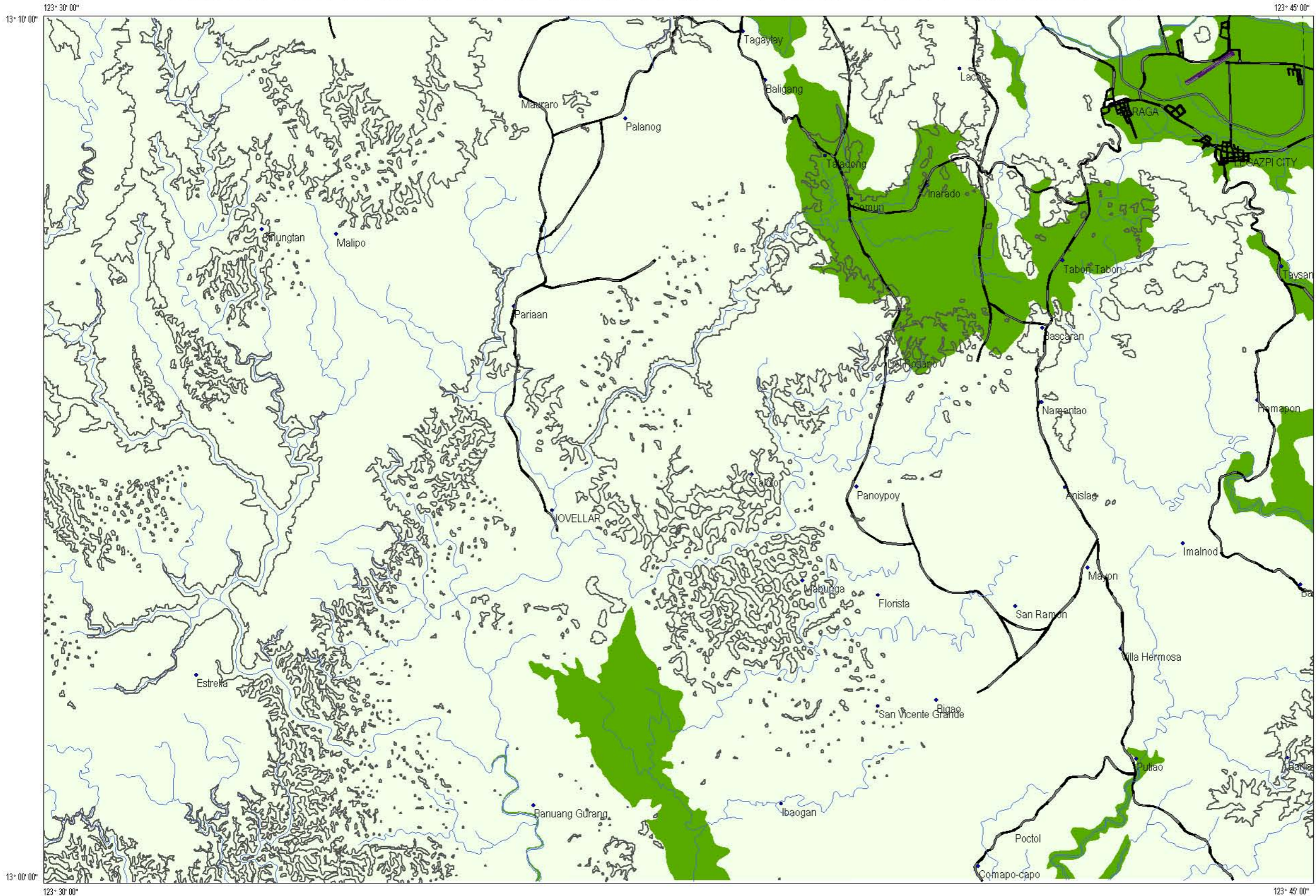
Areas Where Liquefaction is Likely:
Areas where liquefaction is likely include river beds, old or abandoned river beds and meanders, swamps and backswamps. These areas are unsuitable for housing development. Multi-storey structures should be required geotechnical studies addressing or mitigating the possible effects of liquefaction.

Areas Where Liquefaction is Possible:
Alluvial plains and pyroclastic plains where ground water table is relatively shallow and sub-surface soils are silty to sandy are areas where liquefaction is possible. Building structures of 4 storeys or more should be required geotechnical studies to determine and mitigate possible effects of liquefaction.

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GROUND SETTLEMENT SUSCEPTIBILITY MAP OF LEGAZPI CITY QUADRANGLE



LEGEND:

Ground Settlement Susceptibility Zones:

- Areas prone to ground settlement
- Areas not prone to ground settlement

Symbols:

- airstrip
- railroad
- river
- road

EXPLANATIONS:

Areas of possible ground settlement were delineated through the analysis of the geomorphological lay of the study area, the sub-surface soils and the ground water levels.

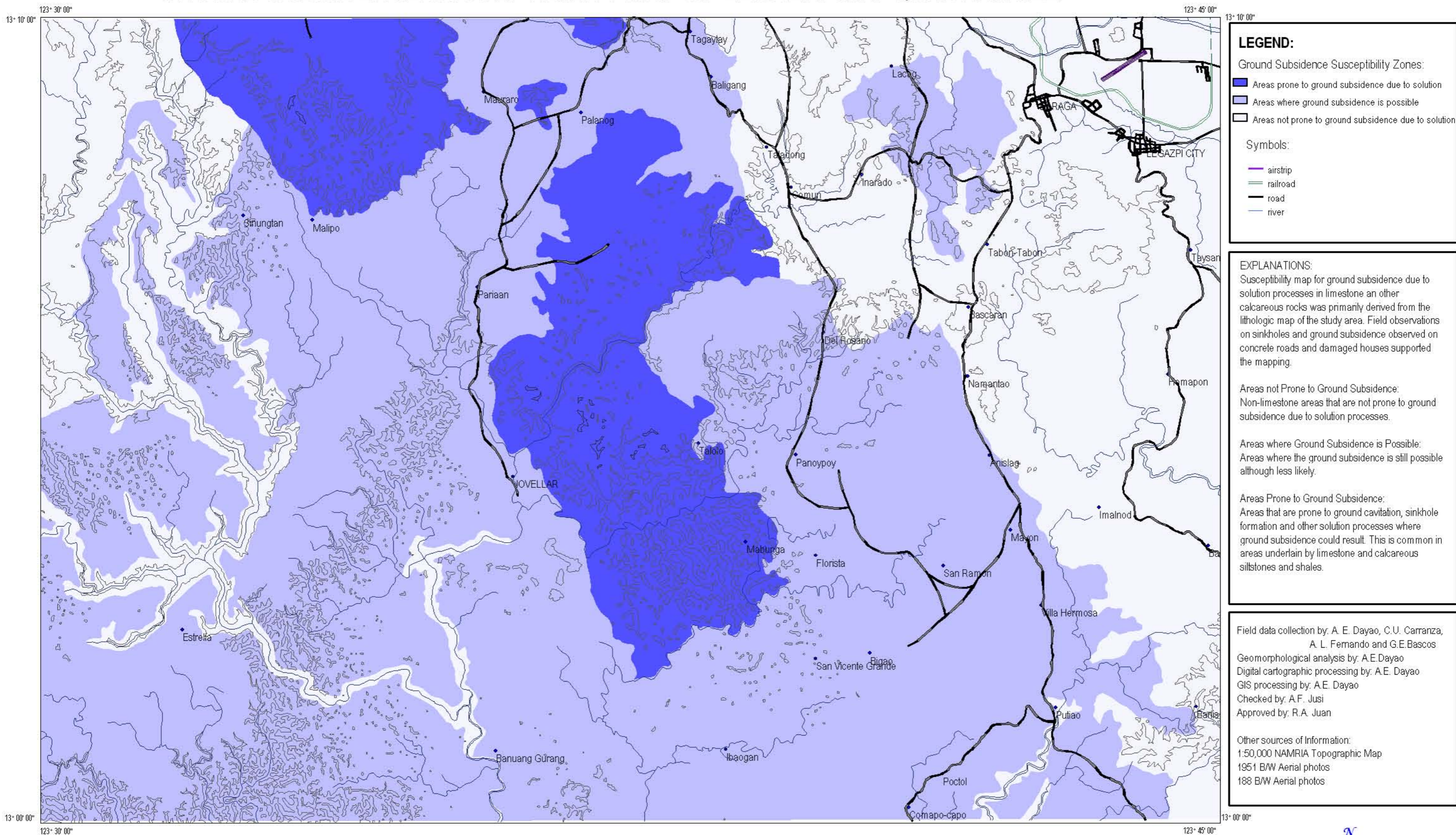
Areas Susceptible to Ground Settlement:
 Areas where fluvialite and fluvio-deltaic sands, silts and clays coupled with shallow ground water table are sites of possible ground settlement. Ground settlements may be reduced through appropriate foundation design. Buildings having 3 storeys or more should be tested for settlement and/or consolidation. Buildings having 5 storeys or more should undergo detailed geotechnical studies.

Areas not Susceptible to Ground Settlement:
 Areas where the possibility of ground settlement is low or absent but still, buildings of 5 storeys or more should undergo geotechnical studies.

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GROUND SUBSIDENCE SUSCEPTIBILITY MAP OF LEGAZPI CITY QUADRANGLE



LEGEND:

Ground Subsidence Susceptibility Zones:

- Areas prone to ground subsidence due to solution
- Areas where ground subsidence is possible
- Areas not prone to ground subsidence due to solution

Symbols:

- airstrip
- railroad
- road
- river

EXPLANATIONS:

Susceptibility map for ground subsidence due to solution processes in limestone and other calcareous rocks was primarily derived from the lithologic map of the study area. Field observations on sinkholes and ground subsidence observed on concrete roads and damaged houses supported the mapping.

Areas not Prone to Ground Subsidence:
Non-limestone areas that are not prone to ground subsidence due to solution processes.

Areas where Ground Subsidence is Possible:
Areas where the ground subsidence is still possible although less likely.

Areas Prone to Ground Subsidence:
Areas that are prone to ground cavitation, sinkhole formation and other solution processes where ground subsidence could result. This is common in areas underlain by limestone and calcareous siltstones and shales.

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