

RESULTS OF THE MGB LANDSLIDE ASSESSMENT AND MAPPING (1:10,000 SCALE) OF THE MUNICIPALITY OF SAN FRANCISCO, PROVINCE OF AGUSAN DEL SUR



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RD-G-11-03-54
March 30, 2011

HONORABLE JENNY DE ASIS
Municipal Mayor
San Francisco, Agusan del Sur

Dear Hon. Mayor De Asis,

Respectfully furnishing your end the document entitled “Results of the MGB Landslide Assessment and Mapping (1:10,000 scale) of the Municipality of San Francisco, Province of Agusan del Sur”. The assessment is in line with the government’s effort aimed at reducing, if not totally mitigating the destructive effects and impacts of natural hazards to the populace.

The Office expresses its deep gratitude for the support and assistance rendered to the Geohazard Mapping and Assessment Team of our Regional Office during the conduct of the field survey.

We look forward to a continuing partnership and collaboration with the LGU of San Francisco in the nation’s overall disaster risk reduction program.

Very truly yours,

ALILO C. ENSOMO, JR.
Regional Director

GSD-11-03-Ghz-28

Cc: Hon. Director : DENR, MGB
Hon. Gov., ADS
Honorable Representative – 2nd District, ADS
OCD-RDCC Caraga

RED, DENR,R-XIII
PENRO, ADS
CENRO, ADS

RESULTS OF THE MGB LANDSLIDE ASSESSMENT AND MAPPING (1:10,000 SCALE) OF THE MUNICIPALITY OF SAN FRANCISCO, PROVINCE OF AGUSAN DEL SUR

The Mines and Geosciences Bureau-Department of Environment and Natural Resources (MGB-DENR) conducted a landslide assessment and mapping (1:10,000 scale) of areas within the municipality of San Francisco on March 2 to 16, 2011. The assessment is in line with the government's efforts aimed at reducing, if not, totally mitigating the destructive effects and impacts of natural hazards on the populace. Comprising the geohazard assessment team are Mr. Romeo M. Dalodado and Manuel B. Delfino, Jr., geologists from the MGB-Caraga Region XIII with the assistance of two geologic mappers, Mr. Dionesio A. Surigao and Evangelino M. Morales, Jr.

The MGB-DENR particularly covered the following areas:

- Puroks 1, 2A, 2B, 3, 4, 5, 6, 7, and 8 in Brgy. Alegria
- Puroks 1 to 9 in Brgy. Bayugan 2
- Puroks 1 to 4 in Brgy. Bitan-agan
- Puroks 1, 1A, 2, 2A, 3, 4, and 5 in Brgy. Das-agan
- Puroks 1, 2A, 2B, 3A, 3B, 4 and 5 in Brgy. Karaos
- Puroks 1 to 8 in Brgy. Lapinigan
- Puroks 1 to 6 in Brgy. Lucac
- Puroks 1, 2A, 2B and 3 in Brgy. Ormaca
- Puroks 1 to 8 in Brgy. Mate
- Puroks 1, 1A, and 2 to 9 in Brgy. San Isidro

The assessed areas were rated as having low, moderate, high or very high (critical) susceptibility to landslide. The landslide susceptibility rating parameters are as follows:

Very high : Areas usually with steep to very steep slopes and underlain by weak materials. Recent landslides, escarpments and tension cracks are present. Human initiated effects could be an aggravating factor.

High : Areas usually with steep to very steep slopes and underlain by weak materials. Areas with numerous old/inactive landslides.

Moderate : Areas with moderately steep slopes. Soil creep and other indications for possible landslide occurrence are present.

Low : Gently sloping areas with no identified landslides.

When appropriate, the barangay official/s were presented with a *Landslide Threat Advisory*. This advisory informs them of their area's susceptibility to landslides and contains the corresponding recommendations.

Below summarizes the results of the assessment of the covered areas:

Table 1. Results of Landslide Assessment at Barangay Alegria

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low	Constant communication and updates with the barangay officials and upland purok officials (P-2A) on geohazard situation
2	Purok 2A	Very High (Sumugbong area)	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Develop an early warning system (e.g., extensometers, signages) ; For evacuation of residents near creeks during times of heavy and continuous rains; Constant communication and updates with the barangay officials and upland purok officials on geohazard situation. Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area; Conduct pre-emptive landslide evacuation drills. Develop an Alert Level Warning scheme (e.g. 1-ready, 2-get set, 3-go)
3	Purok 2B	Low	Constant communication and updates with the barangay officials and upland purok officials (P - 2A) on geohazard situation
4	Purok 3	Low at settlement center; High at upland area between Tuwa-Tuwa and Sumugbong	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; For evacuation of residents near creeks during times of heavy and continuous rains; Constant communication and updates with the barangay officials and upland purok officials (P - 2A and 4) on geohazard situation; Provide "no settlement" buffer zone in active river scouring areas; Consider emplacement of river erosion protection structures such as dikes, gabions, etc; Coordinate with PMRB on small-scale mining and/or regulation in the area; Coordinate with DPWH on the status of the Alegria Bridge.
5	Purok 4	Low at settlement center; Very High at Tuwa-Tuwa and Manag-as area	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; For evacuation of residents near creeks during times of heavy and continuous rains; Constant communication and updates with the barangay officials and upland purok officials (P-4) on geohazard situation; Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.

6	Purok 5	Low at settlement center	Constant communication and updates with the barangay officials and upland purok officials (P-7) on geohazard situation
7	Purok 6	Low at settlement center	Constant communication and updates with the barangay officials and upland purok officials (P-7) on geohazard situation
8	Purok 7	Moderate	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on; For evacuation of residents near creeks during times of heavy and continuous rains esp. when signs in item 4 (of landslide threat advisory recommendations) are observed; Constant communication and updates with the barangay officials on geohazard situation.
9	Purok 8	Low at settlement center	Constant communication and updates with the barangay officials and upland purok officials (P-7) on geohazard situation

Table 2. Results of Landslide Assessment at Barangay Bayugan 2

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation.
2	Purok 2	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation.
3	Purok 3	Low	Constant communication and updates with the barangay officials on geohazard situation.
4	Purok 4	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office

			concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation.
5	Purok 5	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation.
6	Purok 6	Low; High river Scouring (Bayugan 2 Creek)	Provide “no settlement” buffer zone in active river scouring areas; Consider emplacement of engineering structures as protection from river erosion – bioengineering measures is deemed applicable in the area
7	Purok 7	Low	Constant communication and updates with the barangay officials on geohazard situation.
8	Purok 8	Low; High Susceptibility to River Scouring (Bayugan 2 Creek)	For evacuation of residents near actively scouring creeks during times of high river swelling; Provide “no settlement” buffer zone in active river scouring areas; Consider emplacement of engineering structures as protection from river erosion – i bioengineering measures is deemed applicable in the area.
9	Purok 9	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation.

Table 3. Results of Landslide Assessment at Barangay Bitan-agan

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low landslide susceptibility but moderate flooding and high river scouring (Adlayan River)	For evacuation of residents near creeks during times of high river swelling; Provide “no settlement” buffer zone in active river scouring areas; Consider emplacement of engineering structures as protection of land from river erosion or opt for relocation of houses in actively eroding zones.
2	Purok 2	High	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; For relocation of houses at the edge of slope esp. those facing Matuog Creek. Constant communication and updates with the barangay officials on geohazard

			situation; Conduct pre-emptive landslide evacuation drills. Develop an Alert Level Warning Scheme(e.g. 1-ready, 2-get set, 3-go)
3	Purok 3	High	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; For relocation of houses at the edge of slope esp. those facing Matuog Creek. Constant communication and updates with the barangay officials on geohazard situation; For evacuation of students during extreme weather conditions (Elementary school is not suitable as evacuation site); Conduct landslide evacuation drills. Develop an Alert Level Warning Scheme(e.g. 1-ready, 2-get set, 3-go)
4	Purok 4	Low	Constant communication and updates with the barangay officials on geohazard situation.

Table 4. Results of Landslide Assessment at Barangay Das-agan

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low	Constant communication and updates with the barangay officials on geohazard situation.
2	Purok 1A	Low	Constant communication and updates with the barangay officials on geohazard situation.
3	Purok 2	Low	Constant communication and updates with the barangay officials on geohazard situation.
4	Purok 2A	Low	Constant communication and updates with the barangay officials on geohazard situation.
5	Purok 3	Moderate	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities ; Constant communication and updates with the barangay officials on geohazard situation; Coordinate with PMRB on small-scale mining regulation in the area.
6	Purok 4	Moderate (Das-agan Creek undercutting of slope)	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities ; Constant communication and updates with the

			barangay officials on geohazard situation; Coordinate with PMRB on small-scale mining regulation in the area.
7	Purok 5	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation; Coordinate with PMRB on small-scale mining regulation in the area.

Table 5. Results of Landslide Assessment at Barangay Karaos

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	None	
2	Purok 2A	Low	Conduct routine de-clogging of culverts and de-silting/ deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season; Constant communication and updates with the barangay officials and upland purok officials (P-4) on geohazard situation
3	Purok 2B	Moderate – Landslide Accumulation Zone and flashfloods (Binus-agan Creek)	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Conduct routine de-clogging of culverts and de-silting/ deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season; Constant communication and updates with the barangay officials and upland purok officials (P-4) on geohazard situation
4	Purok 3A	None	
5	Purok 3B	None	
6	Purok 4	Moderate – Landslide Accumulation Zone and flashfloods (Binus-agan Creek)	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods and/or landslide run-on; Conduct routine de-clogging of culverts and de-silting/ deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season ; Constant communication and updates with the barangay officials on geohazard situation.

7	Purok 5	Moderate in settlement center and the 9 households separated but covers the Purok 5 zone but high at “Boy Scout Resort” – Landslide Accumulation Zone and flashflood (Lapag Creek)	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods and/or landslide run-on; Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming; Conduct routine de-clogging of culverts and de-silting/ deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season ; Constant communication and updates with the barangay officials on geohazard situation; Prohibition of use of Boy Scout resort during extreme weather conditions if item number 5 of Landslide Threat Advisory recommendations was not conducted.
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Table 6. Results of Landslide Assessment at Barangay Lapinigan

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low; River scouring (Lapinigan Creek)	Provide “no settlement” buffer zone in active river scouring areas. Coordinate with PMRB on proper regulation of SAG extraction in the area.
2	Purok 2	None; moderate flooding (Langkogangan Creek)	
3	Purok 3	Low; River scouring (Lapinigan Creek)	Provide “no settlement” buffer zone in active river scouring areas.
4	Purok 4	None; High flooding (Langkogangan Creek)	For evacuation of residents near creeks during times of high river swelling; Review of urban drainage system constraints to improve water flow
5	Purok 5	None; High flooding (Langkogangan Creek)	For evacuation of residents near creeks during times of high river swelling; Review of urban drainage system constraints to improve water flow
6	Purok 6	Low; Very High river scouring at Manga area and Purok 6 relocation site (Anagasian and	For evacuation of residents near creeks during times of high river swelling; Constant communication and updates with the barangay officials on geohazard situation; Provide “no settlement” buffer zone in active river scouring areas; Consider emplacement of engineering structures as protection from river erosion –

		Lapinigan Creek)	bioengineering interventions are deemed not applicable but would require masonry structures and/or gabion structures. If engineering interventions cannot be emplaced in the Purok 6 relocation site, areas near the creeks are not suitable for future habitation; Coordinate with PMRB on proper regulation of SAG extraction in the area.
7	Purok 7	None; River scouring (Lapinigan Creek)	Provide "no settlement" buffer zone in active river scouring areas.
8	Purok 8	None; River scouring (Lapinigan Creek)	Provide "no settlement" buffer zone in active river scouring areas.

Table 7. Results of Landslide Assessment at Barangay Lucac

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low but Very High in Water Reservoir area and along road going to Purok 3	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation Rehabilitation of water reservoir not advisable. Install warning signages at critical road sections of Purok 1 to 4 for motorists to pass with caution and/or close the road during times of extreme weather condition.
2	Purok 2	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
3	Purok 3 (Durian)	Low but Very High along road cut	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation; Review road alignment at some section prone to landslide cutoff ; Install warning signages at critical road sections of Purok 1 to 4 for motorists to pass with caution and/or close the road during times of extreme weather condition.

4	Purok 4 (Kantagan)	Low at settlement center but moderate at surrounding elevated area; Very High along road cut	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation; Review road alignment at some section prone to landslide cutoff ; Install warning signages at critical road sections of Purok 1 to 4 for motorists to pass with caution and/or close the road during times of extreme weather condition; Prohibit future building of houses near foot of slope.
5	Purok 5	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
6	Purok 6	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities

Table 8. Results of Landslide Assessment at Barangay Ormaca

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	High	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; For evacuation of residents in unstable areas and permanent relocation if slope movement progress to a serious level. Conduct pre-emptive landslide evacuation drill. Develop an Alert Level Warning scheme (e.g. 1-ready, 2-get set, 3-go).
2	Purok 2A	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities ; Constant communication and updates with the barangay officials and Purok 1 officials on geohazard situation; Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.
3	Purok 2B	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the

			barangay officials and Purok 1 officials on geohazard situation; Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.
4	Purok 3	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities;

Table 9. Results of Landslide Assessment at Barangay Mate

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low	
2	Purok 2	Low; High river scouring (Mate Creek)	For evacuation of residents near creeks during times of high river swelling; Provide “no settlement” buffer zone in active river scouring areas; Consider emplacement of engineering structures as protection of land from river erosion or opt for relocation of houses in actively eroding zones, Coordinate with the Provincial Engineering and/or DPWH for assessment of the structural integrity of the overflow structure.
3	Purok 3	Low; High river scouring (Mate Creek)	For evacuation of residents near creeks during times of high river swelling; Provide “no settlement” buffer zone in active river scouring areas; Consider emplacement of engineering structures as protection of land from river erosion or opt for relocation of houses in actively eroding zones.
4	Purok 4	Low at Housing Site; Flashflood hazard at lower purok 4(confluence of Mate and Arasan Creeks	At housing site: Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; At lower Purok 4: Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on; For evacuation of residents near creeks during times of high river swelling; Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.
5	Purok 5	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office

			concerned and the municipal/city authorities.
6	Purok 6	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
7	Purok 7	Low; High river scouring (Mate Creek)	For evacuation of residents near creeks during times of high river swelling; Provide “no settlement” buffer zone in active river scouring areas; Consider emplacement of engineering structures as protection of land from river erosion or opt for relocation of houses in actively eroding zones. Program construction of river erosion protective structures at active erosion area near the Mate Elementary School to arrest future advance of erosion towards the school site.
8	Purok 8	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials on geohazard situation ; Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.

Table 10. Results of Landslide Assessment at Barangay San Isidro

	Location	Landslide Susceptibility Rating	Remarks/ Recommendations
1	Purok 1	Low	Constant communication and updates with the barangay officials and purok 1A officials on geohazard situation;
2	Purok 1A	Moderate – Landslide Accumulation Zone	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming; Constant communication and updates with the barangay officials on geohazard situation.
3	Purok 2	High Landslide Accumulation Zone and Flashflood potential east of National Highway near boundary with	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods and/or landslide run-on ; Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which

		Purok 3	could contribute to higher probability of landslide debris damming; Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season; For preemptive evacuation of residents near creeks during times of heavy and continuous rains especially when signs in item 4 (of landslide threat advisory recommendations) are observed; Constant communication and updates with the barangay officials on geohazard situation; Conduct pre-emptive landslide evacuation drills. Develop an Alert Level Warning scheme (e.g. 1-ready, 2-get set, 3-go)
4	Purok 3	Very High – Landslide Accumulation Zone and Flashfloods potential (Katumbi and Mainit Creeks)	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Develop an early warning system (e.g., signages); Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods and/or landslide run-on ; Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming; Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season; For preemptive evacuation of residents near creeks during times of heavy and continuous rains especially when signs in item 4 of landslide threat advisory recommendations) are observed; Constant communication and updates with the barangay officials on geohazard situation; Conduct pre-emptive landslide evacuation drills. Develop an Alert Level Warning scheme (e.g. 1-ready, 2-get set, 3-go)
5	Purok 4	Low	Constant communication and updates with the barangay officials and purok 3 officials on geohazard situation
6	Purok 5	Very High – Landslide Accumulation Zone and Flashfloods (Mainit Creek)	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Develop an early warning system (e.g., signages); Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods and/or landslide run-on ; Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming; Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season; For preemptive evacuation of residents near creeks during times of heavy and continuous rains especially when signs in item 4 (of landslide threat advisory recommendations) are observed;

			Constant communication and updates with the barangay officials on geohazard situation; Conduct pre-emptive landslide evacuation drills (Elementary school facilities not suitable for evacuation site). Develop an Alert Level Warning scheme (e.g. 1-ready, 2-get set, 3-go)
7	Purok 6	Low	Constant communication and updates with the barangay officials and purok 5 officials on geohazard situation;
8	Purok 7	Moderate	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials and purok 5 officials on geohazard situation.
7	Purok 8	Low	Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities; Constant communication and updates with the barangay officials and purok 5 officials on geohazard situation
8	Purok 9	None	

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). Hence, the MGB constantly recommends strict and continuous monitoring by the barangays.

MGB GEOHAZARD MAPPING ASSESSMENT TEAM

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Manuel B. Delfino, Jr.
Senior Geologist

Evangelino M. Morales, Jr.
Geologic Mapper

Dionesio A. Surigao
Geologic Mapper

BARANGAY ALEGRIA



Purok Sumugbong incipient landslide (L). (R) - view of the settlement center while standing on the unstable slope. Monitoring of the tension cracks displacement is recommended.



Other unstable slopes in upper Alegria (Manag-as and Tuwa-Tuwa). Although far from main purok settlement center, the area is a small-scale mining site. Coordination with the PMRB is recommended for safe small-scale mining regulation in the area.



River scouring at Alegria Creek (fed by upstream Sumugbong, Manag-as and Tuwa-Tuwa creeks). Left – Purok 3 houses; Right – Alegria Bridge.

BARANGAY BAYUGAN 2



The purok settlement centers of Bayugan 2 are, in general distant, from Mt. Magdiwata and have low to negligible landslide susceptibility. However, slight to severe river erosion along the Bayugan 2 Creek had been observed from the Bayugan 2 Bridge(upper left photo) along the National Highway downstream to Purok 8 near the boundary with Barangay Ebro (lower right photo). Some houses of Purok 8 are at the side of the creek. Bioengineering river channel slope protection measure is deemed applicable in the area to arrest further river scouring.

BARANGAY BITAN-AGAN



High landslide susceptibility rating was observed at portions of Puroks 2 and 3 of the barangay where houses are built on top of steep slopes facing the Matuog Creek (Left Photo). A separate team who surveyed the proposed barangay site at Purok 4 found it has a low to negligible landslide susceptibility and suitable as relocation site for other parts of the barangay prone to landslide and river erosion hazards.



Another hazard identified in the barangay is the severe river erosion at some sections of the Adlayan River affecting Purok 1 (remaining 3 photos) . This is one of the main hazard needed to be addressed either thru emplacement of river erosion protection structures or relocation. Buffer on river sides should also be established as a “no settlement area.”

BARANGAY DAS-AGAN



Moderate landslide susceptibility was given at portions of Purok 3 due to parts in moderately sloping terrain and in Purok 4 on ridge with river undercutting of slope face. Monitoring of slope is recommended as basis for future actions to be undertaken. Moderate flooding was also noted affecting Purok 5. Main concerns in the Das-agan area are the small-scale mining activities. It is recommended to coordinate with the PMRB of Agusan del Sur for proper regulation of the mining activities and its effect on the environment.

BARANGAY KARAOS



Sample pictures of several landslides mapped at Mt. Magdiwata mountain slope facing Brgy. Karaos. As in Barangay San Isidro, clearing of the landslide-uprooted trees and rock/soil debris is recommended. The settlement centers are however at greater distance to the landslide initiation zones as compared to San Isidro. Areas that could be affected by potential flashfloods and landslide run-on should artificial damming occur upslope are the 'Boy Scout Resort' and settlements of Purok 5 near the Lapag and Maputi Creeks and parts of Puroks 2B and 4 near the Binus-agan Creek. Observance of the turbidity and load of these creeks is recommended during inclement weather condition. River scouring were also observed at the downstream segments of these creeks .

BARANGAY LAPINIGAN



All the puroks of barangay Lapinigan have low to none susceptibility to landslides. The main geologic hazards identified in the barangays are active river erosion along the Lapinigan and Anagasian Creeks affecting adversely Purok 6 and to a lesser extent Puroks 1, 3, 7 and 8. Some houses in Purok 6 Manga area have build personal riprap structure as protection from erosion but others have none and are exposed to river scouring hazard (Upper Photos). At the confluence of the Anagasian and Lapinigan area (Middle Photos), scouring have affected portions of the Purok 6 relocation site and if no river protection structure is emplaced should require a no settlement buffer zone near the creeks. Severe to moderate urban flooding has also been reported at parts of Puroks 2, 4 and 5 near the Langkogangan Creek (Bottom Photo).

BARANGAY LUCAC



Clustered settlement centers of Barangay Lucac (Puroks 1, 2, 5 and 6) have low landslide susceptibility while the distant Puroks 3 and 4 settlement site were rated as having low to moderate landslide hazard depending on proximity to foot slope. The major hazard identified are the high landslide susceptibility along the roads connecting Puroks 1-3-4 as manifested by several landslide debris and tension cracks along the road (Upper four photos). Most of this could be addressed by simple road shoulder widening but one road segment between Puroks 3 and 4 is in danger of permanent landslide cut-off and needs to either be re-routed or benching of road shoulder (would require large earth movement). As a precautionary measure for the safety of motorists, the road could be temporarily closed to traffic during extreme weather condition or "pass with caution" sign installed along critical road segments. A new water reservoir is needed as the Purok 1 reservoir is located in landslide prone area and not suitable for rehabilitation.

BARANGAY MATE



Active river scouring at Mate Creek affecting portions of Puroks 7, 3 and 2. Residents near the actively scouring creeks are advised to be vigilant during high flood level and evacuate accordingly. If river erosion engineering structures cannot be emplaced, option is to relocate houses already very near the creek channels. The structural integrity of the overflow structure (lower photos) is also affected and needs technical evaluation assistance from LGU Engineering Office or DPWH.



The main purok settlement centers of Mate has a low landslide susceptibility. Landslide occurrence was observed at the upper Mate Creek. Purok 4 settlements near the Aras-asan and Mate Creek confluence are affected by flooding and should be vigilant for flashflood hazards.

BARANGAY ORMACA



Of the four puroks of Ormaca, only one have a high landslide susceptibility rating (Purok 1) with the rest (Puroks 2A, 2B and 3) rated as having low landslide hazard. Factors leading to unstable slopes are unfavorable bedding plane of the siltstone and soft soil and regolith derivative. One house built on unstable slope develop cracks. Constant monitoring of slopes in the area is needed as basis for future actions.

BARANGAY SAN ISIDRO



Sample pictures of the numerous gulley landslides at Mt. Magdiwata mountain slope facing Brgy. San Isidro. Most of the landslides occur at narrow valleys and with uprooted trees blocking creek paths could create artificial damming increasing landslide run-on distance and flashflood potential downstream. Clearing of the landslide-uprooted trees and debris is recommended.



Potential debris accumulation zones and flashflood exit points of the gulley landslides is generally conveyed along the Katumbi and Mainit Creeks and could affect communities near these streams (Purok 3, 5 and portions of Purok 2). Routine deepening/desilting of the creeks and de-clogging of culverts before the rainy season is recommended. Observance of the creeks turbidity and load during extreme weather condition is necessary as basis for undertaking pre-emptive evacuation schemes.



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Solomon T. Rufila
Brgy. Alegria
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay from March 7, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low at settlement center	9
Purok 2A (Sumugbong)	Very High	1, 3, 8, 9,12, 14,15
Purok 2B	Low at settlement center	9
Purok 3	None at settlement center but high at upland area between Tuwa-Tuwa and Sumugbong; , Active river scouring at Alegria Creek	1, 8, 9,10, 11, 12,13
Purok 4	Low at settlement center; Very High at Tuwa-Tuwa and Manag-as area	1, 8, 9, 12
Purok 5	Low at settlement center	9
Purok 6	Low at settlement center	9
Purok 7	Moderate	1, 4, 8, 9
Purok 8	Low at settlement center	9

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., extensometers, signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For evacuation of residents near creeks during times of heavy and continuous rains esp. when signs in item 4 are observed.
9. Constant communication and updates with the barangay officials and/or purok officials on geohazard situation.
10. Provide “no settlement” buffer zone in active river scouring areas.
11. Consider emplacement of river erosion protection structures such as dikes, gabions, etc.
12. Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.
13. Coordinate with DPWH on the status of the Alegria Bridge.
14. Conduct pre-emptive landslide evacuation drills.
15. Develop an Alert Level Scheme. (e.g. 1-ready, 2-get set, 3-go.)



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Naciencino M. Dingding
Brgy. Bayugan 2
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir/ Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay on March 8, 2011 . The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low	1,2,9
Purok 2	Low	1,2,9
Purok 3	Low	9
Purok 4	Low	1,2,9
Purok 5	Low	1,2,9
Purok 6	Low	9, 10, 11
Purok 7	Low	9
Purok 8	Low	8, 9, 10, 11
Purok 9	Low	1, 9

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For evacuation of residents near actively scouring creeks during times of high river swelling
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Provide “no settlement” buffer zone in active river scouring areas
11. Consider emplacement of engineering structures as protection from river erosion – bioengineering measures is deemed applicable in the area.



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Reynaldo B. Navarro
Brgy. Bitan-agan
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir/ Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay on March 15, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low landslide susceptibility but moderate flooding and high river scouring (Adlayan River)	8, 9, 10, 11
Purok 2	High	1, 2, 7, 9, 15, 16
Purok 3	High	1, 2, 7, 9, 13, 14, 15, 16
Purok 4	Low at settlement area and proposed barangay site	9

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation of houses at the edge of slope esp. those facing Matuog Creek.
8. For evacuation of residents near creeks during times of high river swell
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Provide "no settlement" buffer zone in active river scouring areas
11. Consider emplacement of engineering structures as protection of land from river erosion.
12. Review drainage system constraints to minimize flood water backflow
13. For evacuation of students during extreme weather conditions
14. Elementary school facilities not suitable for evacuation site
15. Conduct pre-emptive landslide evacuation drills.
16. Develop an Alert Level Warning Scheme (e.g. 1-ready, 2-get set, 3-go).



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Jubert N. De Castro
Brgy. Das-agan
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir/ Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay on March 16, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low	9
Purok 1A	Low	9
Purok 2	Low	9
Purok 2A	Low	9
Purok 3	Moderate	1, 2, 9, 10
Purok 4	Moderate	1, 2, 9, 10
Purok 5	Low	1, 9, 10

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For evacuation of residents near creeks during times of heavy and continuous rains
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Coordinate with PMRB on small-scale mining regulation in the area.



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Reynalito S. Homeres
Brgy. Karaos
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay on March 6, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	None	
Purok 2A	Low	6, 9
Purok 2B	Moderate – Landslide Accumulation Zone and flashfloods (Binus-agan Creek)	1, 4, 6, 9
Purok 3A	None	
Purok 3B	None	
Purok 4	Moderate – Landslide Accumulation Zone and flashfloods (Binus-agan Creek)	1, 4, 6, 9
Purok 5	Moderate in settlement center and the 9 households separated but covers the Purok 5 zone but high at “Boy Scout Resort” – Landslide Accumulation Zone (Lapag Creek)	1, 4, 5, 6, 9, 10

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/ deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For pre-emptive evacuation of residents near creeks during times of heavy and continuous rains especially when signs in item 4 are observed
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Prohibition of use of Boy Scout resort during extreme weather conditions if item number 5 was not conducted.



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Dante H. Miro
Brgy. Lapinigan
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir/ Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangayon March 15, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low but river scouring at Lapinigan Creek	10, 13
Purok 2	None but moderate flooding of areas near Langkogangan Creek including Lapinigan Elementary School	
Purok 3	None but river scouring at Lapinigan Creek	10
Purok 4	None but high flooding near Langkogangan Creek	8, 12
Purok 5	None but high flooding near Langkogangan Creek	8, 12
Purok 6	Low but high river scouring at Lapinigan and Anagasian Creek (Manga area and P6 relocation site)	8, 9, 10, 11, 13
Purok 7	None but river scouring at Lapinigan Creek None, Moderate flooding	10
Purok 8	None but river scouring at Lapinigan Creek	10

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For evacuation of residents near creeks during times of high river swelling
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Provide “no settlement” buffer zone in active river scouring areas
11. Consider emplacement of engineering structures as protection of land from river erosion.
12. Review drainage system constraints to minimize flood water backflow
13. Coordinate with PMRB on SAG extraction regulation in the area



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Ramona C. Pajo
Brgy. Lucac
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir/ Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay on March 16, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low at settlement center but very high at reservoir area and road going to Purok 3	1, 2, 9, 11
Purok 2	Low	1
Purok 3	Low but very high at road cut	1, 2, 9, 10, 11
Purok 4	Low but very high at road cut	1, 2, 9, 10, 11, 12
Purok 5	Low	1
Purok 6	Low	1

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For evacuation of residents near creeks during times of heavy and continuous rains especially when signs in item 4 are observed
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Review road alignment at some section prone to landslide cutoff
11. Install warning signages at critical road sections of Purok 1 to 4 for motorists to pass with caution and/or close the road during times of extreme weather condition.
12. Prohibit future building of houses near foot of slope



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Roselio M. Bajilles
Brgy. Mate
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir/ Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay on March 10, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low	
Purok 2	Low but high river scouring at Mate Creek	8, 10, 11
Purok 3	Low but high river scouring at Mate Creek	8, 10
Purok 4	Low at Housing Site; Flashflood hazard at lower purok (confluence of Mate and Aras-asan Creeks)	1, 4, 8, 13
Purok 5	Low	1, 2
Purok 6	Low	1, 2
Purok 7	Low but high river scouring at Mate Creek	8, 10, 12
Purok 8	Low	1, 2, 9, 13

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For evacuation of residents near creeks during times of high river swelling
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Consider emplacement of river erosion protection (masonry) structures or opt for relocation of residences in active river scouring sites.
11. Coordinate with Provincial Engineering and/or DPWH on assessment of the structural integrity of the overflow structure.
12. Program construction of river erosion protective structures at active erosion area near the Mate Elementary School to arrest future advance of erosion towards the school site.
13. Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Ursicia B. Cabag
Brgy. Ormaca
Municipality of San Francisco
Province of Agusan del Sur

Dear Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay on March 9, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	High	1, 2, 7, 8,10, 11
Purok 2A	Low	1, 8, 9
Purok 2B	Low	1, 2, 8, 9
Purok 3	Low	1, 2

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods, mudflows and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For evacuation of residents in unstable areas and permanent relocation if slope movement progress to a serious level.
8. Constant communication and updates with the barangay officials and Purok 1 officials on geohazard situation.
9. Coordinate with PMRB on small-scale mining and/or SAG extraction regulation in the area.
10. Conduct pre-emptive landslide evacuation drill.
11. Develop an Alert Level Warning scheme(e.g. 1-ready, 2-get set, 3-go).



LANDSLIDE THREAT ADVISORY

To: Brgy. Chairman Daniel S. Bedia Sr.
Brgy. San Isidro
Municipality of San Francisco
Province of Agusan del Sur

Dear Sir/ Madam:

Please be advised that the Geohazards Mapping and Assessment Team (GMAT) of the Mines and Geosciences Bureau (MGB) – Caraga Region has conducted landslide hazard assessment in your barangay from March 2 to 4, 2011. The following are the results and recommendations following the assessment:

Location	Landslide susceptibility rating	***Recommendations
Purok 1	Low	9
Purok 1A	Moderate – Landslide Accumulation Zone	1, 5, 9
Purok 2	High Landslide Accumulation Zone and Flashflood potential east of National Highway near boundary with Purok 3	1, 4, 5, 6, 8, 9, 10, 12
Purok 3	Very High – Landslide Accumulation Zone and Flashfloods (Katumbi and Mainit Creeks)	1, 3, 4, 5, 6, 8, 9, 10, 12
Purok 4	Low	9
Purok 5	Very High – East of National Highway - Landslide Accumulation Zone and flashflood (Mainit Creek)	1, 3, 4, 5, 6, 8, 9, 10, 11, 12
Purok 6	Low	1
Purok 7	Moderate	1, 9
Purok 8	Low	1, 9
Purok 9	None	

*****Unless stated, please see recommendations below**

Kindly advise your affected constituents to initiate readiness and measures for this identified geohazard. This susceptibility rating was arrived at as of this field assessment. It should be noted that the rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses. Hence, the MGB constantly recommends strict and continuous implementation of the MGB recommendations by the barangay.

Your office is encouraged to contact your Municipality/City Disaster Risk Reduction and Management Council to plan for any emergency.

Thank you very much.

Very truly yours,

GMAT-MGB Team Member

Received by: _____

Date: _____

Recommendations:

1. Observe for and/or monitor for presence of mass movement (e.g., landslides, tension cracks). Report situation to the MGB office concerned and the municipal/city authorities
2. Observe for saturated ground or seeps and sunken or displaced road surfaces. Report situation to the MGB office concerned and the municipal/city authorities.
3. Develop an early warning system (e.g., signages) (for critical areas only).
4. Observe for turbidity of creeks and unusual decrease/increase of creek level as indications of landslide damming upstream and potential flashfloods and/or landslide run-on
5. Conduct clearing of landslide-uprooted trees and landslide debris blocking upstream creeks which could contribute to higher probability of landslide debris damming
6. Conduct routine de-clogging of culverts and de-silting/deepening of downstream creeks to minimize future flashfloods and siltation before the advent of the rainy season
7. For relocation
8. For preemptive evacuation of residents near creeks during times of heavy and continuous rains especially when signs in item 4 are observed.
9. Constant communication and updates with the barangay officials on geohazard situation.
10. Conduct pre-emptive landslide evacuation drill
11. Elementary school facilities not suitable for evacuation site.
12. Develop an Alert Level Warning scheme (e.g. 1-ready, 2-get set, 3-go)