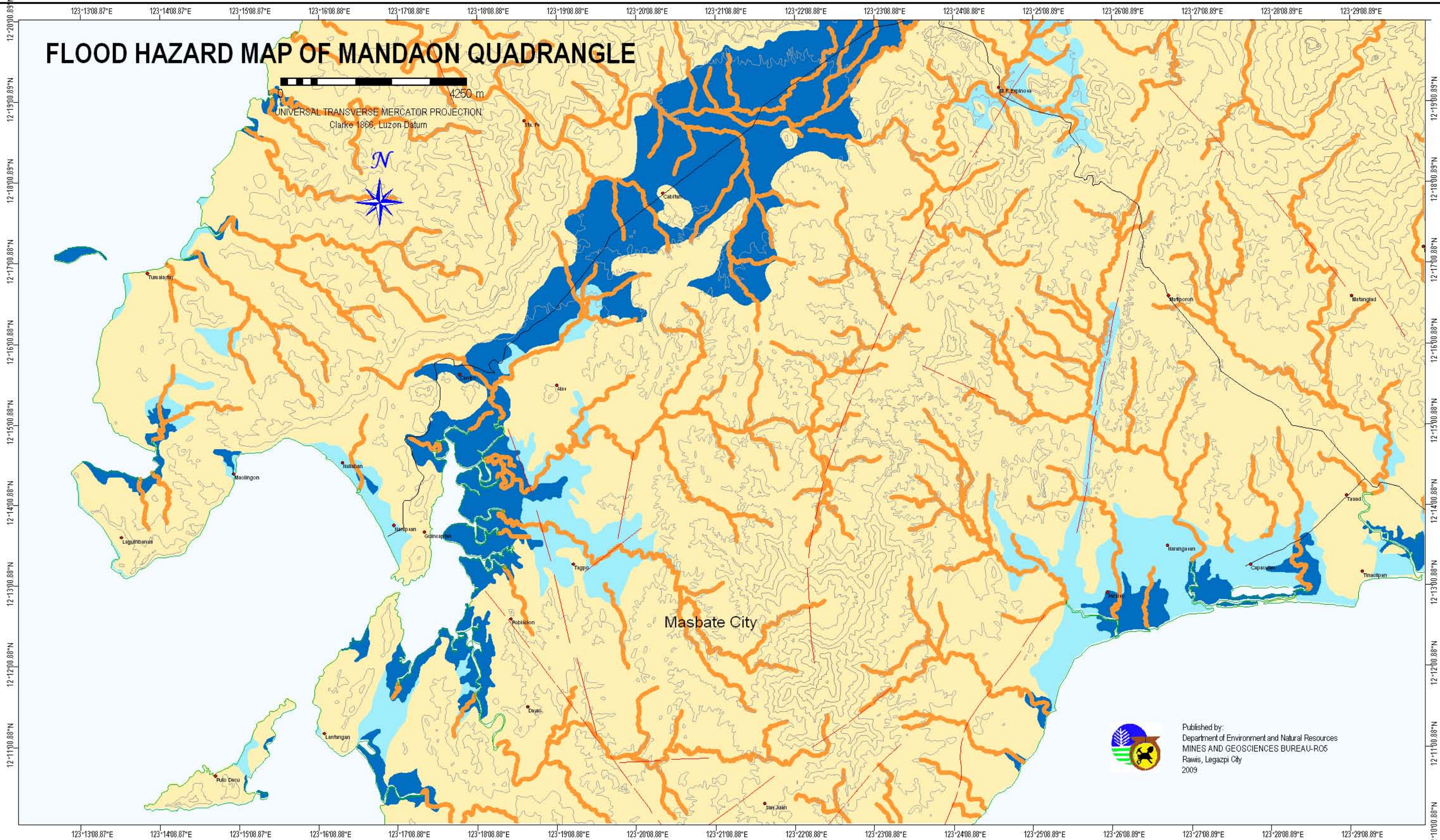


FLOOD HAZARD MAP OF MANDAON QUADRANGLE



MAP LEGEND

Flood Hazard Zones:

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

— contour line — Railroad
 — dike — river
 — fault — road
 — coast

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. Intermittent moderate to heavy rains of 1 to 2 days could bring about flooding in these areas. Moderate to strong typhoons accompanied by heavy rains could submerge these areas 0.5 to 2.0 m. in flood waters for a few days to a few weeks. Development of urban settlements in these areas is not recommended.

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

Non Flood Prone Areas:
 Areas with no reported flood occurrences except in low-lying areas immediately adjoining rivers and creeks but are unmappable in medium scale.

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

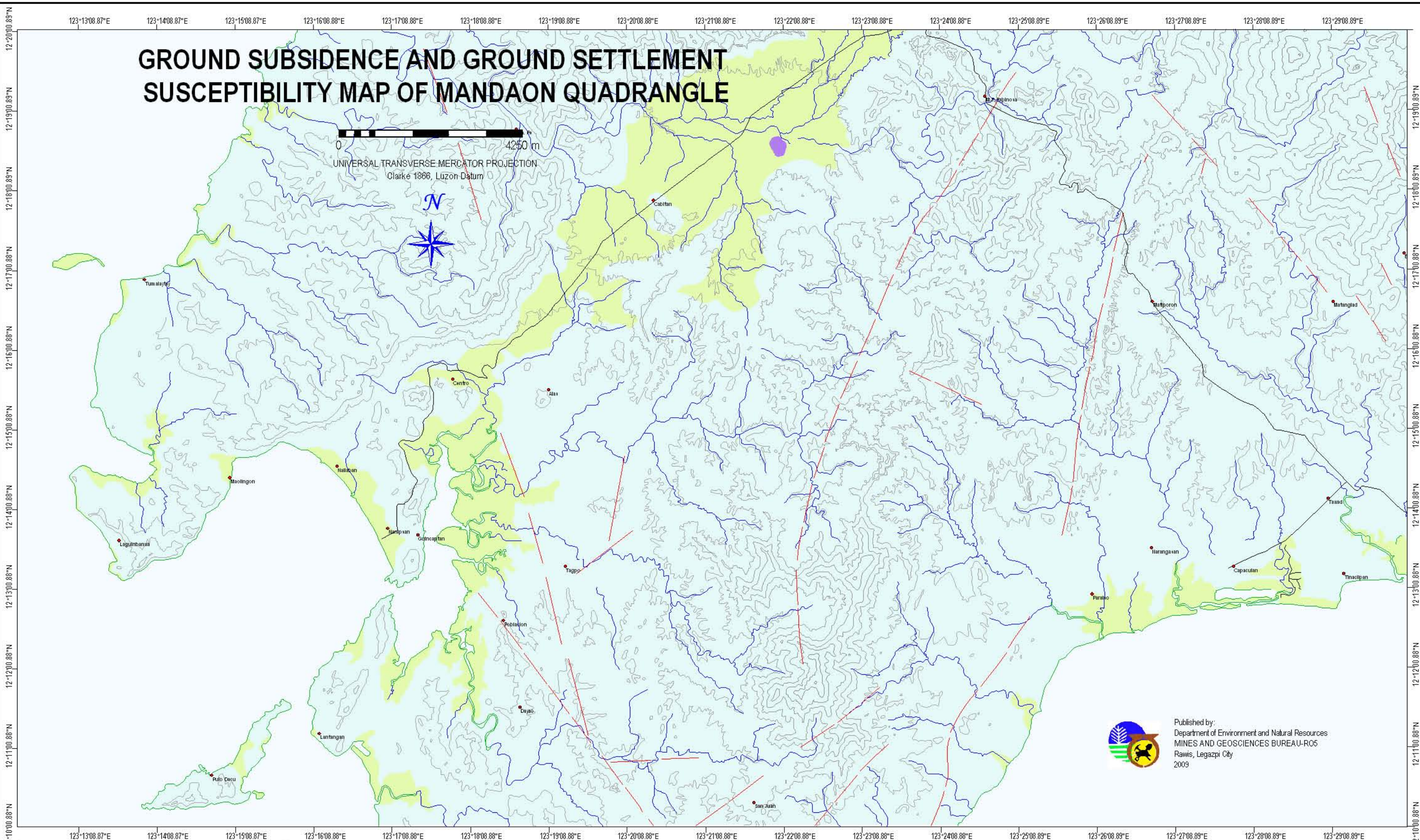
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 2009

Field data collection by: AEDayao, DRDizon, ETAvila, MNLMiraballes, EGBasilan, JNMalto
 Geomorphological interpretation by: JNMalto
 Digital cartographic processing by: JNMalto, RRLMapalad
 GIS processing by: JNMalto
 Checked by: RAJuan
 Approved by: RAJuan

Other sources of Information:
 1:50,000 NAMRIA Topographic Map
 1951 BW Aerial photos



GROUND SUBSIDENCE AND GROUND SETTLEMENT SUSCEPTIBILITY MAP OF MANDAON QUADRANGLE



UNIVERSAL TRANSVERSE MERCATOR PROJECTION
Clarke 1866, Luzon Datum



Published by:
Department of Environment and Natural Resources
MINES AND GEOSCIENCES BUREAU-RO5
Rawis, Legazpi City
2009

MAP LEGEND: Liquefaction Potential Zones

- areas not susceptible to ground subsidence/settlement
 - areas susceptible to ground settlement
 - areas susceptible to ground subsidence
 - sea
-
- contour line
 - coast
 - dike
 - fault
 - Railroad
 - 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 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 underlain by limestone, calcarenites and calcareous siltstones and shales are prone to ground cavitation, sinkhole formation and ground subsidence.

Areas Susceptible to Ground Settlement:
Areas where fluvialite 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 detailed geotechnical studies.

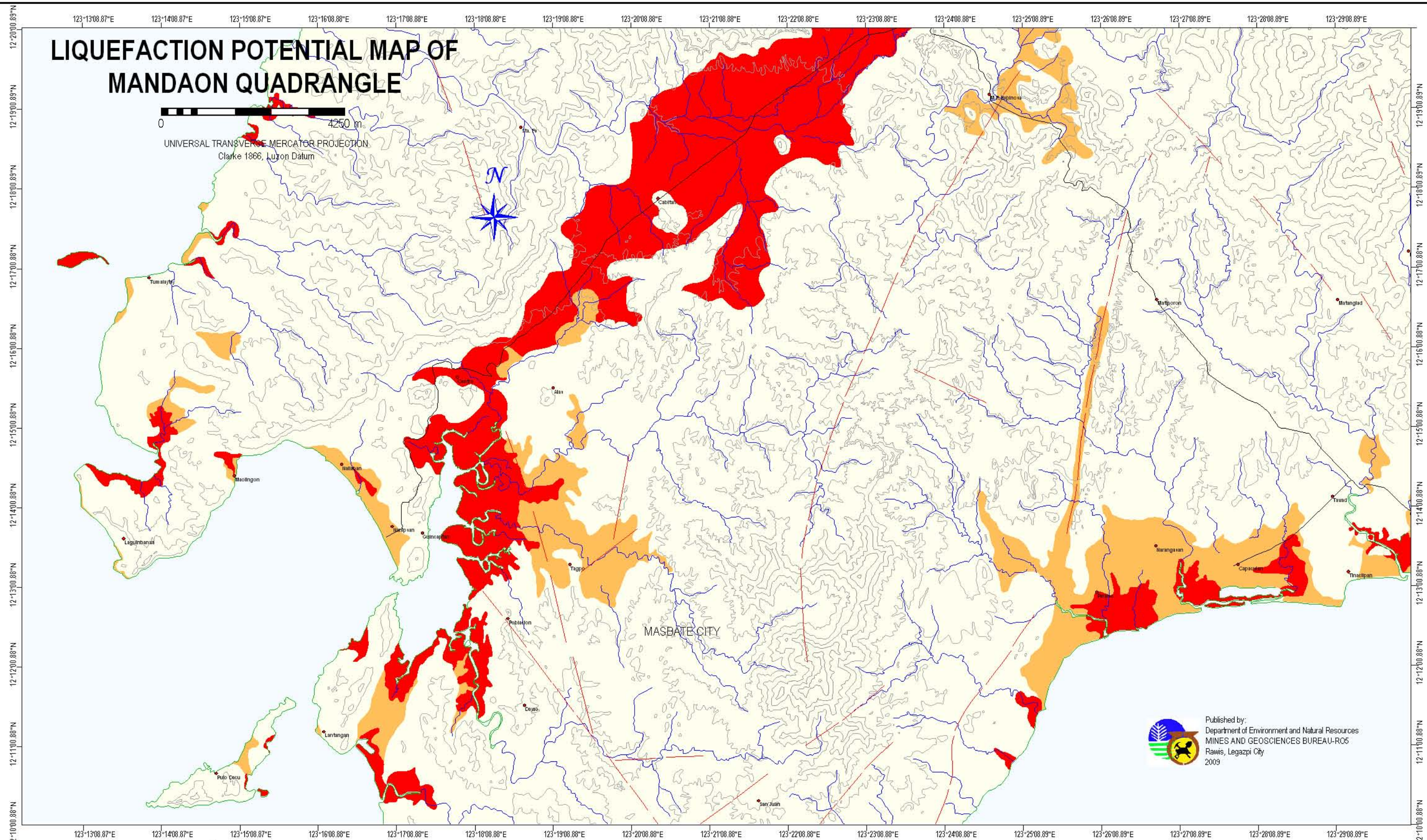
Areas not Susceptible to Ground Settlement or Ground Subsidence:
Areas where the possibility of ground settlement or ground subsidence is low or absent.

Field data collection by: AEDayao, DRDizon, ETAvila, MNLMiraballes, EGBasilan, JNMalto
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GIS processing by: JNMalto
Checked by: RAJuan
Approved by: RAJuan

Other sources of Information:
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1951 B/W Aerial photos

LIQUEFACTION POTENTIAL MAP OF MANDAON QUADRANGLE

0 4250 m
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
Clarke 1866, Luzon Datum



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2009

MAP LEGEND:
Liquefaction Potential Zones

- areas where liquefaction is likely
- areas where liquefaction is not likely
- areas where liquefaction is possible
- sea

— contour line — Railroad
— dike — river
— fault — road

EXPLANATIONS:

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

Areas where Liquefaction is Likely:
Areas where liquefaction is likely include river beds, swamps, beaches and active tidal flats. These areas are unsuitable for urban settlements and housing development. Multi-storey buildings should be required geotechnical assessment studies addressing or mitigating the effects of liquefaction.

Areas where Liquefaction is Possible:
The narrow coastal plains of Aroroy, the alluvial plains and the elongated alluvial plains and narrow valleys formed along minor rivers are areas where liquefaction is possible. Buildings having 5 storeys or more should be required a full geotechnical study.

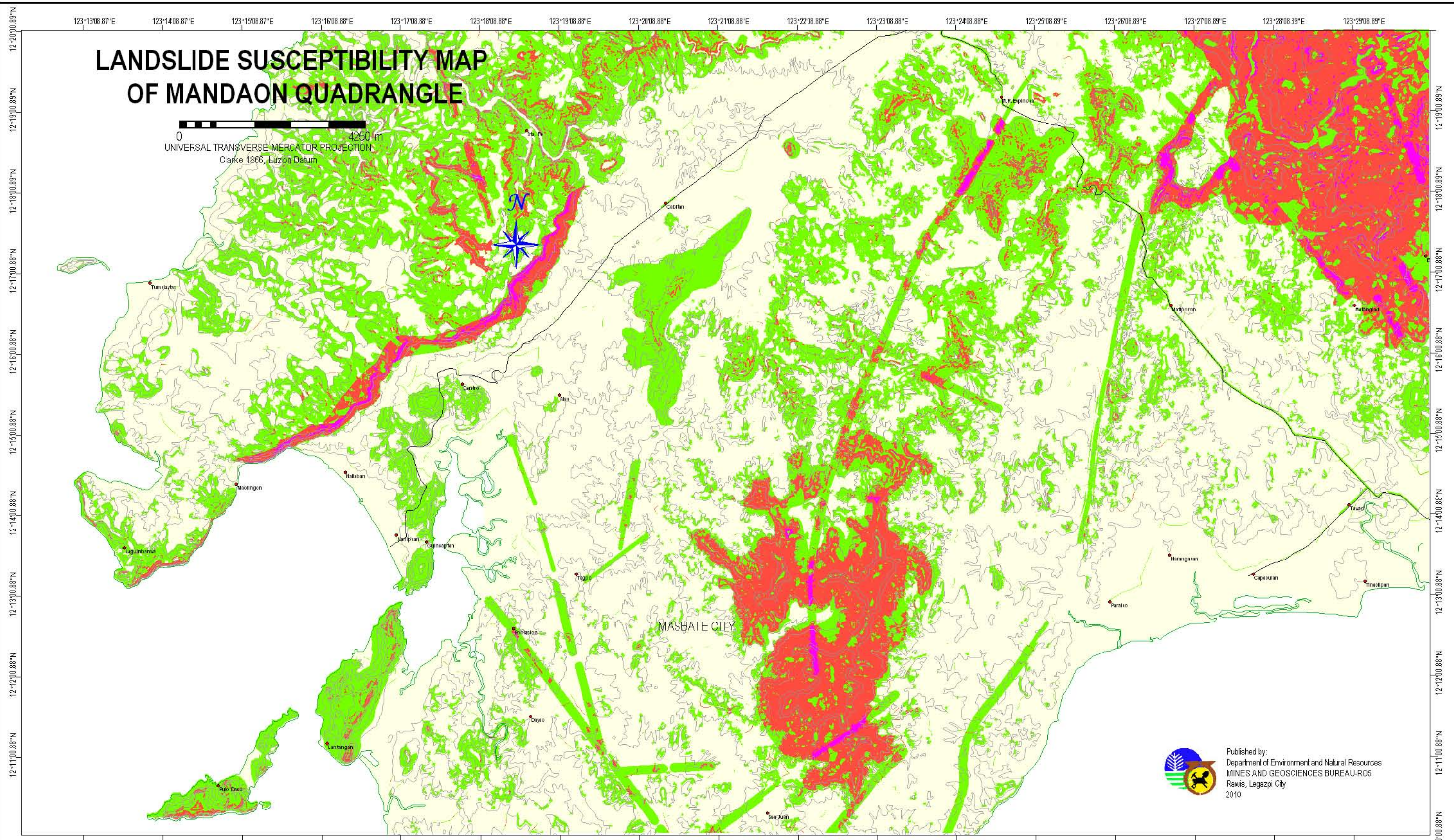
Areas where Liquefaction is not Likely:
Areas where the possibility of liquefaction is unlikely.

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1951 B/W Aerial photos

LANDSLIDE SUSCEPTIBILITY MAP OF MANDAON QUADRANGLE

0 4250 m
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
Clarke 1866, Luzon Datum



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MAP LEGEND: Landslide Susceptibility

- absent
 - low to absent
 - moderate susceptibility
 - high susceptibility
-
- contour line
 - dike
 - fault
 - Railroad
 - river
 - road

EXPLANATIONS:

Landslide hazard susceptibility zones were derived through qualitative map combination using lithology, geomorphology, slope gradient, road distance and fault distance as input parameters. 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 having high probability 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 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 Absent or Low Susceptibility to Landslides:
Areas where the likelihood of landslide occurrence is either absent or low.

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