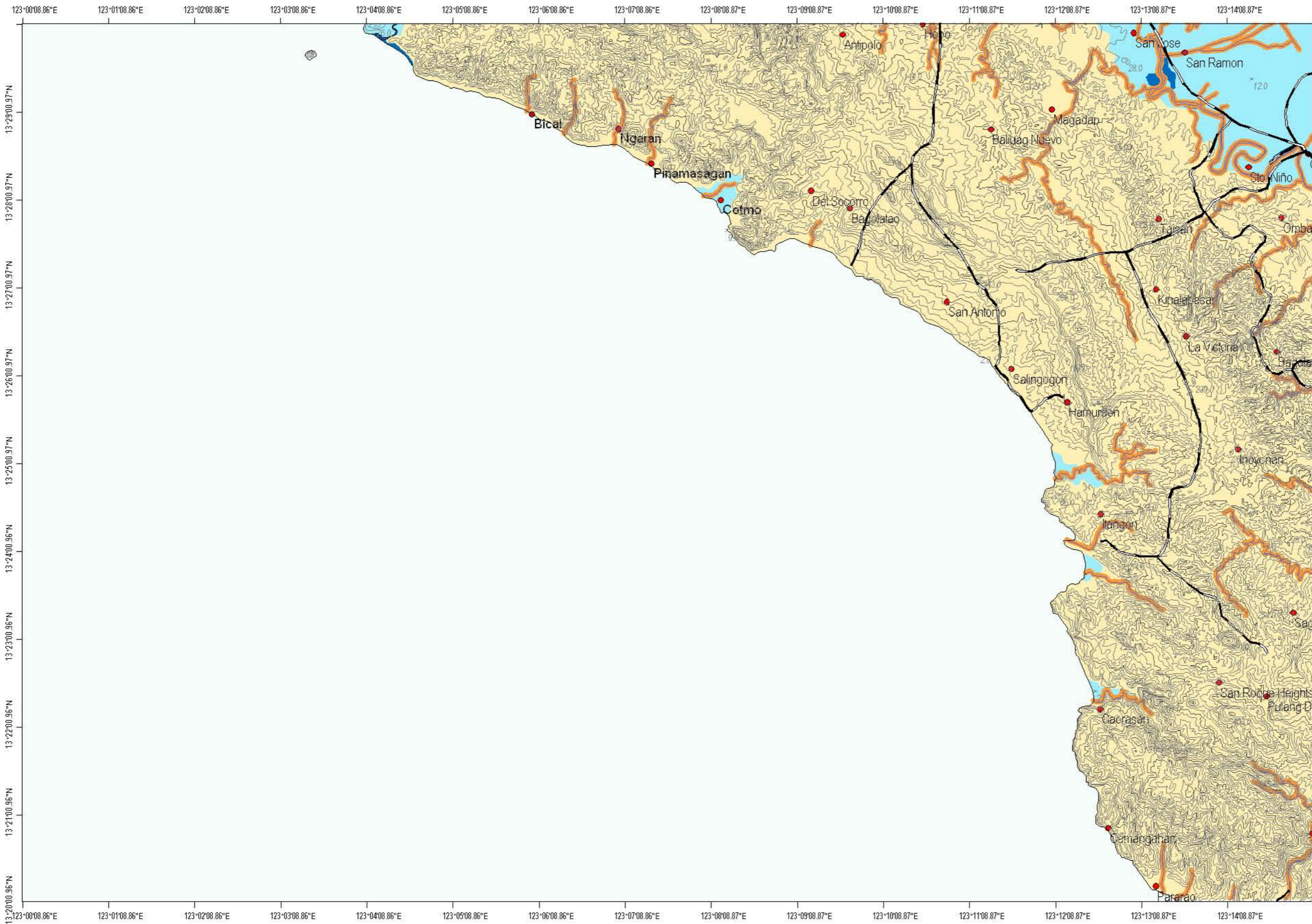


FLOOD HAZARD MAP OF SIBONO QUADRANGLE



MAP LEGEND:
Flood Hazard Zones:

- Regularly to Frequently Flooded Areas
- Occasionally to Rarely Flooded Areas
- Non Flood Prone Areas
- Areas Prone to Bank Erosion

— river
 — road

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 to 0.5 to 3 m. in flood waters for a few days to a few weeks. This type of flood occurs on backswamps & river terraces of Bicol River. Housing development in these areas is not recommended.

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

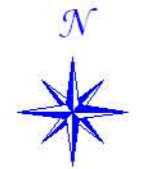
Non-Flood Prone Areas:
 Areas with no reported flood occurrences except along low lying areas adjoining rivers or creeks.

Areas Prone to Riverbank Erosion:
 Areas 0 to 50m. from river banks that are prone to scouring and erosion.

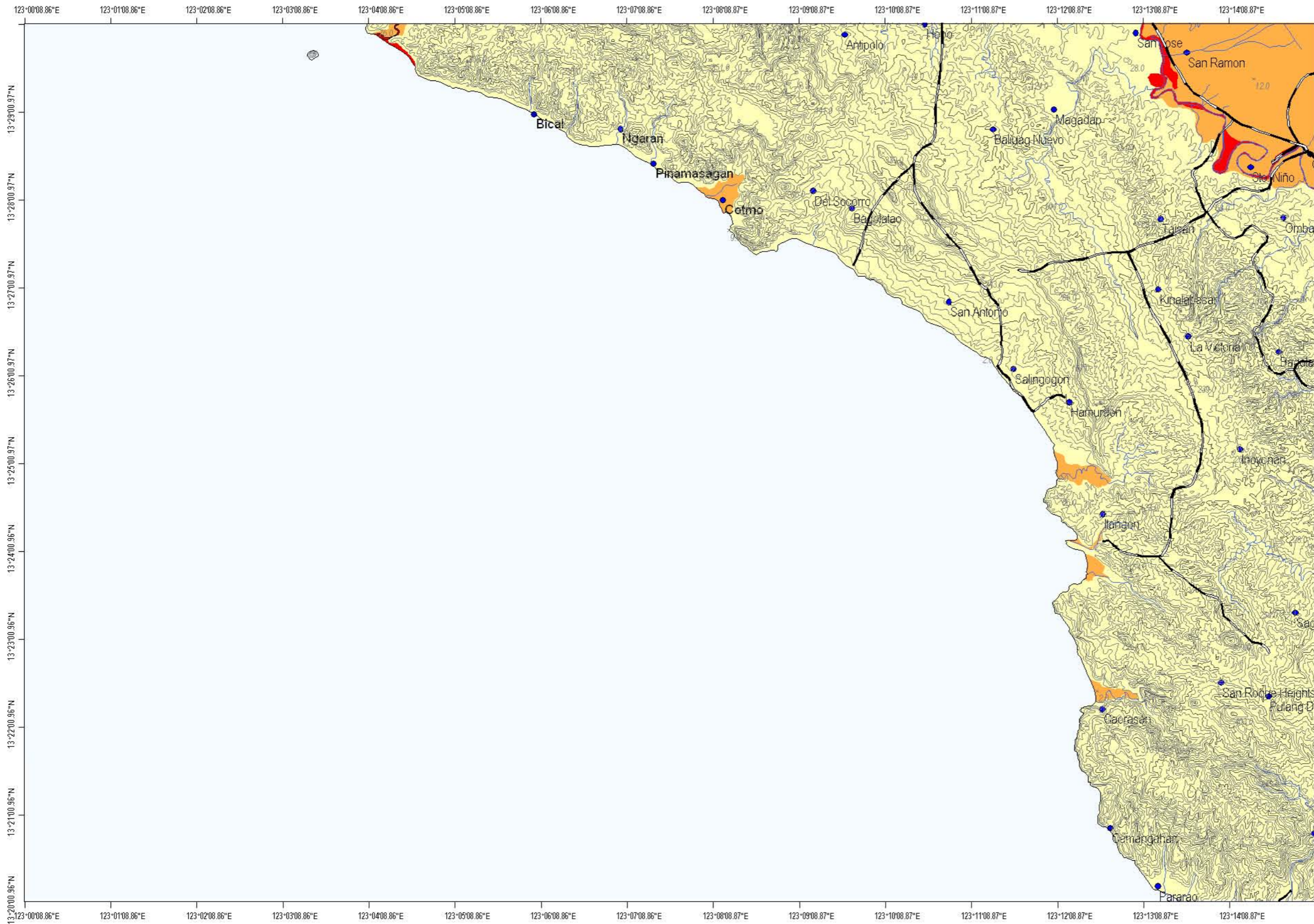
Field data collection by : D. R. Dizon
 GIS processing by : D. R. Dizon
 Digital Processing by : R. L. Mapalad
 Checked by : A. E. Dayao
 Approved by : R. A. Juan

Other sources of Information :
 1:50,000 scale NAMRIA Topographic Map
 1951 B/W Aerial Photographs

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 2007



LIQUEFACTION POTENTIAL MAP OF SIBONO QUADRANGLE



MAP LEGEND:

Liquefaction Potential Zones:

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

— river

— road

EXPLANATIONS :

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

Areas where Liquefaction is Likely:
 Areas where liquefaction is likely to occur include riverbeds, old or abandoned riverbed and meanders and river terraces. These areas are not suitable for housing development. Multi-storey buildings should be required geotechnical studies addressing or mitigating the possible effects of liquefaction.

Areas where Liquefaction is Possible:
 Pyroclastic plains and floodplains where groundwater is relatively shallow and sub-surface soils are silty to sandy are areas where liquefaction is possible. Buildings of 5 storeys or more should be required geotechnical studies to determine and mitigate possible effects of liquefaction.

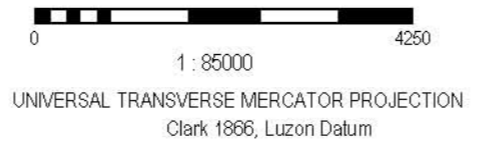
Areas where Liquefaction is not Likely:
 Areas where the occurrence of liquefaction is unlikely.

Field data collection by : D. R. Dizon
 GIS processing by : D. R. Dizon
 Digital Processing by : R. L. Mapalad
 Checked by : A. E. Dayao
 Approved by : R. A. Juan

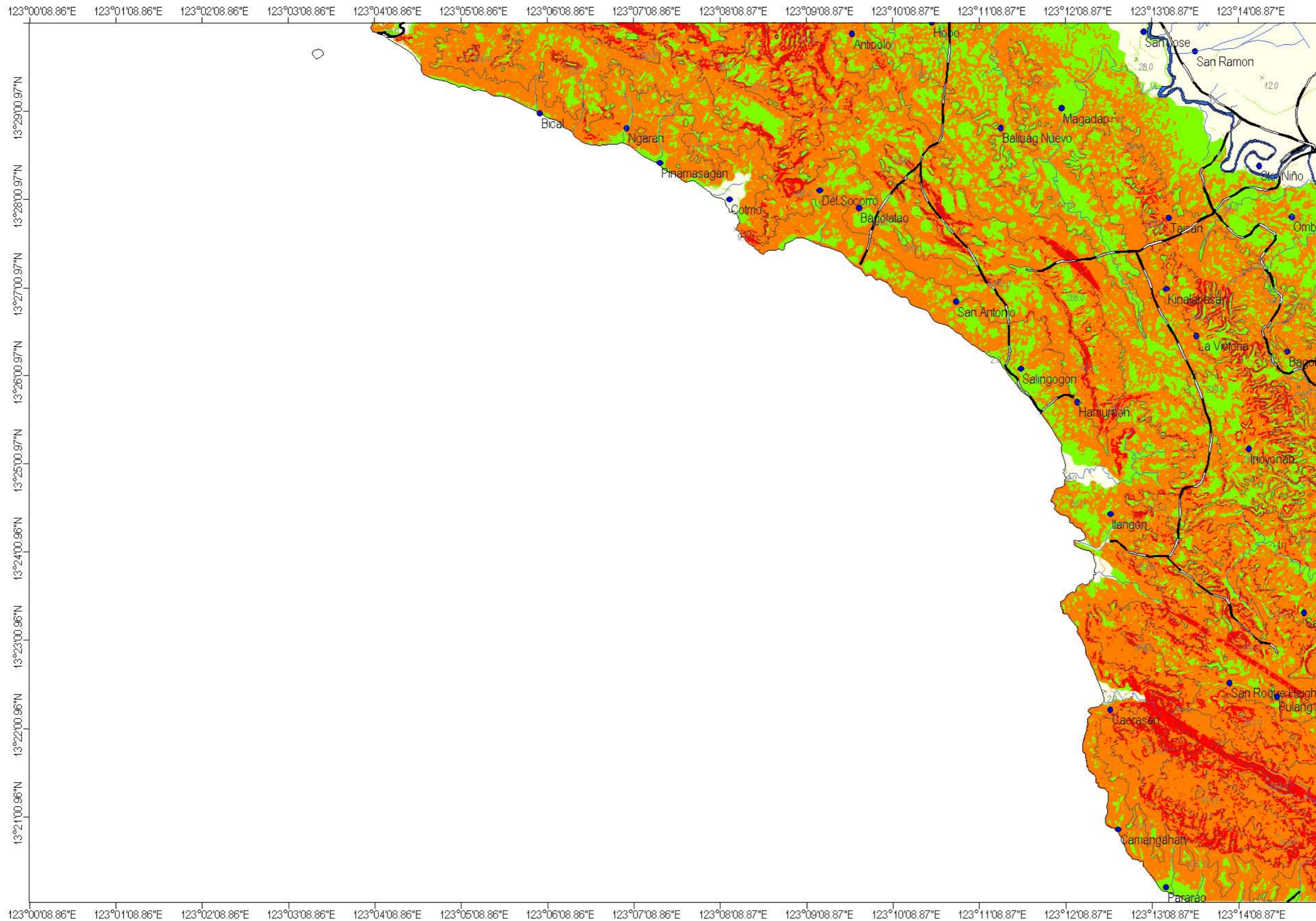
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LANDSLIDE SUSCEPTIBILITY MAP OF SIBONO QUADRANGLE



LEGEND:

Landslide Susceptibility Zones:

- Absent
- Low Susceptibility to Absent
- Moderate Susceptibility
- High Susceptibility

— fault
— river
— road

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 probability of occurrences 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 and human settlement.

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 Low Susceptibility to Landslides :
Areas where the occurrence of landslides is low.

Absent:
Areas where the likelihood of landslide occurrence is absent.

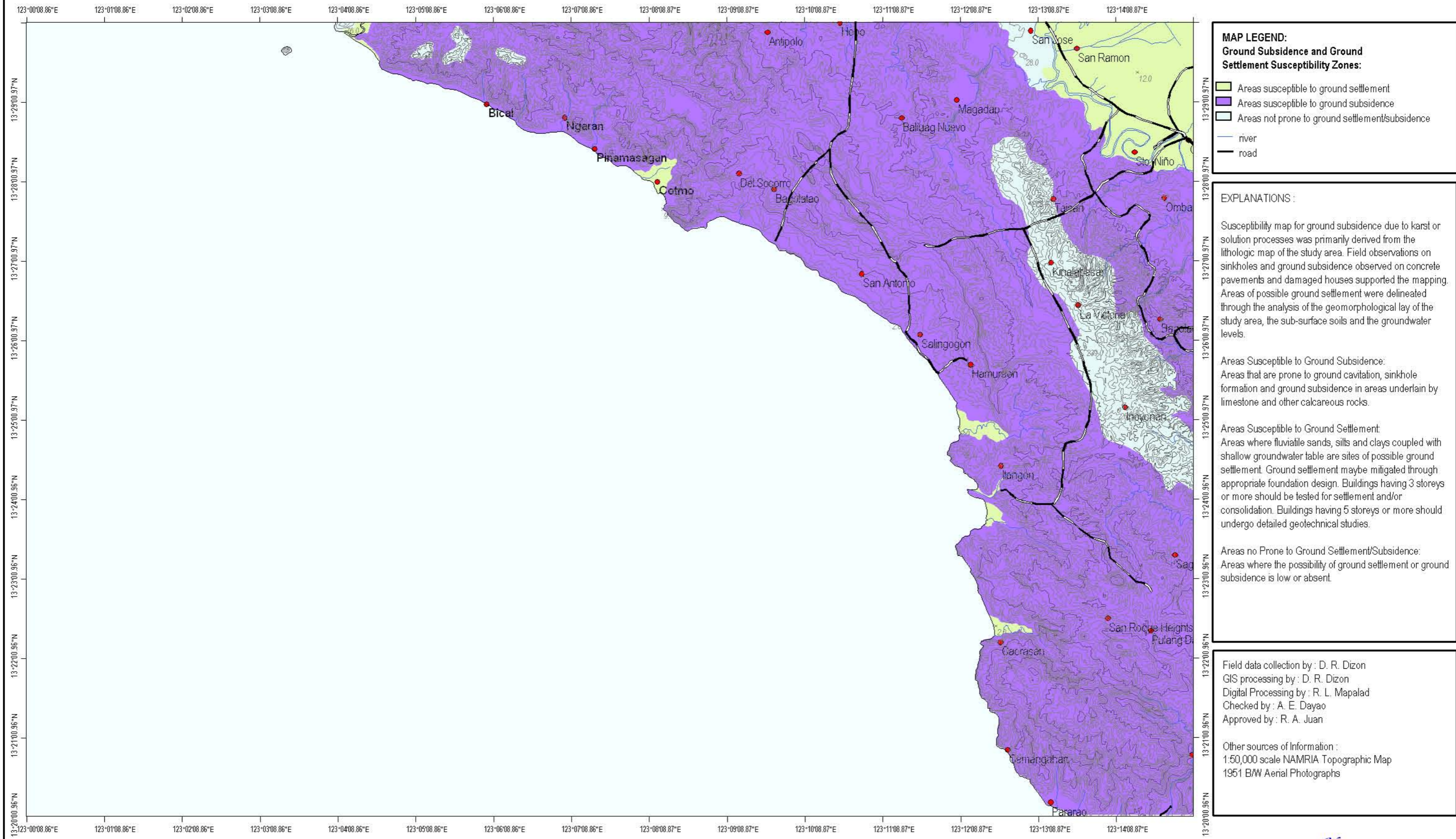
Field data collection by : D. R. Dizon
 Geomorphological Interpretation by : D.R. Dizon
 Digital cartographic processing by : D.R. Dizon
 GIS processing by : D.R. Dizon
 Checked by: A.E. Dayao
 Approved by : R.A. Juan

Other sources of Information :
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 1951 RAW Aerial Photographs

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GROUND SUBSIDENCE AND GROUND SETTLEMENT SUSCEPTIBILITY MAP OF SIBONO QUADRANGLE



MAP LEGEND:
Ground Subsidence and Ground Settlement Susceptibility Zones:

- Areas susceptible to ground settlement
- Areas susceptible to ground subsidence
- Areas not prone to ground settlement/subsidence
- river
- road

EXPLANATIONS :

Susceptibility map for ground subsidence due to karst or solution processes was primarily derived from the lithologic map of the study area. Field observations on sinkholes and ground subsidence observed on concrete pavements and damaged houses supported the mapping. Areas of possible ground settlement were delineated through the analysis of the geomorphological lay of the study area, the sub-surface soils and the groundwater levels.

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

Areas Susceptible to Ground Settlement:
 Areas where fluvialite sands, silts and clays coupled with shallow groundwater table are sites of possible ground settlement. Ground settlement maybe mitigated 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 no Prone to Ground Settlement/Subsidence:
 Areas where the possibility of ground settlement or ground subsidence is low or absent.

Field data collection by : D. R. Dizon
 GIS processing by : D. R. Dizon
 Digital Processing by : R. L. Mapalad
 Checked by : A. E. Dayao
 Approved by : R. A. Juan

Other sources of Information :
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