



Republic of the Philippines
Department of
Environment and
Natural Resources

MINES AND GEOSCIENCES BUREAU

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MEMORANDUM

FOR : The Regional Director
Mines and Geosciences Bureau
Regional Office No. 8, Tacloban City

FROM : The Geohazard Survey Team

SUBJECT : PRELIMINARY REPORT ON THE RAPID ASSESSMENT OF
REPORTED LANDSLIDE OCCURRENCES IN THE PROVINCE
OF SOUTHERN LEYTE

DATE : February 14, 2006

In compliance with your urgent directive relative to the aforementioned subject, the undersigned conducted an emergency fieldwork on February 13 to 14, 2006 in several areas of Southern Leyte with reported landslide.

Most of the heavy mass movements occurred along the Sogod – Mahaplag and Himay-angan (Liloan) – Lepanto (St. Bernard) road segments, both of which happened on February 12, 2006.

The mass movements that occurred along the Sogod – Mahaplag Highway resulted to the death of 7 people and caused heavy damages on the Agas-agas road section rendering it impassable to vehicles. Other heavy landslides also occurred at road segments of Sitio Ballacao, Brgy. Pinamunuan, Mahaplag, Leyte and Brgy. Pancho Villa, Sogod, S. Leyte, both of which have completely blocked the road passage. No houses have been destroyed aside from the bunkhouse located at Agas-agas area.

The mass movements that happened at Himay-angan – Lepanto Highway on the other hand have destroyed 4 houses at the Barangay proper of Himay-angan, Liloan, and caused a road segment collapse within Brgy. Lepanto, St. Bernard. The road segment failure rendered the municipalities of St. Bernard, San Juan, Anahawan, Hinunangan, Hinundayan, and Silago temporarily inaccessible for vehicles coming from western municipalities of mainland Leyte.

Landslide areas can be presently reached thru a combination of hike and motorbike ride.

Initial assessment by the team conducting the rapid assessment made the following observations:


1. The area with mass movements are traversed by the Philippine Fault Zone, thus the rock units in the area are highly fractured and sheared, and hence prone to slumping, landsliding, and other forms of mass movement aided by or induced by water movement, action of gravity, or seismic activity.
2. The presence of fault structures in the area renders its rock units to be highly altered and weathered due to the action of mineralizing fluid and other chemical weathering process. This in turn contributed to the rapid decomposition, alteration, and weathering of rock units thereby affecting the rock and soil strength and stability.

3. The area with mass movement are topographically high with steep valley walls and slopes, thus influence of gravity is very high.
4. Rock units in the inspected areas are composed of andesite and basalt flows, volcanic breccias and conglomerate, and pyroclastic rocks in the Sogod-Mahaplag area, while, and sedimentary rock formations made up of sandstone, shale, and mudstone underlies the Himay-angan – Lepanto Area.
5. The sedimentary rock formations in the Himay-angan – Lepanto area are also prone to slides and other mass movements due to the steep bedding configuration with dip direction going towards the road segment.
6. Based on the rain gauge data taken at Brgy. Oticon, Libagon, Southern Leyte PAGASA Station, the highest rainfall occurred on Sunday (February 12, 2006) at 171 mm and where on that single day all the mass movements in the aforementioned area occurred. If we are to add up the readings for the past five (5) days of continuous rains prior to the main mass movements (February 8-12, 2006), the reading would amount to 571.2 mm, which is equivalent to almost three months or 20% of the average annual precipitation of 3000 mm.
7. PAGASA records show that Southern Leyte area experiences wet seasons during the months of November to March.

Based on the findings and observations made, the survey team believed that most areas of Southern Leyte are prone to mass movements due to the aforementioned factors. Agas-agas area is one of the most highly unstable highways in the region.

It is respectfully recommended that the affected areas be off limits to people and that detailed geohazard survey be conducted in the area to fully assess its possibility to future mass movements and that proper engineering designs be made to come up with proper engineering structures to mitigate and counteract the inherent geological conditions of the rock units in the area.


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List of Areas Inspected for Mass Movements

LOCATION	COORDINATES	REMARKS
1. Sitio Ballacao, Pinamunuan, Mahaplag, Leyte	10°31'12.1" N 124°58'44" E	Recurrence of rock and debris slides in old landslides as induced by heavy rains, weathering of rocks, and gravity actions. Volume of rock and soil fragments/ debris blocking the road is approximately 400 m ³ . No loss of lives and damage to properties have been observed nor reported in the area.
2. Near Agas-Agas area, Sogod, Southern Leyte	10°30'05.7" N 14°59'24.4" E	Rock debris and flow coming from steep slopes at the side of the road as induced by heavy rains and loose nature of the rock fragments and action of gravity. (70° - 80° slope) No damage to properties was observed in the area. Rock materials are scattered along the road.
3. Brgy. Sampongan, Bato, Leyte	10°19'42.1" N 124°55'34.9" E	Loss of foundation support due to scouring at the base of the road foundation and lack of support to road pavements located in curvilinear embankment resulting to road slip.
4. Brgy. Pancho Villa, Sogod, So. Leyte	10°26'49.4" N 125°00'25.9" E	Rock and debris slide occurred at about 12am, February 12 (Sunday). Rock debris involved are highly fractured and altered volcanic rocks and pyroclastics. Mass movement was induced by heavy rains, lubricating fault liner, rock fracturing and gravity actions. Debris materials blocking the road is estimated at 8,400 m ³ . No loss to lives and damage to private properties were reported or observed in the area.
5. Agas-agas Area, Brgy. Kahupian, Sogod, So. Leyte	10°29'49.5" N 124°59'54.3" E	Agas-agas debris slide is attributed to highly weathered and altered andesite and pyroclastic bedrocks, steep slopes, and heavy rainfall. High rainfall led to oversaturation of bedrocks that induced debris flow.

		<p>The vicinity of Agas-agas had experienced slumping and rock sliding along the fault line sections as evidenced by 2 to 5 meters vertical displacements observed on the slumped slide planes. The water from the surface runoff and rains acted as lubricant along the fault planes and fractures, resulting to slumping of the mobile portion (unstable) or the rock mass. This in turn resulted to the slippage and overturning of gabions built along the road.</p> <p>The seven (7) fatalities are bystanders, motorcycle drivers, and a couple who took refuge from the rains after harvesting banana crops nearby. The road was rendered off-limits to any type of vehicles since February 10, Friday by the DPWH – Southern Leyte. Landslide occurred on Sunday, February 12 at 8 am. The impact of the debris slide was so intense that a road paver ("pison") was dislodged for about 10 meters.</p>
<p>6. Brgy. Himay-angan, Liloan, So. Leyte</p>	<p>10°11'32" N 125°06'39.9" E</p>	<p>Debris and mudflow. Weathered rock debris and loose soil along steep slope was detached from its bedrock as induced by heavy rains. The debris and mudflow was carried as far as 200 to 300 meters downslope, affecting four houses near the road. No loss of lives was reported. The debris slide/mudflow occurred at about 2pm, February 12.</p>
<p>7. Brgy. Himay-angan, Liloan, So. Leyte</p>	<p>10°12'26.9 N 125°07'34" E</p>	<p>Road buckling and road slip towards northwest in conformity with the steep bedding direction of the sedimentary rock units in the area, although can also be attributed to loss of foundation due to scouring of water. Road buckling was due to pressure exerted by landslide materials towards the concrete section of the road.</p>

<p>8. Brgy. Lepanto, St. Bernard, So. Leyte</p>	<p>10°12'55.2" N 125°07'33" E</p>	<p>Road Collapse (approximately 50 meters) The paved road section collapsed along the steep ravine about 50 – 100 meters high. The failure was due to water saturation on thick unstable soil and sedimentary rock units that act as foundation of the road pavement. A fault plane trending N-S, dipping 60° east served as sliding plane of the overlying soil and rock units, which was further induced by percolating rainwater which acted as a lubricant. The strong surface runoff also scoured the basement materials of the road section.</p>
<p>9. San Roque, Liloan, So. Leyte</p>	<p>10°10'32.2" N 125°07'18.8" E</p>	<p>Minor road cut debris slide induced by heavy rains.</p>
<p>10. Brgy. Punta, San Francisco, So. Leyte</p>	<p>10°03'01.1 N 125°10'09.3" E</p>	<p>Mud/ Debris Flow The debris/ mudflow is located at about 100 to 150 meters south of the 2003 debris slide of Brgy. Punta, San Francisco. The mass movement was induced by heavy rains, soil weathering, rock alteration, and action by gravity.</p>