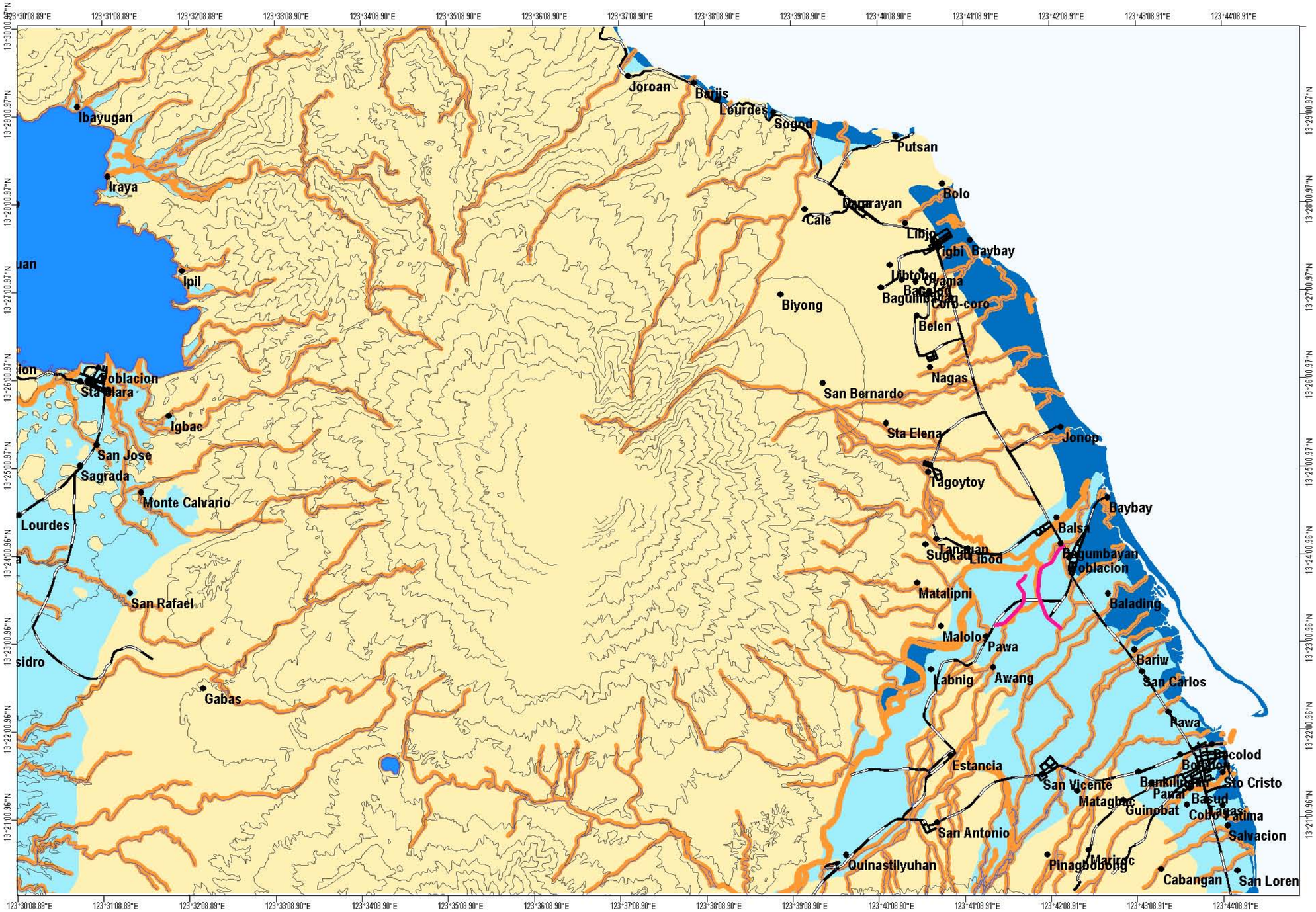
FLOOD HAZARD SUSCEPTIBILITY MAP OF TABACO QUADRANGLE



MAP LEGEND:
Flood Hazard

- Non flood prone areas
- Occasionally to rarely flooded areas
- Regularly to frequently flooded areas
- Areas prone to river bank erosion
- 10
- river
- road
- railroad

EXPLANATIONS:

Flood hazard susceptibility 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 from 0.2 to 2 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.

Occasionally to Rarely Flooded Areas:
Areas that become inundated during moderate to strong typhoons. Flood depths varies from a few centimeters to 1 meter. Floods last from a few hours to a few days.

Non Flood Prone Areas:
Areas with no reported flood occurrences except along low lying areas adjoining rivers and creeks.

Field data collection by: Jose Marcel S. Laud
Geomorphological interpretation by: Jose Marcel S. Laud
Digital cartographic processing by: Rosalyn L. Mapalad
GIS processing by: Jose Marcel S. Laud
Checked by: Arlene E. Dayao
Approved by: Reynulfo A. Juan

Other sources of information:
1:50,000 NAMRIA Topographic Map
1951 B/W Aerial photos
1988 B/W Aerial photos

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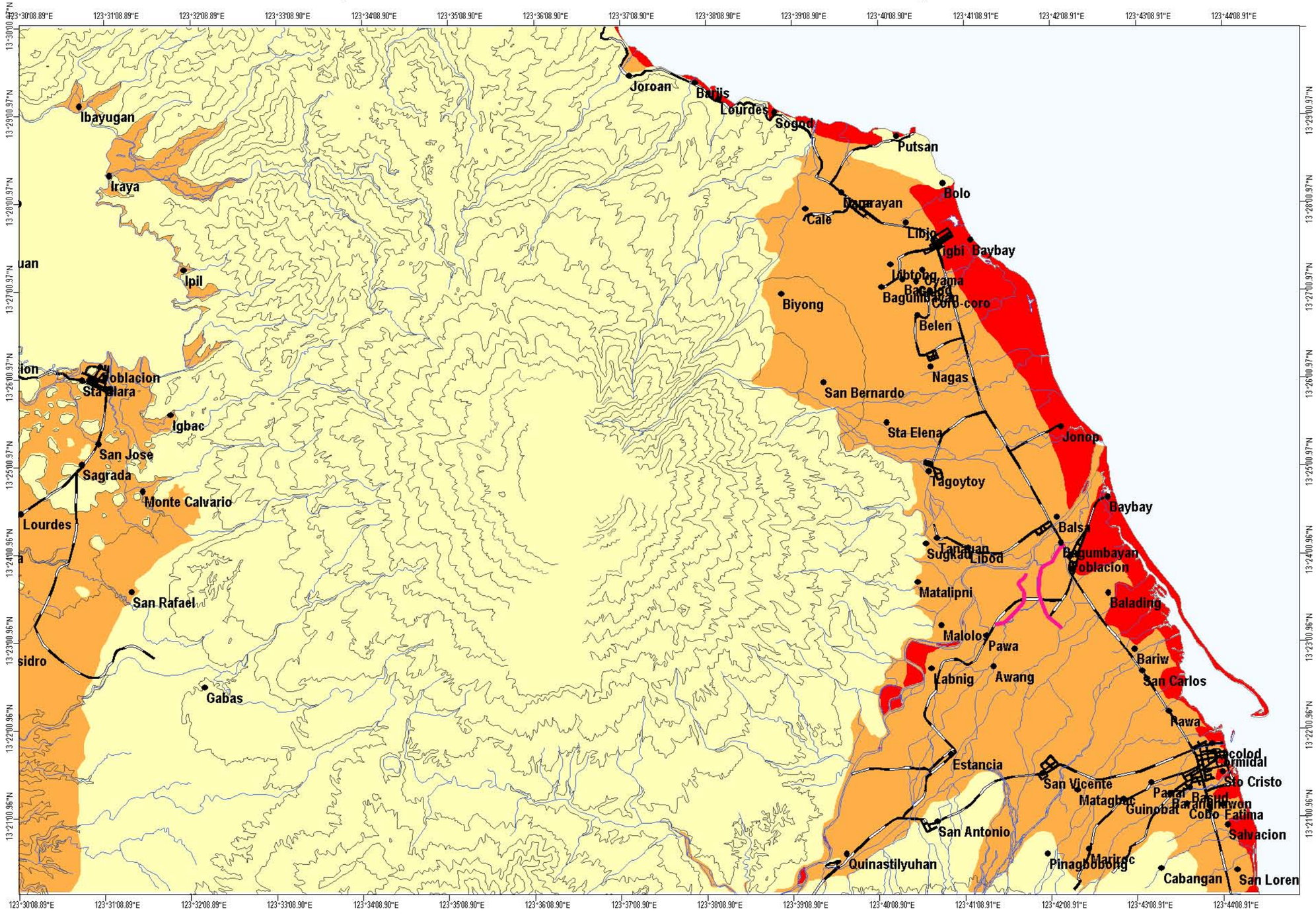
LIQUEFACTION POTENTIAL MAP OF TABACO QUADRANGLE



MAP LEGEND:
Liquefaction Potential Zones:

- Areas where liquefaction is likely
- Areas where liquefaction is not likely
- Areas where liquefaction is possible
- 10
- road
- river

EXPLANATIONS:

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

Areas where Liquefaction is Likely:
Areas where liquefaction is likely are confined within riverbeds, beaches,spits,active and old tidal flats, coastal plains and swamps along coastal areas. These areas are unsuitable for urban development. Multi-storey buildings should be required to undergo geotechnical studies addressing or mitigating the effects of liquefaction.

Areas where Liquefaction is Possible:
The alluvial plains covering the flatlands of the eastern portions of the Tabaco Quadrangle are areas where liquefaction is possible. Buildings having 5 storeys or more should be required to undergo a full geotechnical study.

Areas where Liquefaction is Not Likely:
Areas where liquefaction occurrence is unlikely to happen because of the underlying stable bedrock conditions.

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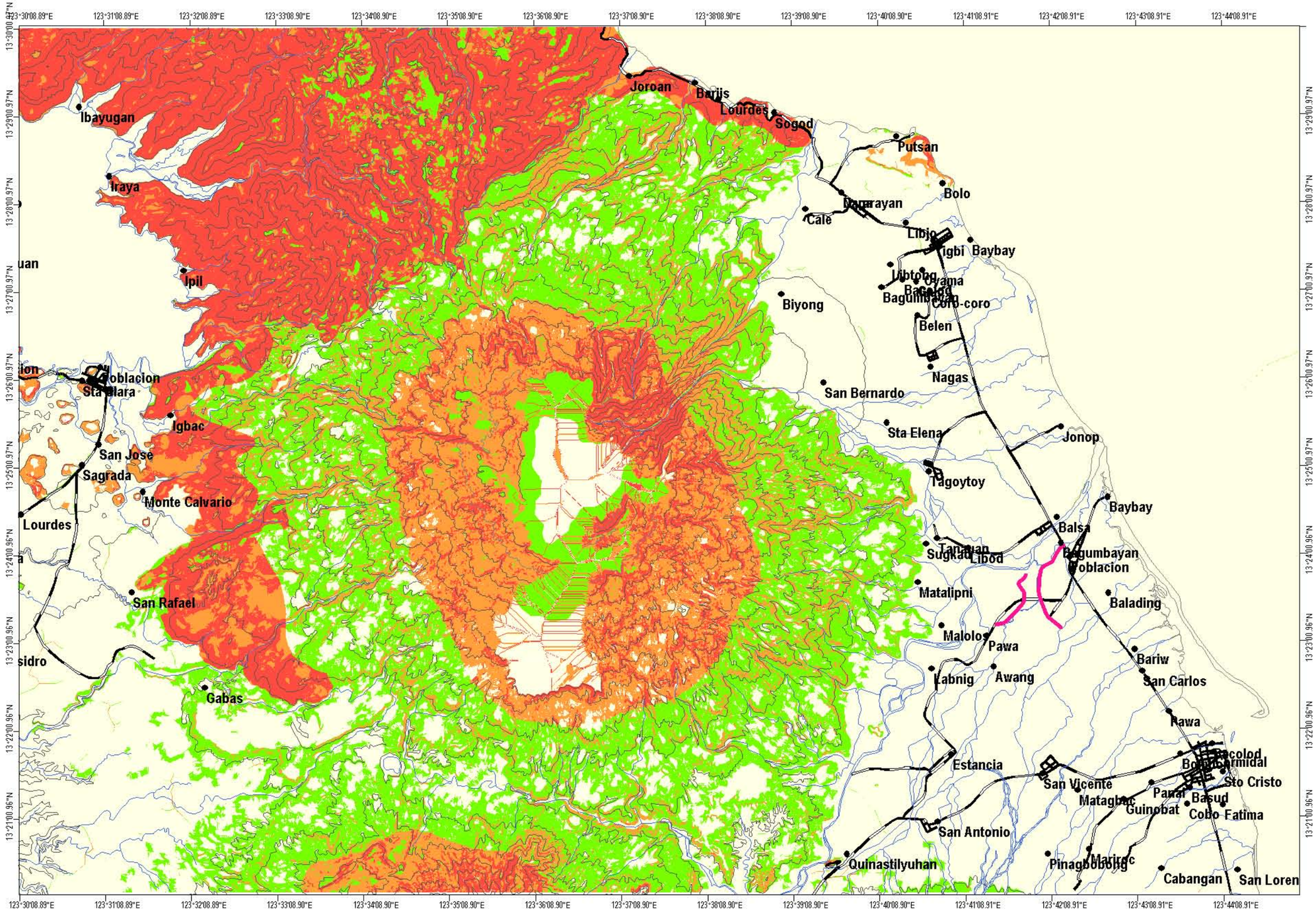
LANDSLIDE SUSCEPTIBILITY MAP OF TABACO QUADRANGLE



MAP LEGEND:
Landslide Susceptibility Zones:

- Absent
- Low Susceptibility
- Moderate Susceptibility
- High Susceptibility

- 10
- river
- road
- railroad

EXPLANATIONS:

Landslide hazard susceptibility zones were derived through qualitative map combination using lithology, geomorphology, slope gradient, road distance and fault distance. GIS was used in the map combination and subjective weights were assigned to each unit in the parameter map.

Areas with High Susceptibility to Landslides:
Areas with equally high probabitlity of occurrence of mass movements particularly rock slides, debris slides and slumps. Very steep to nearly vertical slopes and areas along fault lines are rated high susceptibility areas and are unsuitable for housing development.

Areas with Moderate Susceptibility to Landslides:
Areas having moderate likelihood of occurrence of landslides and are recommended for more detailed engineering geological and geohazard assessment prior to housing development.

Areas with Absent or Low Susceptibility to Landslides:
Areas where the likelihood of landslide occurrence is either absent or low.

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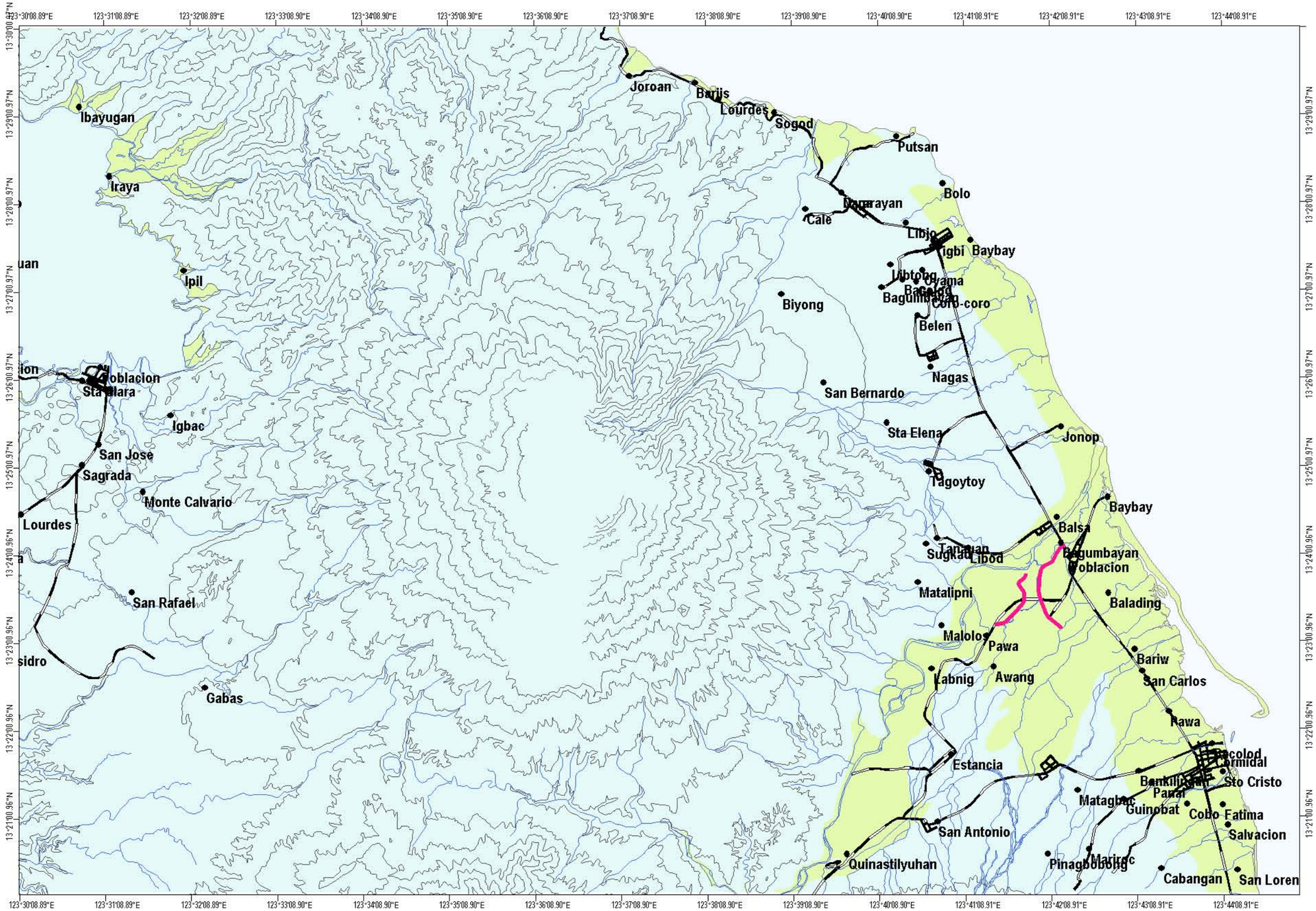
GROUND SUBSIDENCE AND GROUND SETTLEMENT SUSCEPTIBILITY MAP OF TABACO QUADRANGLE



MAP LEGEND:
Ground Subsidence and Ground Settlement Susceptibility Zones:

- Areas susceptible to ground subsidence
- Areas susceptible to ground settlement
- Areas not susceptible to ground subsidence/settlement
- 10
- river
- road
- railroad

EXPLANATIONS:

The areas within the Tabaco Quadrangle is not susceptible to ground subsidence because it has no limestone or karst areas. Areas of possible ground settlement were delineated through the analysis of the geomorphological lay of the study area, the subsurface soils and the ground water levels.

Areas Susceptible to Ground Subsidence:
Areas that are prone to ground cavitation, sinkhole formation and ground subsidence in areas underlain by limestone and calcareous siltstones and shales.

Areas Susceptible to Ground Settlement:
Areas where fluviatile and fluvio-marine sands, silts and clays coupled with shallow ground water table are sites of possible ground settlement. Ground settlement 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 geotechnical studies.

Areas Not Prone to Ground Settlement/ Subsidence:

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