

RESULTS OF THE MGB RAPID GEOHAZARD ASSESSMENT OF BARANGAYS IN CAGAYAN DE ORO CITY, MISAMIS ORIENTAL

In line with the recent Presidential Directive and NDCC resolutions following the February 17 Southern Leyte landslide incident, and the need to fast track the geohazard mapping program of the Philippines, six (6) geologists from the Mines and Geosciences Bureau (MGB), namely; Salvio B. Laserna, Alvin Lucio M. Fernando, Lutgardo S. Laraño, Angelica B. Sajona, Maria Elena S. Lupo, and Beverly Mae M. Brebente conducted a field assessment of 80 barangays in Cagayan de Oro City, Misamis Oriental on July 18-20, 2009. The field assessment focused on both the landslide and flood susceptibilities of the barangays.

In terms of landslide susceptibility, each barangay was rated low, moderate or high. The rating parameters are as follows:

High

- Presence of active and/ or recent landslides
- Presence of numerous and large tension cracks
- Areas with drainages that are prone to debris damming
- Areas with numerous old landslides/escarpments
- Steep slopes
- Presence of weak/rock slope materials
- Structures (joints, beds) dipping towards the slope face
- Nearness to faults

Moderate`

- Areas with indicative and/or old landslides
- Presence of small tension cracks
- Moderate slopes

Low

- Low to gently sloping
- No evidence of mass movement

The rating of each barangay, unless specified, refers to the barangay proper.

The barangays were presented with a *Landslide Threat Advisory*, when appropriate. The Advisory informs the barangays of their susceptibility to landslides and contains the corresponding recommendations particular to the barangay.

In terms of flood susceptibility, the barangays were defined in terms of the depth and frequency of flooding.

The result of the MGB field assessment is as follows:

- Two barangays, namely Camaman-an and Pagalungan, are highly susceptible to landslide.
- Barangays Cugman, F. S. Catanico, Pigsag-an, Tuburan, and Tumpagon have moderate susceptibility to landslide.
- Ten (10) barangays, namely: Baikington, Balulang, Bayanga, Besigan, Lumbia, Mambuaya, San Simon, Taglimao, Tagpangi, and Tignapoloan, have low susceptibility to landslide. Some parts of a number of these barangays, however, have higher susceptibility rating than their barangay proper.
- The rest of the barangays are not susceptible to landslide. Barangays Balubal, Gusa, Indahag, Lapasan, Macasandig, Nazareth, Pagatpat, and Tablon are observed to have moderate to high susceptibility ratings in some areas.

Table1. Results of Landslide Assessment of the barangays

	Barangay Name	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Camaman-an	High	Recent/active landslides have affected houses at Ramonal and Adela Hillside Villages, Sitio Mahayag, a portion of the Brgy. Proper. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Identify evacuation site.
2	Pagalungan	High	Mass movements are evidenced by tension cracks (terraces), old and recent landslides and patchy soil creep. Continuous movements or widening of cracks at the Brgy. Proper are observed. Small landslides are noted at Sitio Batinay. Recommendation: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks).
3	Cugman	Moderate	Recent/active landslides are noted along roadcuts at Sitio Malasag. Recommendations: Monitor progress and observe for presence

			of mass movement (e.g. landslides, tension cracks). Observe for sunken or displaced road surfaces.
4	F.S. Catanico	Moderate	Recent/active landslides are noted along roadcuts of farm to market roads. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Observe for sunken or displaced road surfaces. Activate BDCC.
5	Pigsag-an	Moderate	Evidences of mass movement are tension cracks, old and recent landslides, old escarpments, and patchy soil creep. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Identify relocation for residents living at the Brgy. Proper.
6	Tuburan	Moderate	Single tension cracks and recent/active landslides are evidences of mass movement in the barangay. Recommendation: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks).
7	Tumpagon	Moderate	Recent/active landslides, as seen from slope failures along the road, and patchy soil creep are evidences of mass movement. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Identify relocation site for residents living at Sitio Upper.
8	Baikingon	Low	

9	Balulang	Low for brgy proper; high for Sitios Manggahan, Pryce, Greenheights, Guisok-Carensole, and Balungis	<p>Old escarpments are observed as evidence of mass movement in the area.</p> <p>Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Identify evacuation site. Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Observe for saturated ground or seeps in areas that are not typically wet. Observe for sunken or displaced road surfaces. Identify relocation site for residents living at Sitio Manggahan. Construction of rip-rap structure (benching type) is recommended.</p>
10	Bayanga	Low for brgy proper; moderate for Sitios Bikiwan and Baluga	<p>Mass movements are evidenced by old/inactive landslides, old escarpments, and patchy soil creep.</p> <p>Recommendations: Observe for presence of mass movement (e.g. landslides, tension cracks).</p>
11	Besigan	Low	<p>Evidences of mass movements include recent and old landslides and escarpments.</p> <p>Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Observe for saturated ground or seeps in areas that are not typically wet. Observe for sunken or displaced road surfaces. Conduct training on disaster preparedness and awareness. Conduct slope stability measures on landsliding slope</p>

			along roadcuts. MDCC should have standby rescue vehicle for residents during calamities. Develop road as escape route for residents in times of calamities.
12	Lumbia	Low for Brgy. Proper; high for Sitio Cabula (roadcuts)	
13	Mambuaya	Low for Brgy. Proper; high for Sitio Zone 5	Evidences of mass movement at Zone 5 include recent escarpments and patchy soil creep. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Observe for sunken or displaced road surfaces.
14	San Simon	Low	Evidences of mass movement include single tension cracks at Sitio Rankalon, recent landslides, recent escarpments, and patchy soil creep. 2 houses at Zone 3, Sitio Perico were damaged last January 11, 2009 landslide. 15 houses more are susceptible to potential landslide. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Identify evacuation site. Observe for saturated ground or seeps in areas that are not typically wet. Identify relocation site for residents living at Zone 3, Sitio Perico. Constant communication and updates with Brgy. Pagatpat on geohazard situation
15	Taglimao	Low	Mass movements are manifested by single tension cracks, recent/active landslides, and

			<p>escarpments. Recommendation: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks).</p>
16	Tagpangi	Low	<p>Single tension cracks, recent/active landslides and patchy soil creep are evidences of mass movement in the barangay. Small landslide at Sitio Batinay occurred last Jan 2009. Recommendation: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks).</p>
17	Tignapoloan	Low for Brgy. Proper; high for Sitios Empakibil, Camang, Salimbal, Binagod, Lakob, Dungguan, and Kibulawan	<p>Evidences of mass movement are old/inactive landslides and patchy soil creep. Recommendation: Conduct training for disaster preparedness and awareness (MDCC/PDCC/RDCC).</p>
18	Balubal	None for Brgy. Proper; high for Purok 1 and 7	<p>Slope failures occurred along roadcuts at Purok 1 and 7.</p>
19	Gusa	None for Brgy. Proper; high for Purok 3	<p>Quarrying activities occur at Purok 3, which is a landslide area.</p>
20	Indahag	None for Brgy. Proper; high for Poblacion	<p>Poblacion is highly susceptible to landslide where quarrying activities occur. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Identify evacuation site.</p>
21	Lapasan	None for Brgy. Proper; high for Sitios Hillside, San Miguel, and Camp Alager	<p>Recommendations for sitios: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Identify relocation site. Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content).</p>

			Observe for saturated ground or seeps in areas that are not typically wet. Identify relocation site for residents living at Sitios Hillside, San Miguel, and Camp Alager. Constant communication and updates with Brgy. Lapasan on geohazard situation.
22	Macasandig	None for Brgy. Proper; high for hilltop	Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Observe for sunken or displaced road surfaces. Identify relocation site for 150 residents (informal dwellers) living along the slopes.
23	Nazareth	None for Brgy. Proper; high for sitios	Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Observe for saturated ground or seeps in areas that are not typically wet. Observe for sunken or displaced road surfaces. Identify relocation site for more than 150 households (informal dwellers) along the slopes of Sitios Upper 20, San Jose, and Nazareno.
24	Pagatpat	None for Brgy. Proper; moderate for Zone 6	Landslide at Zone 6 during Jan. 11, 2009 extreme rains resulted to 1 fatality. Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Identify evacuation site. Identify relocation site for residents living at Zone 6.
25	Tablon	None for Brgy. Proper; moderate for Purok 1	Slope failure at Purok 1 affected 20 houses in 2007.
26	Brgy. 1	None	
27	Brgy. 2	None	
28	Brgy. 3	None	

29	Brgy. 4	None	
30	Brgy. 5	None	
31	Brgy. 6	None	
32	Brgy. 7	None	
33	Brgy. 8	None	
34	Brgy. 9	None	
35	Brgy. 10	None	
36	Brgy. 11	None	
37	Brgy. 12	None	
38	Brgy. 13	None	
39	Brgy. 14	None	
40	Brgy. 15	None	
41	Brgy. 16	None	
42	Brgy. 17	None	
43	Brgy. 18	None	
44	Brgy. 19	None	
45	Brgy. 20	None	
46	Brgy. 21	None	

47	Brgy. 22	None	
48	Brgy. 23	None	
49	Brgy. 24	None	
50	Brgy. 25	None	
51	Brgy. 26	None	
52	Brgy. 27	None	
53	Brgy. 28	None	
54	Brgy. 29	None	
55	Brgy. 30	None	
56	Brgy. 31	None	
57	Brgy. 32	None	
58	Brgy. 33	None	
59	Brgy. 34	None	
60	Brgy. 35	None	
61	Brgy. 36	None	
62	Brgy. 37	None	
63	Brgy. 38	None	
64	Brgy. 39	None	

65	Brgy. 40	None	
66	Agusan	None	
67	Bayabas	None	
68	Bonbon	None	
69	Bulua	None	
70	Bugo	None	<p>Old and recent landslides are evidences of mass movement in the barangay, particularly at Villa Trinitas and Greenville Subdivisions.</p> <p>Recommendations: Monitor progress and observe for presence of mass movement (e.g. landslides, tension cracks). Develop an early warning device/system. Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Conduct and organize disaster preparedness training.</p>
71	Canitoan	None	
72	Carmen	None	
73	Consolacion	None	
74	Dansolihon	None	Evidence of mass movement is the occurrence of patchy soil creep.
75	Iponan	None	
76	Kauswagan	None	
77	Macabalan	None	

78	Patag	None	
79	Pontod	None	
80	Puerto	None	Mass movement in the barangay is manifested by old/inactive landslides. Recommendations: Develop an early warning device/system. Identify evacuation site. Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content).

In terms of flood susceptibility, the 80 barangays experience varying degrees of flooding. The results are as follows:

Table 2. Results of Flood Assessment of the Barangays

Barangay Name	Remarks/ Recommendations
Agusan	Flash flood with moderate turbidity is rare. Seasonal sheet flooding with low depth of <0.5m occurs. Zones 1 and 2 are usually flooded during heavy rains; waters subside easily.
Baikingon	Flash flood with low turbidity rarely occurs. Sheet flooding with low depth of <0.5m is also rare. Extreme flooding (with high depth of >1m) occurred last January 11, 2009 affecting Zones 1 to 3. Nine houses near the riverbanks were washed out.
Balubal	Sheet flooding rarely occurs. Puroks 1, 3, 4, 6, and 7 situated between Agusan River and Tin-ano Creek are prone to riverbank erosion. Moderate flood depth of 0.5-1m occurred during heavy rains at Purok 1 in 2005 and lasted for 3-5 hours.
Balulang	None. Recommendation: Construction of dike along the river particularly along the areas of Sitios Puntod, Carisna, and Carinugan.
Brgy. 1	Flash flood rarely occurs. Sheet flooding with high depth of >1m is rare. In January 2009, 16 families living along creek side were affected by flooding. Recommendation: Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content).
Brgy. 2	Sheet flooding with low depth of <0.5m seasonally occurs for

	<p>a 30-minute duration along roads, particularly Rizal Street. Flooding is due to drainage canal problem. Recommendations: Appropriate drainage canals should be installed. Existing drainage canals must be declogged of debris.</p>
Brgy. 3	None
Brgy. 4	<p>Seasonal sheet flooding with low depth of <0.5m occurs due to drainage problems. Recommendation: Improve drainage facility.</p>
Brgy. 5	None
Brgy. 6	<p>Sheet flooding with high depth of >1m seasonally occurs. Barangay is prone to flooding due to its proximity to Cagayan de Oro River. Overflow of the Cagayan de Oro River seasonally causes flooding lasting for 2 days.</p>
Brgy. 7	<p>Seasonal sheet flooding with high depth of >1m occurs. 4-days duration of flooding brought about by Cagayan de Oro River flood waters is experienced in the barangay.</p>
Brgy. 8	None
Brgy. 9	<p>Sheet flooding with low depth of <0.5m is seasonally experienced in the barangay. Flooding is mainly due to drainage problem.</p>
Brgy. 10	<p>Flash flood with moderate turbidity and >1m depth are very common during heavy rains. Flood waters coming from upland area last for 2 hours. Sheet flooding with high depth of >1m occurs during heavy rains and lasts for 6-8 hours. 8 families living along Isla de Oro are affected when Cagayan River overflows. Recommendations: Identify relocation site for residents living at Isla de Oro and along the embankment of Cagayan de Oro River (parallel to Burgos Street). Constant communication and updates with Brgy. 13 on geohazard situation.</p>
Brgy. 11	None
Brgy. 12	<p>Seasonal sheet flooding with low depth of <0.5m occurs due to drainage problems.</p>
Brgy. 13	<p>Flash flood with moderate turbidity is very common during heavy rains. Flood waters coming from upland area with >1m depth last for 2 hours. Sheet flooding with moderate depth of 0.5-1m occurs during heavy rains, affecting the lowlands. Heavy rains usually coinciding with high tide cause flooding below road level. Recommendations: Identify relocation site for residents living at Isla de Oro. Constant communication and updates with Brgy. 10 and 15 on geohazard situation.</p>

Brgy. 14	None. Drainage-related flood occurs along Tiano-Magnambos Streets corner Velez-Kalambaguhan Streets. Recommendation: Improve drainage facility along flood-affected areas.
Brgy. 15	Flash flood with moderate turbidity commonly occurs. Seasonal sheet flooding with high depth of >1m subsides after 3 days. During normal rains, flood depth is about 0.5m. 250 families were affected by Jan 2009 flooding. 28 families, as interviewed by Estate Management Board (EMB), are willing to relocate.
Brgy. 16	None
Brgy. 17	Flash flood with moderate turbidity is rarely experienced and occurs only during exceptional heavy rains and tornadoes. Sheet flooding with moderate depth of 0.5-1m seasonally occurs specifically during heavy rains and high tide. 14 families living along Cagayan River bank are affected by flooding. Recommendations: Identify relocation site for residents living along the riverbank. Constant communication and updates with Brgy. 15 on geohazard situation.
Brgy. 18	Heavy rains coinciding with high tide rarely result to sheet flooding with moderate depth of 0.5-1m. During ordinary rains, flooding is caused by poor drainage system. Recommendation: Improve drainage facility.
Brgy. 19	None. Floods with low depth occur along Tiano-Echem Streets and Luna-Tiano Streets due to drainage-related problem. Flood subsides after 30 min to 1 hour. Recommendation: Improve drainage facility.
Brgy. 20	None. Drainage-related sheet flood with low depth of <0.5m occurs along Velez-Abellanos Street corner Tiano Street. Recommendation: Improve drainage facility.
Brgy. 21	Seasonal sheet flooding with moderate depth of 0.5-1m occurs at Zone 1 and high depth of >1m at Zone 2 and areas near Balacanas Creek. Recommendation: Activate BDCC.
Brgy. 22	Floodwaters from Bitan-ag Creek seasonally cause sheet flooding with moderate depth of 0.5-1m at Zones 3 and 4; and high depth of >1m at Zones 1 and 2. Flooding lasts for a day. Recommendation: Activate BDCC.
Brgy. 23	Sheet flooding with low depth of <0.5m is seasonally experienced at Zones 1 and 2 for 1-day duration. Flooding is due to overflow of Cagayan de Oro River. Recommendations: Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Activate BDCC.

Brgy. 24	Sheet flood with low depth of <0.5m occurs at Brgy. Proper. The back of Brgy. 24 experienced high flood depth of >1m on Jan 2009 that lasted for a day. This is due to the low elevation of the area, high tide, and overflow of creek.
Brgy. 25	Sheet flooding with low depth of <0.5m seasonally occurs at Zone 2 for 1-2 hrs duration due to poor drainage and floodwaters from Cagayan de Oro River.
Brgy. 26	Floodwaters from Bitan-ag Creek and drainage problem cause sheet flooding with moderate depth of 0.5-1m at Zone 2 for an hour and at Zone 3 for 3 days. Recommendation: Dredging of Bitan-ag Creek is necessary to minimize the flooding problems of this barangay.
Brgy. 27	Sheet flooding with high depth of >1m occurred in January 2009.
Brgy. 28	Sheet flood with low depth of <0.5m occurs at Brgy. Proper.
Brgy. 29	None
Brgy. 30	None
Brgy. 31	Sheet flooding with high depth of >1m seasonally occurs. Jan 2009 flooding receded after 2-3 hours.
Brgy. 32	Seasonal sheet flooding with low depth of <0.5 m occurs at the Brgy. Proper and moderate depth of 0.5-1m at the interior.
Brgy. 33	Brgy. Proper seasonally suffers from sheet flooding with low depth of <0.5m.
Brgy. 34	Sheet flooding with moderate depth of 0.5-1m is seasonal.
Brgy. 35	Brgy. Proper seasonally suffers from sheet flooding with low depth of <0.5m. Yacapin Extension situated near the creek suffered from flooding during the Jan 2009 event.
Brgy. 36	Overflow of Bitan-ag Creek causes sheet flood with high depth of >1m lasting for 3 hours.
Brgy. 37	Brgy. Proper is seasonally affected by sheet flooding with moderate depth of 0.5-1m.
Brgy. 38	Seasonal sheet flooding with low depth of <0.5 m occurs at the Brgy. Proper.
Brgy. 39	Sheet flooding with low depth of <0.5m occurs seasonally.
Brgy. 40	Sheet flooding with low depth of <0.5m occurs seasonally.
Bayabas	Sheet flooding with low depth of <0.5m occurs seasonally. Moderate flood depth of 0.5-1m occurred on January 2009 at all the barangay zones particularly those in the coastal area which include Zones 3, 5, 7, and 8.
Bayanga	None

Besigan	Moderately turbid flash flood is common. Sheet flooding with low depth of <0.5m seasonally occurs.
Bonbon	Sheet flooding with high depth of >1m occurs seasonally. Heavy rains and high tide cause flooding reaching >1m depth at the coastal area (Zones 1, 2, 3, 4, and 6) on Jan 2009; water subsided after a week. 300 houses at Zone 9 situated near Cagayan River are seasonally affected by flooding. Zones 5, 7, and 8 are likewise affected by flooding during excessive heavy rains. Recommendations: Improve drainage facilities. Implement flood control measures along river embankment.
Bugo	Very highly turbid flash flood rarely occurs. Sheet flooding with moderate to high depth of 0.5->1m is seasonally experienced at Zones 1 to 8. Recommendation: Conduct and organize disaster preparedness training.
Bulua	Sheet flooding with moderate depth of 0.5-1m is seasonally experienced at Zones 2 Lower, 6, 7, 8, and 9. Flooding usually lasts for about 3 days. Overflow of Sapang Creek floods Zone 2 Lower. Zones 6, 7, 8, and 9 are affected by floodwaters from Iponon River. Recommendations: Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Activate BDCC.
Camaman-an	Moderate sheet flooding depth of 0.5-1m seasonally occurs at Imbornal, Fisher's Valley School, Palawan Central Village Bolonsire, and Pinikitan. Flood lasts for 12 hours. Floodwaters emanate from Bitan-ag Creek.
Canito-an	Moderately turbid flash flood is common. Sheet flooding with high depth of >1m seasonally occurs. Recommendations: Develop an early warning device/system. Identify evacuation site. Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Constant communication and updates with Brgy. Pagatpat on geohazard situation. Conduct seminar and training on disaster preparedness and awareness.
Carmen	The entire barangay, particularly Zones 2, 5, and 7, suffers from seasonal sheet flooding with high depth of >1m for more than 2 days. Flooding is due to overflow of Cagayan de Oro River. Recommendations: Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content). Activate BDCC.
Consolacion	Moderately turbid flash flood rarely occurs. Sheet flood with low depth of <0.5m is seasonal. Flash flood on Jan 2009

	<p>with depth of >1m subsided after 6 hours. Sheet flooding normally affects area along the river embankment. Drainage problem causes flooding along Biga Street bounded by Brgy. 21, 23, 25 and Puntod.</p> <p>Recommendations: Improve drainage facility along Biga Street. Implement flood control measures along the river embankment.</p>
Cugman	<p>Sheet flooding with high depth of >1m seasonally affects the barangay. Floodwaters from Bigaan and Tablon Rivers and poor drainage cause flooding at Zones 2, 5, 6, 8, and 10. Floods last for 2 days.</p>
Dansolihon	None
F.S. Catanico	<p>Sheet flooding with low depth of <0.5m along the barangay roads is seasonal. At Sitio Kawayan, Zone 5, situated near Cugman River, flood depth reaches >1m. River erosion along Cugman River is observed.</p> <p>Recommendation: Activate BDCC.</p>
Gusa	<p>Sheet flooding with low depth of <0.5m seasonally occurs at the Brgy. Proper. Purok 3-3B situated along Bigaan River suffered from sheet flooding with high depth of >1m on June 30, 2008.</p>
Indahag	None
Iponan	<p>Highly turbid flash flood rarely occurs. Sheet flooding with high depth of >1m is likewise rare. Extreme flooding occurred last January 11, 2009 at Zones 1 to 6.</p>
Kauswagan	<p>Sheet flooding with high depth of >1m seasonally occurs specifically at Zone 3. Flood waters from Cagayan de Oro River affect the barangay.</p>
Lapasan	<p>Sheet flooding with low depth of <0.5m seasonally occurs at the Brgy. Proper. Sitios San Lazaro, Little Cebu and San Isidro Labrador suffer from high sheet flood depth of >1m.</p>
Lumbia	None
Macabalan	<p>Sheet flooding with low depth of <0.5m is seasonal. Insufficient drainage canals floods low-lying areas including Piapi Puti, Piapi Itom, Port Area, Mulmoc, and Colrai. 200 houses at the coastal area are commonly affected by flooding and high tide for about 6 hours.</p>
Macasandig	<p>Sheet flooding with low depth of <0.5m occurs at Brgy. Proper. Overflow from Cagayan de Oro River causes high flood depth of >1m at Sitios Buena Oro, Aluba, Tibasak, Biasong, Tambo, and Sitio #14.</p>
Mambuaya	<p>Flash flood with moderate turbidity commonly affects Zones 3 and 5.</p>
Nazareth	<p>Sheet flooding with high depth of >1m affects the barangay</p>

	due to drainage problem. Water recedes fast.
Pagalungan	Flash flood with moderate turbidity is common. Sheet flooding with low depth of <0.5m seasonally occurs. The January 11, 2009 flash flood washed out 3 houses at Sitios Araw-araw and Naapasan.
Pagatpat	Moderately turbid flash flood commonly occurs. Sheet flooding with low depth of <0.5m is seasonal. Frequent flooding occurs at Zones 1, 2, 3, 5, and 7 with water level reaching the roofs of the houses.
Patag	Seasonal sheet flooding with low depth of <0.5m occurs at Zones 11 and 12 and moderate depth of 0.5-1m at Zone 8 Extension. Flood waters from Brgy. Bulua course through Brgy. Patag. Recommendation: Observe for rapid increase/decrease in creek/river water levels, possibly accompanied by increased turbidity (soil content).
Pigsag-an	Flash flood with low turbidity and sheet flooding with low depth of <0.5m rarely occur in the barangay.
Puerto	Flash flood rarely occurs. Sheet flooding with moderate depth of 0.5-1m seasonally affects Purok 3. Coastal flooding and storm surge commonly affect Puroks 1, 2, 3, and 4. January 2009 flood totally damaged 40 houses and forced 70 families to be evacuated to safer grounds.
Puntod	Sheet flooding with moderate depth of 0.5-1m is seasonal. Poor drainage facility causes flooding at Districts 5, 6, and 7 during excessive heavy rains. January 2009 flooding affected Districts 1, 2, 3, and 4. Recommendations: Regular dredging of Bitan-ag Creek, specifically along Osmeña Extension corner Gabucayan Extension. Implement flood control measures along river embankment.
San Simon	Moderately turbid flash flood is common. Sheet flooding with moderate depth of 0.5-1m rarely occurs.
Tablon	Moderate sheet flooding depth of 0.5-1m seasonally occurs. All the 15 Puroks of the barangay suffer from flooding during heavy rains. Run-offs from elevated slopes usually flood Puroks 5 and 6. Coastal area (Puroks 3, 4, 12, and 13) is prone to storm surge. Recommendation: Implement flood control measures along flood prone areas.
Taglimao	Rare occurrences of flash flood with low turbidity and sheet flooding with low depth of <0.5m occur in the barangay.
Tagpangi	Flash flood with low turbidity and sheet flooding with low depth of <0.5m are rarely experienced in the barangay.
Tignapoloan	None

Tuburan	Flash flood with low turbidity and sheet flooding with low depth of <0.5m rarely occurs.
Tumpagon	Flash flood with low turbidity and sheet flooding with low depth of <0.5m rarely occurs.

It should be noted that these susceptibility ratings were arrived at as of this field assessment. However, the rating could advance (e.g., from low to moderate, and moderate to high) as the mass movement progresses. Hence, the MGB constantly recommends strict and continuous monitoring by the barangays.

CAGAYAN de ORO CITY, MISAMIS ORIENTAL



Slopes bounding Brgy. Proper F.S. Catanico with moderate susceptibility to landslides.



Nearly vertical slopes along Cugman River in Brgy. F.S. Catanico.



Portions of Brgys. Macabalan and Puntod situated along the floodplains of Cagayan de Oro River are frequently inundated by floodwaters from the said river.



Houses built along the floodplains of Cagayan de Oro River in Brgy. Puntod are highly susceptible to flooding.



Excessive surface run-off from Brgy. Kauswagan perennially floods Zone 6, Brgy. Bayabas.



Heavy rainfall and the simultaneous occurrence of high tide events cause flooding in Brgy. Bonbon, particularly in this covered basketball court.



Unstable slopes along the road to Brgy. Balubal as manifested by the tilted coconut trees