FLOOD HAZARD MAP OF BALENO QUADRANGLE

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

N

1 : 85000

0 4250 m

UNIVERSAL TRANSVERSE MERCATOR PROJECTION
Clarke 1866, Luzon Datum

MAP LEGEND:

Landslide Susceptibility Zones

- **Areas Prone to Riverbank Erosion**
- **Non Flood Prone Areas**
- **Occasionally to Rarely Flooded Areas**
- **Regularly to Frequently Flooded Areas**
- **contour line**
- **road**
- **river**
- **fault**

EXPLANATIONS:

Flood hazard 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 1-2 days could bring about flooding in these areas. Moderate to strong typhoons accompanied by heavy rains could submerge these areas 0.5 to 3.0 m. in flood waters for a few days to a few weeks. Development of urban settlements in these areas is not

Occasionally to Rarely Flooded Areas:
Areas 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 occurences except along low-lying areas immediately adjoining rivers or 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.

Field data collection by: AEDayao, DRDizon, ETAvila, MNLMiraballes, EGBasilan, JNMalto
Geomorphological interpretation by: EGBasilan
Digital cartographic processing by: AEDayao, RRLMapalad,EGBasilan
GIS processing by: EGBasilan
Checked by: RAJuan
Approved by: RAJuan
Other sources of Information:
1:50,000 NAMRIA Topographic Map
1951 B/W Aerial photos

LIQUEFACTION POTENTIAL MAP OF BALENO QUADRANGLE

Published by:
Department of Environment and Natural Resources
MINES AND GEOSCIENCES BUREAU-RO5
Rawis, Legazpi City, Albay
2008

N

1 : 85000
0 4250
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
Clarke 1866, Luzon Datum

Bangon, Tinapian, Puro, Pinanaan, Syndicate, Lahong Interior, BALENO, Potoson, Docol, Baao, Batuila, Cagara, Calanay, Balawing, Panique, Capsay, Sn. Agustin, Eastern Capsay, Banase, Sn. Isidro, Lanang, Gabi, Dayhagan, Luy-a, Cabangcalan, Concepcion, Balete, Malubi, Cabas-an, Amotag, Nabongsoran, Pangle, Manamoc, Macabug, Managa-naga, Bugtong

MAP LEGEND:

Liquefaction Potential Zones

- **Areas where Liquefaction is Likely**
- **Areas where Liquefaction is Not Likely**
- **Areas where Liquefaction is Possible**
- **contour line**
- **fault**
- **river**
- **road**

EXPLANATIONS:

There are no reported liquefaction occurences 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 previous studies made by Iwasaki and Yasuda.

Areas where Liquefaction is Likely:

Areas where liquefaction is likely include active/young tidal flats with nipa and mangrove, beach ridge and swale complex and spit. These areas are unsuitable for urban development. Multi-storey storey building should be required of geotechnical studies addressing or mitigating the effects of liquefaction.

Areas Where Liquefaction is Possible:

Coastal plains and the alluvial plains are areas where liquefaction is possible. Buildings having 5 storeys or more should be required a full geotechnical study.

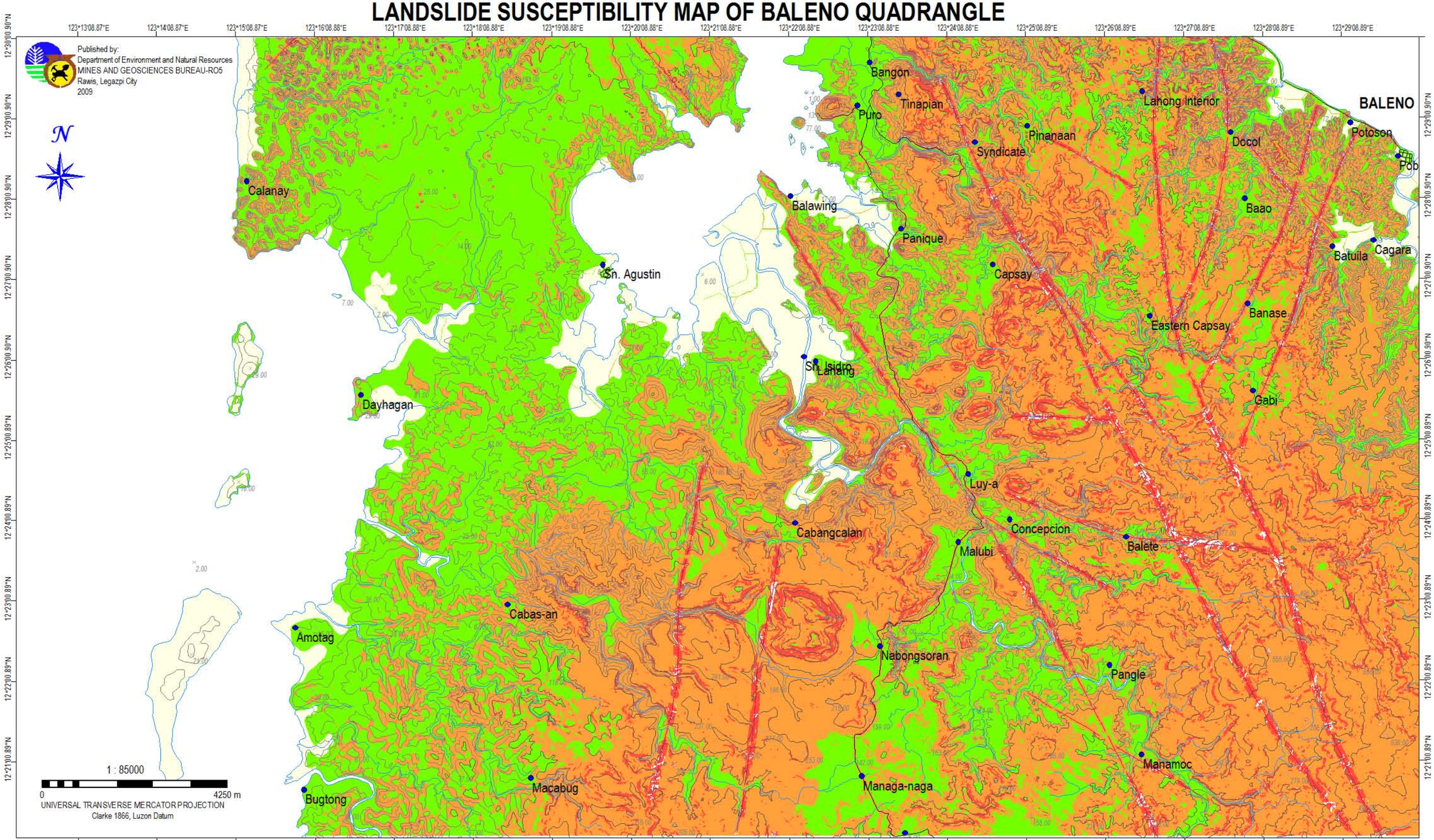
Areas where Liquefaction is not Likely:

Areas where the likelihood of liquefaction is unlikely.

Field data collection by: AEDayao, DRDizon, ETAvila, MNLMiraballes, EGBasilan, JNMalto
Geomorphological interpretation by: EGBasilan
Digital cartographic processing by: AEDayao, RRLMapalad,EGBasilan
GIS processing by: EGBasilan
Checked by: RAJuan
Approved by: RAJuan
Other sources of Information:
1:50,000 NAMRIA Topographic Map
1951 B/W Aerial photos

LANDSLIDE SUSCEPTIBILITY MAP OF BALENO QUADRANGLE

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



MAP LEGEND:
Landslide Susceptibility Zones

- Absent
- Low Susceptibility to Landslides
- Moderate Susceptibility to Landslides
- High Susceptibility to Landslides
- contour line
- road
- river
- fault

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.

Field data collection by: AEDayao, DRDizon, ETAvila, MNLMiraballes, EGBasilan, JNMalto
Geomorphological interpretation by: EGBasilan
Digital cartographic processing by: AEDayao, RRLMapalad,EGBasilan
GIS processing by: EGBasilan
Checked by: RAJuan
Approved by: RAJuan
Other sources of Information:
1:50,000 NAMRIA Topographic Map
1951 B/W Aerial photos

GROUND SUBSIDENCE AND GROUND SETTLEMENT SUSCEPTIBILITY MAP OF BALENO QUADRANGLE

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

N

Bangon
Tinapian
Puro
Lanang Interior
Pinanaan
Syndicate
Docol
BALENO
Potoson
Pob
Calanay
Balawing
Panique
Baao
Batuila
Cagara
Sn. Agustin
Capsay
Eastern Capsay
Banase
Sn. Isidro
Lanang
Dayhagan
Gabi
Luy-a
Cabangcalan
Concepcion
Malubi
Balete
Cabas-an
Amotag
Nabongsoran
Pangle
Manamoc
Macabug
Managa-naga
Bugtong

1 : 85000
0 4250 m
UNIVERSAL TRANSVERSE MERCATOR PROJECTION
Clarke 1866, Luzon Datum

MAP LEGEND:
Gound Subsidence and Ground Susceptibility Map

- Areas not susceptible to ground subsidence/settlement
- Areas susceptible to ground settlement
- Areas susceptible to ground subsidence
- contour
- 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 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 prone to ground cavitation, sinkhole formation and ground subsidence in areas underlain by limestone and calcareous siltsones and shales.

Areas Susceptible to Ground Settlement:
Areas where fluviatile sands, silts and clays coupled with shallow ground water tables are site 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 Prone to Ground Settlement/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
Geomorphological interpretation by: EGBasilan
Digital cartographic processing by: AEDayao, RRLMapalad
GIS processing by: EGBasilan
Checked by: RAJuan
Approved by: RAJuan
Other sources of Information:
1:50,000 NAMRIA Topographic Map
1951 B/W Aerial photos