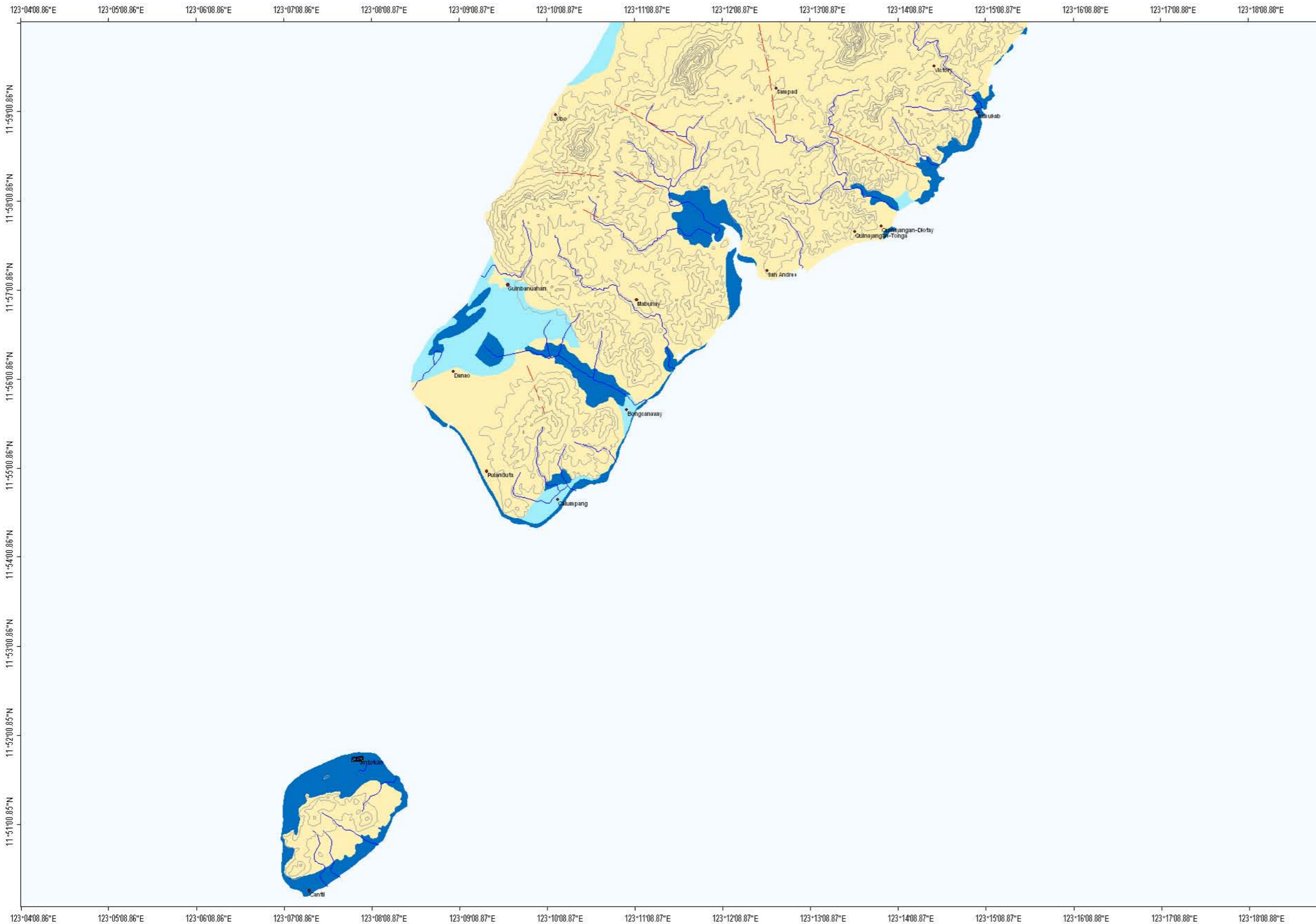


FLOOD HAZARD MAP OF PULANDUTA QUADRANGLE



MAP LEGEND:

Flood Hazard Zones:

- non flood prone areas
- occasionally to rarely flooded areas
- regularly to frequently flooded areas
- areas prone to riverbank erosion
- sea

— contour line
 - - - fault
 — 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.

Regular 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 1 to 3 meters or more in flood waters for a few days to a few weeks.

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

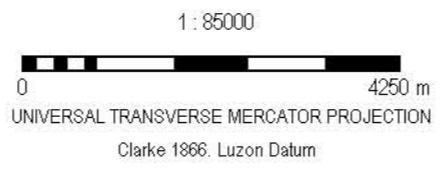
Non-Flood Prone Areas:
 Areas with no reported flood occurrences except low lying areas adjoining rivers or creeks.

Areas Prone to River Bank Erosion:
 Areas 0 to 50 meters from river banks of active river channels that are prone to bank erosion.

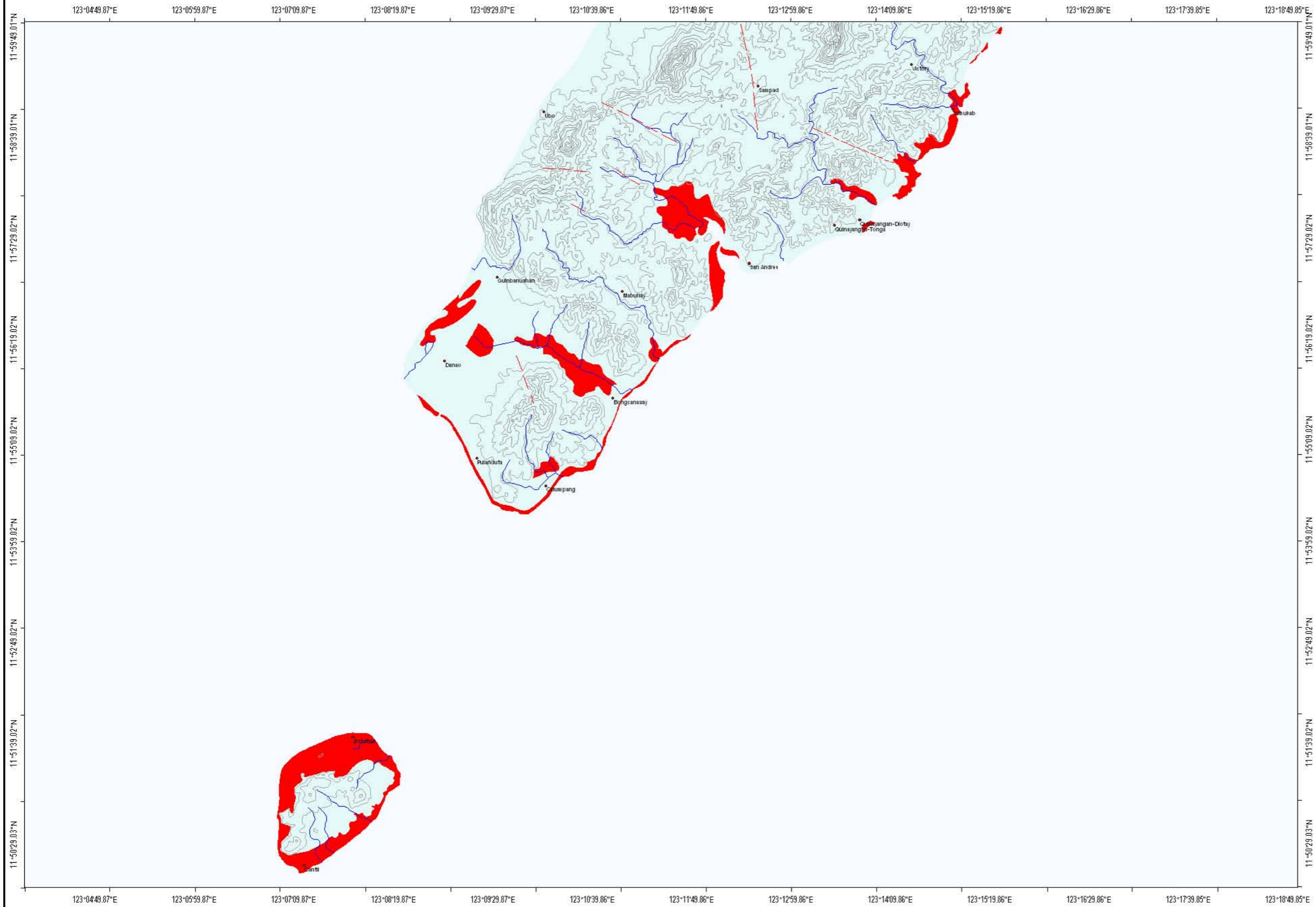
Field Data Collection: A.E. Dayao, D.R. Dizon, E.T. Avila, J. N. Malto, E. G. Basilan, M. N. L. Miraballes
 Geomorphological Interpretation : A. E. Dayao, J. N. Malto
 Digital Cartographic Processing by: J. N. Malto, R. L. Mapalad
 GIS Processing by: A. E. Dayao, J. N. Malto
 Checked by: R. A. Juan
 Approved By: R. A. Juan

Other sources of Information:
 USGS 1:50,000 NAMRIA Topographic Map

Published by:
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MINES AND GEOSCIENCES BUREAU
 Rawis, Legazpi City, Albay
 2009



GROUND SETTLEMENT SUSCEPTIBILITY MAP OF PULANDUTA QUADRANGLE



MAP LEGEND:
Ground Subsidence and Ground Settlement Susceptibility Zones:

- ?
- ?
- ?
- contour line
- fault
- 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 ground subsidence observed on concrete roads 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 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 sands, silts and clays coupled with shallow ground water table are silts 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 detailed geotechnical studies.

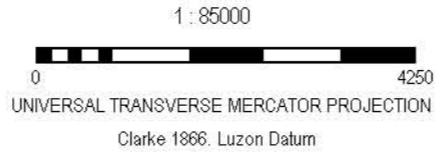
Areas Not Susceptible to Ground Settlement or Ground Subsidence:
 Areas where the possibility of ground settlement or ground subsidence is low or absent.

Field Data Collection: A.E. Dayao, D.R. Dizon, E.T. Avila, J. N. Malto, E. G. Basilan, M. N. L. Miraballes
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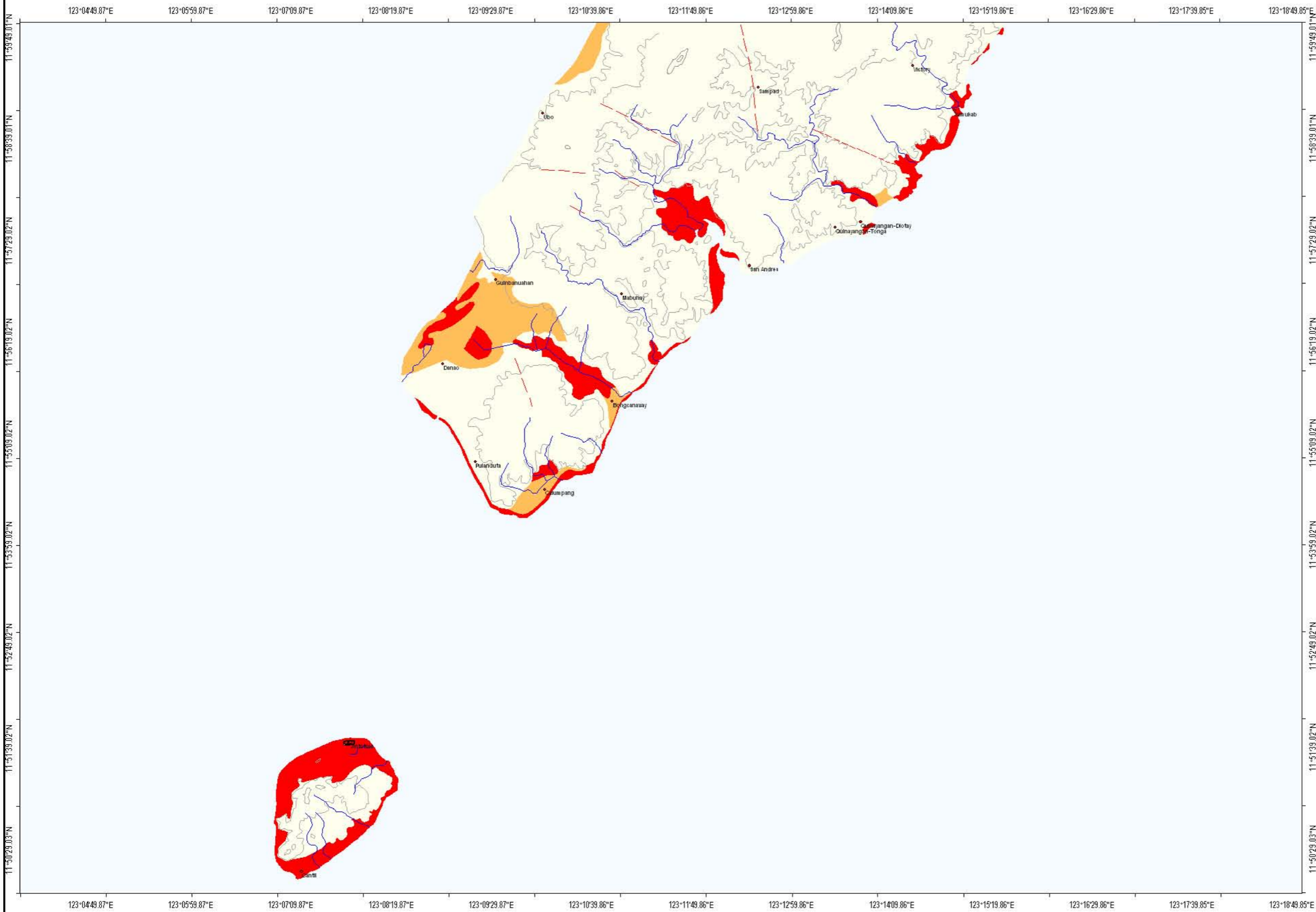
Other sources of Information:
 1:50,000 NAMRIA Topographic Map

123°04'49.87"E 123°05'59.87"E 123°07'09.87"E 123°08'19.87"E 123°09'29.87"E 123°10'39.86"E 123°11'49.86"E 123°12'59.86"E 123°14'09.86"E 123°15'19.86"E 123°16'29.86"E 123°17'39.85"E 123°18'49.85"E

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LIQUEFACTION POTENTIAL MAP OF PULANDUTA QUADRANGLE



MAP LEGEND:
Ground Subsidence and Ground Subsidence Susceptibility Zones:

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

— contour line
 - - - fault
 — river
 — road

EXPLANATIONS:

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

Areas where liquefaction is likely to occur include the riverbeds, mangrove swamps, lakes, lake fan, ponds and coastal plain. These areas are unsuitable for community or urban settlement.

Areas Where Liquefaction is Possible:
 The likelihood of liquefaction occurrence is less for these areas.

Areas Where Liquefaction is Not Likely:
 Areas where liquefaction is unlikely to occur. Most parts of the Palanas Quadrangle Map sheet is not prone to liquefaction because of the presence of underlying bedrock.

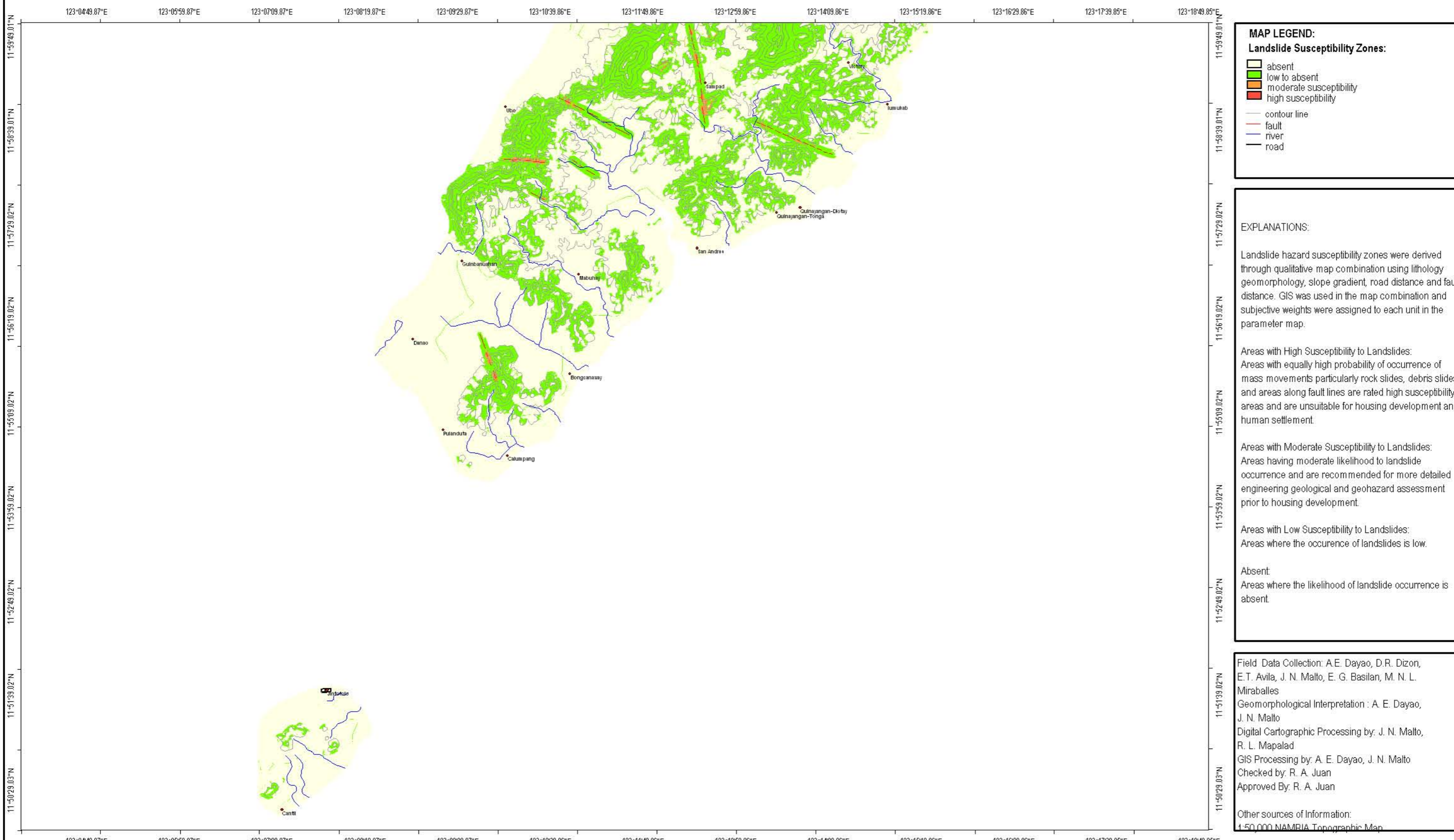
Field Data Collection: A.E. Dayao, D.R. Dizon, E.T. Avila, J. N. Malto, E. G. Basilan, M. N. L. Miraballes
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Other sources of Information:
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LANDSLIDE SUSCEPTIBILITY MAP OF PULANDUTA QUADRANGLE



MAP LEGEND:

Landslide Susceptibility Zones:

- absent
- low to absent
- moderate susceptibility
- high susceptibility

— contour line
— 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 occurrence of mass movements particularly rock slides, debris slides 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 to landslide occurrence 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: A.E. Dayao, D.R. Dizon, E.T. Avila, J. N. Malto, E. G. Basilan, M. N. L. Miraballes
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11°59'49.01"N 11°58'39.01"N 11°57'29.02"N 11°56'19.02"N 11°55'09.02"N 11°53'59.02"N 11°52'49.02"N 11°51'39.02"N 11°50'29.03"N

123°04'49.87"E 123°05'59.87"E 123°07'09.87"E 123°08'19.87"E 123°09'29.87"E 123°10'39.86"E 123°11'49.86"E 123°12'59.86"E 123°14'09.86"E 123°15'19.86"E 123°16'29.86"E 123°17'39.85"E 123°18'49.85"E

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