Republic of the Philippines
Department of Environment and Natural Resources
MINES AND GEOSCIENCES BUREAU
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January 9, 2014

RD-G-14-01-10

HONORABLE GLENN M. PLAZA
Municipal Mayor
Municipality of Sta. Josefa
Province of Agusan del Sur

Dear Hon. Mayor Plaza:

Respectfully furnishing your end the document entitled "Results of the MGB Landslide and Flood Assessment and Mapping (1:10,000 scale) of the Municipality of Sta. Josefa 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 Sta. Josefa, Agusan del Sur in the nation's overall disaster risk reduction program.

Very truly yours,
BY THE AUTHORITY OF THE REGIONAL DIRECTOR:

NOLI N. ARREZA
OIC, Mine Management Division

GSD-13-01-Ghz-10

Cc: **DIRECTOR**, MGB CO
HON. GOVERNOR, Agusan del Sur
HON.REPRESENTATIVE, 2nd District, ADS
Office of Civil Defense, RDRRMC Caraga
REGIONAL EXECUTIVE DIRECTOR, DENR, R-XIII
PENRO, Agusan del Sur
CENRO, Bunawan, ADS
REGIONAL DIRECTOR, DILG-Caraga

"MINING SHALL BE PRO-PEOPLE AND PRO-ENVIRONMENT
IN SUSTAINING WEALTH CREATION AND IMPROVED QUALITY OF LIFE."

RESULTS OF THE MGB LANDSLIDE AND FLOOD ASSESSMENT AND MAPPING (1:10,000 SCALE) OF THE MUNICIPALITY OF STA. JOSEFA, PROVINCE OF AGUSAN DEL SUR

The Mines and Geosciences Bureau-Department of Environment and Natural Resources (MGB-DENR) conducted landslide and flood assessment and mapping (1:10,000 scale) of areas within the municipality of Sta. Josefa on October 10-18, 2013. 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 Joel A. Calugcugan, Melvin A. Mantilla, Elaine L. Galido, geologists from MGB – Caraga Region XIII with the assistance of GSD personnel Mr. Evangelino M. Morales, Jr. ,Dionesio A. Surigao and Julius A. Sulapas.

The MGB-DENR particularly covered the following areas:

- Puroks 1 to 24 in Barangay Angas
- Puroks 1 to 15 in Barangay Aurora
- Puroks 1 to 11 in Barangay Awao
- Puroks 1 to 5 in Barangay Concepcion
- Puroks 1 to 7 in Barangay Pag-asa
- Puroks 1 to 8 in Barangay Patrocinio
- Puroks 1 to 12 in Barangay Poblacion
- Puroks 1 to 7 in Barangay San Jose
- Puroks 1 to 11 in Barangay Santa Isabel
- Puroks 1 to 10 in Barangay Sayon
- Puroks 1 to 9 in Barangay Tapaz

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.

Likewise, the assessed areas were also rated as having low, moderate or high susceptibility to flooding. The flood susceptibility parameters are as follows:

High : Areas likely to experience flood heights of greater than 1.0 meter and.or flood duration of more than 3 days. These areas are immediately flooded during heavy rains of several hours; include landforms of topographic lows such as active river channels, abandoned river channels and areas along river banks; also areas prone to flashfloods

Moderate : Areas likely to experience flood heights of 0.5 to 1.0 meter and flood duration of 1 to 3 days. These areas are subject to widespread inundation during periods of prolonged and extensive heavy rainfall or extreme weather condition. Fluvial terraces, alluvial fans, and infilled valleys are areas subjected to moderate flooding

Low : Areas likely to experience flood heights of less than 0.5 meter and/or flood duration of less than one day. These areas include low hills and gentle slopes. They also have sparse to moderate drainage density

The barangay officials were presented with a *Landslide and Flood Threat Advisory* when appropriate. This advisory informs them of their area's susceptibility to landslides and floods and contains the corresponding recommendations.

Summarized below are the results of the assessment of the covered areas:

Table 1. Results of Landslide and Flood Assessment at Barangay Angas

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'30.8"N/126°01'56.1"E
2	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'18.3"N/126°01'58.1"E
3	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates

			07°58'12.7"N/126°01'57.6"E
4 (Lower Angas)	**Low to Moderate**	**Low**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement directly located at the foot of slopes. Observe for rapid increase/decrease on the water level at Angas Creek possibly accompanied with increased turbidity (soil content). Prohibit settlement at the creeks embankments. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'55.8"N/126°02'00.1"E
6 (Sitio Bacilisi)	**Low**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Activate BDCC at all times. Geographic coordinates 07°57'59.1"N/126°02'25.1"E
7 (Sitio Bacilisi)	**Low**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Activate BDCC at all times. Geographic coordinates 07°58'00.2"N/126°02'23.8"E
8 (Sitio Bacilisi)	**Low**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Activate BDCC at all times. Geographic coordinates 07°58'00.7"N/126°02'24.6"E
9 (Sitio Bacilisi)	**Low to Moderate**	**Low**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned

			municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement directly located at the foot of slopes. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'00.6"N/126°02'25.8"E
10 (Sitio Bacilisi)	**Moderate**	**None**	Monitor and observe for progress of mass movements on the road cut. Observe for other presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report such observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slopes during inclement weather conditions. Prohibit future settlement directly located at the foot of slopes. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Stabilize the reported mass movements present at the purok. Activate BDCC at all times. Geographic coordinates 07°57'58.3"N/126°02'28.5"E
11 (Sitio Cebuli)	**Low**	**Low**	Observe for rapid increase/decrease on the water level at Angas Creek possibly accompanied with increased turbidity (soil content). Prohibit settlement at the creeks embankments. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'23.5"N/126°01'54.7"E
12	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes and on the ridge edges. Provide an evacuation site which is safe from

			landslide and flooding. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°57'27.9"N/126°01'35.7"E
13	**Moderate to High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning system regarding landslide. Prohibit future settlement at the foot of slopes and on the ridge edges. Provide an evacuation site which is safe from landslide and flooding. Residents located at the ridge edges characterized with steep slopes are recommended to be relocated. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°57'27.6"N/126°01'30.4"E
14 **(Proper Angas)**	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes and on the ridge edges. Provide an evacuation site which is safe from landslide and flooding. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°57'31.2"N/126°01'31.8"E
15 **(Sitio Durian)**	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'44.8"N/126°01'17.6"E
16 **(Sitio Durian)**	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site

			which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'44.0"N/126°01'15.4"E
17 (Sitio Durian)	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'42.1"N/126°01'11.5"E
18 (Sitio Dao)	**None**	**Low to Moderate**	Observe for rapid increase/decrease on the water level at the creek traversing the purok possibly accompanied with increased turbidity (soil content). Prohibit settlement at the creeks embankments. Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times. Geographic coordinates 07°57'48.4"N/126°00'40.3"E
19 (Sitio Dao)	**None**	**Low to Moderate**	Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times. Geographic coordinates 07°57'51.0"N/126°00'34.4"E
20 (Sitio Dao)	**None**	**Low to Moderate**	Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times.

			Geographic coordinates 07°57'51.4"N/126°00'37.4"E
21 (Sitio Dao)	**None**	**Low to Moderate**	Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Provide an evacuation site which is safe from landslide and flooding. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times. Geographic coordinates 07°57'51.8"N/126°00'40.0"E
22	**None**	**Moderate to High**	Observe for rapid increase/decrease on the water level at Hinalinan Creek possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Prohibit settlement at the creeks embankments. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Provide an evacuation site which is safe from landslide and flooding. For long term solutions, relocating the entire purok is recommended. Activate BDCC at all times. Geographic coordinates 07°58'32.0"N/126°01'25.1"E
23	**None**	**Low**	The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'34.0"N/126°01'37.0"E
24	**Low**	**Low**	The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'13.1"N/126°01'28.3"E
25	**None**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'24.8"N/126°01'58.7"E
26 (Sitio Durian)	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and

			flooding. Activate BDCC at all times. Geographic coordinates 07°57'39.2"N/126°01'24.1"E
Proposed Relocation Site (Purok 13) Site 1- 07°57'27.6"N/ 126°01'31.3"E Site 2- 07°57'26.6"N/ 126°01'28.3"E			The proposed relocation sites are subject for detailed mapping and/or The proposed relocation site is subject for detailed mapping and/or Geohazard Identification Report (GIR).

Table 2. Results of Landslide and Flood Assessment at Barangay Aurora

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low	Provide concrete line canals.
2	None	Low	Provide concrete line canals. Provide concrete line canals at Aurora Elem. School and at Aurora Nat'l High School.
3	None	Moderate; partly high	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the riverbanks. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Provide proper drainage canals.
4	None	Moderate with High portion at the boundary near Purok 5	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the riverbanks. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Elevate the road, define and deepen existing drainage canals and replace RCP

			into box-type culvert at the boundary between Purok 4 and 5.
5	**None**	**Low with High portion at the boundary near Purok 4**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the riverbanks. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Elevate the road, define and deepen existing drainage canals and replace RCP into box-type culvert at the boundary between Purok 4 and 5.
6	**None**	**Low**	Define and deepen existing drainage canals.
7	**None**	**Low**	Define and deepen existing drainage canals.
8 (Kaangayan 1)	**None**	**Low**	Define and deepen existing drainage canals.
9 (Kaangayan 1)	**None**	**Low**	Define and deepen existing drainage canals.
10 (Kaangayan 1)	**None**	**Low**	Define and deepen existing drainage canals.
11 (Kaangayan 1)	**None**	**Low**	Define and deepen existing drainage canals and also conduct regular maintenance on drainage canals near Kaangayan Primary School.
12 (Kaangayan 2)	**None**	**Moderate**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Lucad Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Elevate barangay road. Provide proper drainage canals.
13 (Kaangayan 2)	**None**	**Moderate**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Buhanginon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation.

			Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Provide proper drainage canals. Rechannel Buhanginon creek. Elevate barangay road. Provide additional box-type culvert.
14 (Kaangayan 2)	**None**	**Moderate with High portion along the Buhanginon creek banks**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Buhanginon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Buhanginon creek. Elevate barangay road. Relocate all houses and prohibit future settlement and construction of new structures at or near the creek banks.
15 (Kaangayan 2)	**None**	**Moderate**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Lucad Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. At Pag-asa Elem. School, elevate the school grounds, concretize existing canal and define its outlet. Also, provide proper drainage system at the school. Remove obstructions (e.g. access road, plants and structure like culvert) under Lucad Bridge. Realign and elevate barangay road. Provide protective structure on Lucad Creek. Rechannel Lucad creek.

Table 3. Results of Landslide and Flood Assessment at Barangay Awao

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	High	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. A flood protective structure is also recommended to install along Awao River where flooding usually starts from near the steel bridge (07°58' 02.4"N/126°00'11.5"E). Proper concrete drainage canals are also recommended to install. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'05.0"N/126°00'02.6"E
2	None	High	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'07.2"N/126°00'01.5"E
3	None	Moderate	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-

			emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Proper concrete drainage canals are also recommended to install. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°57'44.0"N/125°59'42.8"E
4	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Proper concrete drainage canals are also recommended to install. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°57'56.3"N/126°00'21.3"E
5	**None**	**Low**	Provision of evacuation sites which is safe from landslide and flooding is highly recommended. Activate BDCC at all times. Geographic coordinates 07°58'20.1"N/126°00'19.6"E
6	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Proper

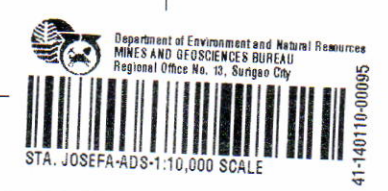
			drainage canals are recommended to facilitate surface run-off. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'01.8"N/125°59'32.7"E
7	**Low to Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend proper drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'36.7"N/125°59'11.9"E
8	**Moderate to High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend proper drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'36.3"N/125°58'48.1"E
9 **(Sitio Agda)**	**High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early

			warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. For long term solution, relocating the residents located at the ridges with very steep slopes is recommended. Activate BDCC at all times. Geographic coordinates 07°57'11.5"N/125°57'59.2"E
10 (Sitio Kayakalan)	**High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. For long term solution, relocating the entire purok is recommended. Activate BDCC at all times. Geographic coordinates 07°56'39.0"N/125°57'40.9"E
11 (Sitio Mahayahay)	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend proper drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'05.4"N/125°57'40.9"E
12	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased

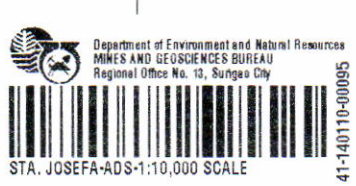
			turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°57'31.9"N/126°00'06.8"E
13 (Sitio Tagbayog)	**Moderate to High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend to install proper concrete drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'16.7"N/125°58'50.3"E

Table 4. Results of Landslide and Flood Assessment at Barangay Concepcion

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and



			flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'12.1"N/126°00'29.4"E
2	**None**	**Moderate to High**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'07.8"N/126°00'28.8"E
3	**None**	**Moderate to High**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire



			rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'07.6"N/126°00'28.2"E
4	**None**	**Moderate to High**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'59.7"N/126°00'30.6"E
5	**None**	**High**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'15.6"N/126°00'45.1"E
6	**None**	**Low**	Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement

			weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'36.2"N/126°01'08.0"E

Table 5. Results of Landslide and Flood Assessment at Barangay Pag-asa

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**None**	**Moderate**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 1 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'34.5"-N/126°00'00"-E.
2	**None**	**Moderate**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along

			intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 2 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'45.5"-N/126°00'00"-E.
3	**None**	**Moderate**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 3 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'59.3"-N/126°59'59.9"-E.
4	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and

			landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 4 situated along Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'55.4"-N/126°00'24.2"-E.
5	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 5 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°05'26.1"-N/126°00'00.3"-E.
6 Malipayon	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site

			which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 6 "Malipayon" is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'10.1"-N/126°00'48.4"-E.
7 Malipayon	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 7 "Malipayon" is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'03.6"-N/126°00'48.3"-E.

Table 6. Results of Landslide and Flood Assessment at Barangay Patrocinio

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Provision of evacuation site which is safe from landslide and flooding is also recommended. Activate BDCC at all times. Geographic coordinates 07°58'53.9"N/126°03'00.5"E
2	**None**	**Low to Moderate**	Observe rapid increase/decrease of water level along Agusan River possibly accompanied with increased turbidity (soil content). Vigilance of residents near the Agusan River is advised during inclement weather conditions. Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. The barangay should provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is advised if abnormalities in the water level along the Agusan River are observed especially during extreme weather events. Prohibit future settlement directly located at the Agusan River embankments. Rechanneling of the Agusan River is also recommended. Proper drainage canals are recommended to facilitate surface run-off especially during heavy precipitation. The barangay should provide rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'45.7"N/126°02'58.0"E
3	**None**	**Low to Moderate**	Observe rapid increase/decrease of water level along Agusan River possibly accompanied with increased turbidity (soil content). Vigilance of residents near the Agusan River is advised during inclement weather conditions. Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. The barangay should provide

			an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is advised if abnormalities in the water level along the Agusan River are observed especially during extreme weather events. Prohibit future settlement and construction of classrooms or school site expansion at Patrocinio Elementary School towards the Agusan River. Rechanneling of the Agusan River is also recommended. Proper drainage canals are recommended to facilitate surface run-off especially during heavy precipitation. The barangay should provide rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'41.8"N/126°02'56.5"E
4	**Low to Moderate**	**Low**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes. Prohibit settlement at the river embankments. Prohibit future settlement and construction of classrooms or school site expansion at Patrocinio Elementary School towards the Agusan River. Proper drainage canals are recommended to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. The barangay should provide rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'49.0"N/126°02'53.1"E
5	**None**	**Low**	Recommend to provide proper concrete line canals to facilitate surface run-off especially during heavy precipitation. Provision of an evacuation site which is safe from landslide and flooding is also recommended. Activate BDCC at all times. Geographic coordinates 07°59'03.5"N/126°02'25.1"E
6 (Magalibobo)	**Low**	**High**	Observe for rapid increase/decrease of water level along Mahaba Creek

			possibly accompanied with increased turbidity (soil content) especially during extreme weather events. Develop an early warning system. Pre-emptive evacuation is recommended during typhoons or if unusual flooding is experienced. Prohibit future settlement at the creek embankments and foot of slopes. Provision of evacuation site which is safe from landslide and flooding is also recommended. Recommend to replace existing RCP culverts along Mahaba Creek to box-type to accommodate more volume of water especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°59'48.9"N/126°03'42.3"E
7 (Lilo)	**High; Very High**	**high**	The area is underlain by highly weathered/fractured tuffaceous sandstone-siltstone-shale interbeds; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency. Geographic location of Purok 7 "Lilo" situated along Agusan River embankment which is prone to flooding and flash-flood. Some houses are located foot-slopes. River-bank soil slumping due to scouring is common features on the area. Total relocation of the entire Purok is highly recommended. GPS reading is 7°57'16.8"-N/125°03'20.5"-E.
8 (Sitio Lemon)	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future

			settlement directly at the foot of slopes and ridge edges with very steep slopes. Provision of an evacuation site which is safe from landslide and flooding is also recommended. Conduct regular maintenance on existing drainage canals along the highway. Activate BDCC at all times. Geographic coordinates 08°00'02.0"N/126°03'05.9"E
9 (Sitio Marang)	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement directly at the foot of slopes and ridge edges with very steep slopes. Provision of an evacuation site which is safe from landslide and flooding is also recommended. Activate BDCC at all times. Geographic coordinates 07°59'42.2"N/126°03'29.5"E
10 (Sitio Bacilisi)	**Low**	**Low to Moderate**	Observe rapid increase/decrease of water level along Agusan River possibly accompanied with increased turbidity (soil content). Vigilance of residents near the Agusan River is advised during inclement weather conditions. Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. The barangay should provide evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is advised if abnormalities in the water level along the Agusan River are observed especially during extreme weather events. Prohibit future settlement directly located at the Agusan River embankments. Activate BDCC at all times. Geographic coordinates 07°58'12.0"N/126°02'49.4"E

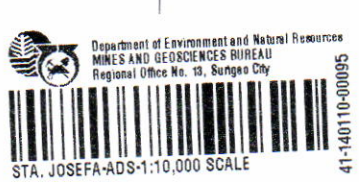
Table 7. Results of Landslide and Flood Assessment at Barangay Poblacion

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**None**	**Low but prone to scouring**	Provide proper drainage canals. Prohibit further settlement and

			construction of new establishments at/near the banks of Agusan River.
2	None	Low	Provide proper drainage canals.
3	None	Low	Provide proper drainage canals.
4	None	Low	Provide proper drainage canal. Provide sufficient culvert and provide define outlet of Binagyohan creek.
5	None	Low	Provide proper drainage canals.
6	None	Low	Provide proper drainage system
7	None	Low	Provide proper drainage canals. Elevate barangay road.
7A	None	Low: partly high due to still on-going NIA irrigation project	Provide proper drainage system. Define and conduct regular maintenance at the culvert near the Purok center of 7A.
7B	None	Low	Provide proper drainage canals. Define, concretize and clear the obstructions at drainage canal at the back of Sta. Josefa Nat'l High School
8	None	Low	Provide proper drainage canals.
9	None	Low	Provide proper drainage canals on other parts of this purok.
9A	None	Low: partly high due to still on-going NIA irrigation project	Provide proper drainage canals and drainage outlet. Continue the drainage canal near NIA and provide drainage outlet. To request the Municipal LGU to organize a consultation with NIA to address the concern of the barangay on flooding in their area.

Table 8. Results of Landslide and Flood Assessment at Barangay San Jose

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low	Provide proper drainage system.
2	None	Low	Provide concrete line canal.
3	None	Low	Provide concrete line canal at the area and at San Jose Elem. School
4	None	High (prone to flashflood and river scouring)	Prohibit future settlement and construction of new establishments at/near the Agusan riverbanks. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Relocate all the houses on this Purok.
5	None	Low	Improve barangay road as an evacuation route towards Nat'l Highway.
6	None	Moderate to High	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Binongahan creek and Agusan River's water levels and flows during extreme rainfall events



			and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek and river. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Provide concrete line canal and proper drainage outlet.
7	**None**	**Low with High portion near Binongahan creek**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Binongahan creek and Agusan River's water levels and flows during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek and river. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. For long term solution, relocate houses near Binongahan creek and Agusan River that are greatly affected by flooding.

Table 9. Results of Landslide and Flood Assessment at Barangay Santa Isabel

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**None**	**Low but prone to river scouring at Agusan River**	Remove the remaining parts of the damaged overflow bridge at Agusan River.
2	**None**	**Low**	
3	**Gen. Moderate with High portion near cliff**	**Low**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition. Prohibit future settlement and construction of new establishments on areas at the cliff, slope and at/near the foot slope. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response.
4	**Low**	**None**	

5	**Moderate**	**None**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition. Prohibit future settlement and construction of new establishments on areas at the cliff, slope and at/near the foot slope. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response.
5A	**Low**	**Low**	
6	**Low**	**None**	
6A	**None**	**Low**	
6B	**None**	**Low**	
7	**Moderate**	**None**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition. Prohibit future settlement and construction of new establishments on areas at the slope and at/near the foot slope. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response.
8	**None**	**Low with Moderate portions near Lucad creek and Tadeco canal**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Lucad Creek and Tadeco canal's water levels and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new establishments near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Replace existing double barrel RCP into box-type culvert. Rechannel Lucad creek. Define and clear obstructions at the Tadeco canal. Conduct regular maintenance on the creek and Tadeco canal.

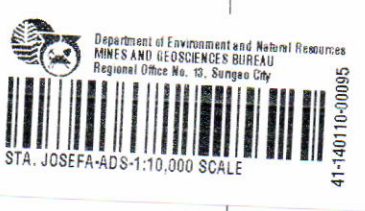
Table 10. Results of Landslide and Flood Assessment at Barangay Sayon

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**None**	**High (prone to**	Develop an early warning system and flood preparedness plan thru

		flashflood)	periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Prohibit future settlement and construction of new establishments near the banks of creek. Elevate provincial road. Rechannel Sayon creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
2	**None**	**High (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Sayon creek. Prohibit future settlement and construction of new establishments at/near the banks of creek. Provide proper drainage system at Sayon Elem. School. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
3	**None**	**High (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Sayon creek. Prohibit future settlement and construction of new establishments near the banks of creek. Rechannel Sayon creek. For long term solution,

			relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
4	**None**	**High (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Sayon creek. Prohibit future settlement and construction of new establishments near the banks of creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
5	**None**	**Moderate (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Sayon creek. Prohibit future settlement and construction of new establishments near the banks of creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
6	**None**	**Moderate (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Sayon creek. Prohibit future settlement and

			construction of new establishments near the banks of creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
7	**None**	**Moderate**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel nearby creek. Prohibit future settlement and construction of new establishments near the banks of creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
8 (Tagmanuro)	**Moderate**	**Low**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition. Prohibit future settlement and construction of new establishments on areas at the cliff, slope and at/near the foot slope. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response.
9	**High**	**None**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Prohibit future settlement and construction of new establishments on areas at the edge of the ridge, the slope and at/near the foot slope. Relocate houses that are near the edge of the ridge.
10	**Moderate to High**	**Low**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for



			vigilance of residents in areas located near the foot of slope during inclement weather condition. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Prohibit future settlement and construction of new establishments on areas at the edge of the ridge, the slope and at/near the foot slope.

Table 11. Results of Landslide and Flood Assessment at Barangay Tapaz

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	High (due to Kanobahan Lake and Agusan River overflow)	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Kanobahan lake and Agusan Rivers's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Define and provide box-type culvert and protective structure on a canal outlet. Elevate provincial road. Define and widen outlet of Kanobahan Lake. For long term solution, relocate all houses at/near the Agusan riverbank and Kanobahan Lake that are greatly affected by flooding.
2	None	Low	Provide concrete line canal.
3	None	Gen. Low with High portion near Agusan River	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Provide proper drainage system at Tapaz Elem. School. For

			long term solution, relocate all houses at/near the Agusan riverbank that are greatly affected by flooding.
4	**None**	**Gen. Low with High portion near Agusan River (prone to river scouring)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. For long term solution, relocate all houses at/near the Agusan riverbank that are greatly affected by flooding.
5	**None**	**Gen. Low with High portion near Agusan River (prone to river scouring)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. For long term solution, relocate all houses at/near the Agusan riverbank that are greatly affected by flooding.
6	**None**	**Low**	
7 (Paraiso Nangka)	**None**	**Low**	Improve and conduct regular maintenance on drainage canals.
8	**None**	**Moderate**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Activate BDCC at all times for quick response. Identify evacuation site that is safe from landslide and flooding. Consider constructing box-type culverts as a

			drain-out structure on future projects.
9	**None**	**High**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boats (e.g. speed boat, pump boat or out board). For long term solution, relocate all houses at/near Agusan Riverbanks that are greatly affected by flooding.

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.

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JULIUS A. SULAPAS
Geologic Mapper

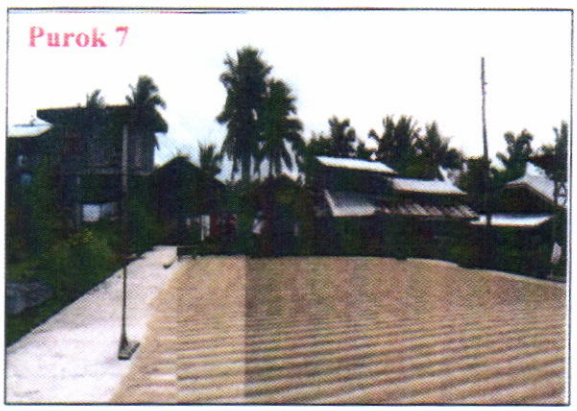
BRGY. ANGAS

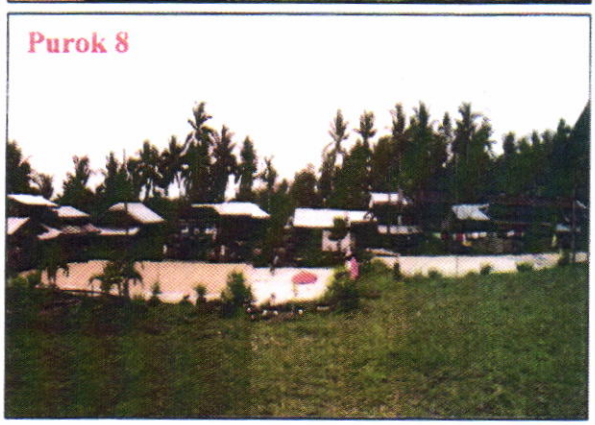
Photos are Purok 1 which is recommended to install proper concrete drainage canals to facilitate surface run-off especially

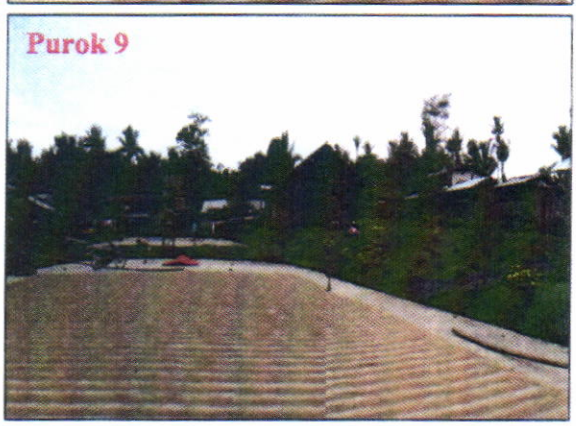
Photos above are areas at Purok 2 including Angas Elementary School. Installation of proper concrete drainage canals at the purok and at the school is recommended.

Photos are Purok 3 which is recommended to install proper concrete drainage canals to facilitate surface run-off.

Photos are Purok 4 Lower Angas. Installation of proper concrete drainage canals to facilitate surface run-off is recommended.







Photos above are Puroks 16, 17, 18, and 19 of Sitio Bacilisi which the location is characterized with gentle to moderately steep slopes. Recommend to install proper concrete drainage canals to the sitio to facilitate surface run-off especially during heavy rainfall. Also prohibit settlement directly located at the foot of slopes.

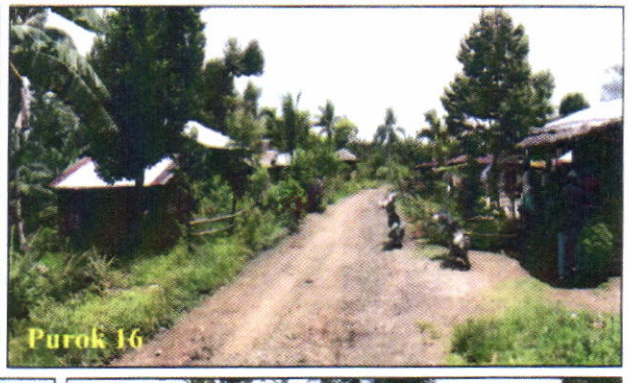
Photo above is an unstable slope with progress of erosion located at Purok 10 Sitio Bacilisi. Stabilization of the slope is recommended. GPS coordinates 07°57'58.3"N/126°02'28.5"E

Photo above is a panoramic view of Purok 11 Sitio Cebuli which is rated low to landslide and flooding.

Photos above are houses of Purok 12 which are located at the ridge and rated moderate to landslide. Observe for presence of mass movements and prohibit future settlement along ridge edges and footslopes.

Photos are some of the houses of Purok 13 which are on the ridge edges and highly susceptible to landslide. Prohibit future settlement along ridge edges and footslopes. For long term solution, relocating the residents located at the ridge with very steep slopes is highly recommended.

Photo is Purok 14 which is moderate to landslide. Observe for presence of mass movements and prohibit future settlement along ridge edges and footslopes.



Photos are Puroks 15, 16, 17, and 26 located at Sitio Durian. The puroks are elevated from its surrounding ricefields and are rated low to landslide and flooding. Proper drainage canals are recommended to be installed to facilitate surface run-off especially during heavy precipitation.

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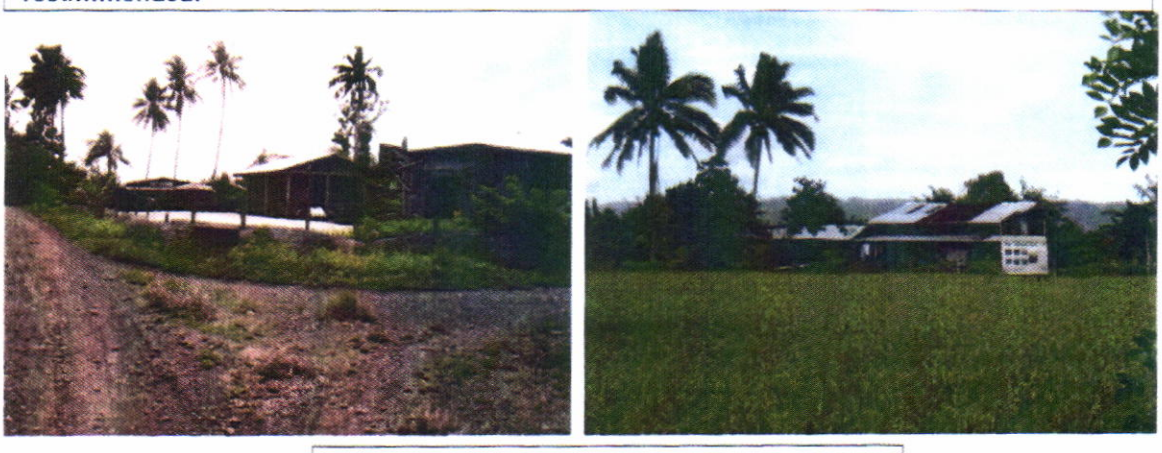
Photos are Purok 18 Sitio Dao which is rated low to moderate to flooding. Right photo is a resident showing the flood height the purok experienced during typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Also prohibit future settlement on the creeks embankments.

Photos are Purok 19 Sitio Dao which is rated low to moderate to flooding. Right photo is a resident showing the flood height the purok experienced during typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Proper concrete drainage canals are also recommended to install.

Photos are Purok 20 Sitio Dao and some of its existing drainage canals. The purok had experienced a moderate flooding during the typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Proper concrete drainage canals are also recommended to install.

Photos are Purok 21 Sitio Dao which also experienced moderate flooding during typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Proper concrete drainage canals are also recommended to install.

Photo above is the Purok 22 which experiences moderate to high flooding every time the Hinalinan Creek overflows. Recommend to observe for water level at the creek during inclement weather conditions and pre-emptive evacuation is advised. Also prohibit future settlement at the creeks embankments. For long term solution, relocating the entire purok is recommended.

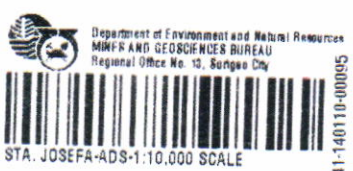


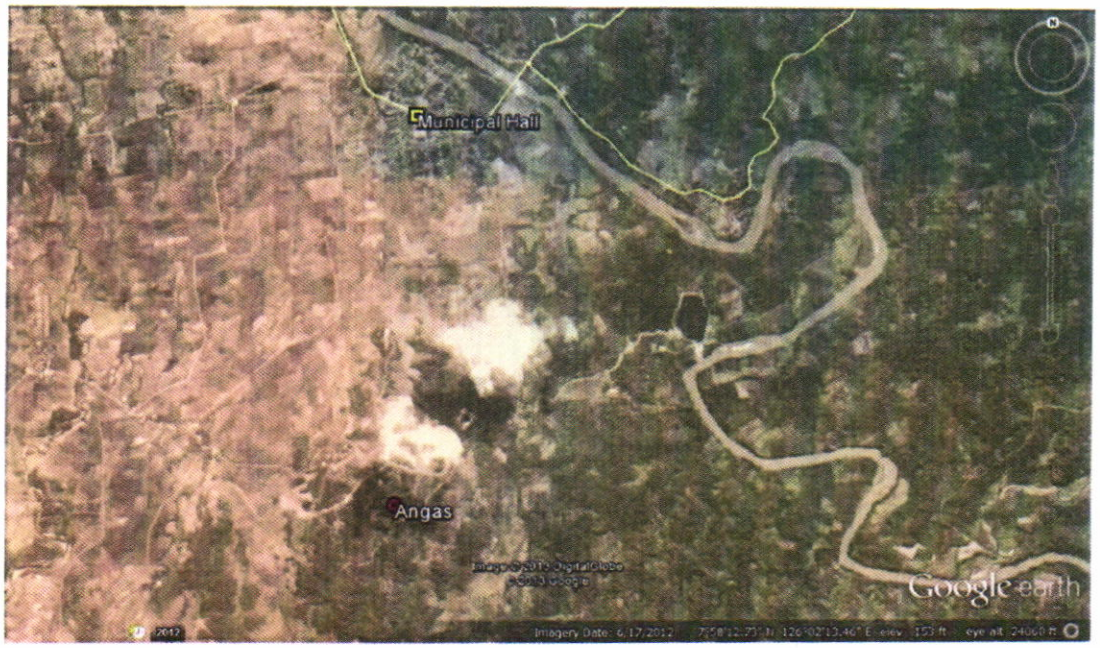
Photos are Purok 23 which is low to flooding.

Photos above are houses of Purok 24 which are elevated from the surrounding ricefields. The purok is both low to landslide and flooding.

Photos are areas of Purok 25 which are recommended to install proper concrete drainage canals to facilitate surface run-off.

The two photos above are the proposed relocation sites of Barangay Angas both located at Purok 13. The sites are subject for detailed mapping and/or Geohazard identification Report.





Location of Barangay Angas via Google Earth Satellite Imagery. GPS coordinates 07°57'27.9"N/126°01'35.1"E

BRGY. AURORA

Photo showing the damaged Sitio Hall of Kaangayan 1 due to the strong winds brought by Typhoon Pablo.

A view of Kaangayan Primary School located at Purok 10 which needs proper drainage system.

Drainage canals at Sitio Kaangayan 1 that needs to be defined and deepened so as to prevent its overflow.

Photo showing the school ground located at Aurora Nat'l High School that needs to be provided with concrete line canals.

Barangay road located at Sitio Kaangayan 2 that is recommended to be elevated and to be provided with drainage canals to lessen the effects of flooding at the area.

Area at Purok 13 located at Sitio Kaangayan 2 that is recommended to be provided with additional box-type culvert to aid in draining out water from the area.

School grounds of Pag-asa Elem. School at Purok 15 located at Sitio Kaangayan 2 that is recommended to be elevated and to be provided with proper drainage system.

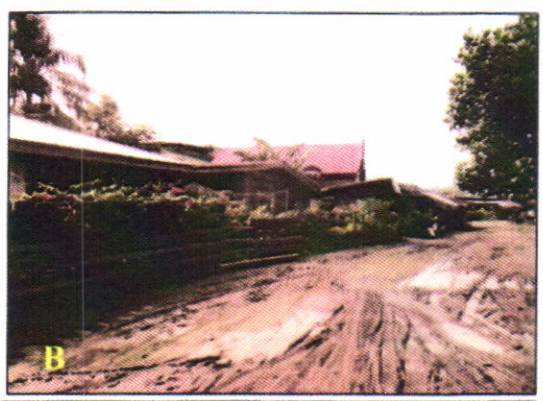
Photo showing the drainage canal at Pag-asa Elem. School that is recommended to be concretized and have its outlet defined to properly drain run-off and prevent further erosion at the school grounds.

A view of Lucad creek flowing under the steel bridge located at Purok 15 which is the main cause of the major flooding at Sitio Kaangayan 2. Rechanneling the creek is recommended.

Also under the Lucad steel bridge is a part of barangay road (above photo) installed with box-type culvert which obstructs the flow of the Lucad creek during inclement weather condition causing it to overflow. Removing such obstructions as well as realigning the barangay road directly to the steel bridge is recommended.

Satellite image of Brgy. Aurora with a GPS reading of: N 8° 00' 34.9"/ E 126° 01' 03.9".

BRGY. AWAO



Photos above are areas of Purok 1 and Purok 2 which are experiencing high flooding due to Awao River overflow during extreme weather events. Photo E shows the flood height the houses experienced during flooding. Observe for increase/decrease of water level along the river. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather conditions. Proper drainage canals are also recommended.

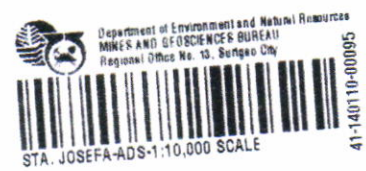


Photo above is an area ok Purok 3 which is moderate to flooding due to the Awao River overflow. Observe for increase/decrease of water level along the river. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather

Photos are Purok 4 which is rated moderate to flooding. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather conditions. Proper drainage canals are also recommended to install

Photos are houses of Purok 5. The purok is rated low to flooding. According to the residents, Awao River overflow do not reach up to

Photos are Purok 6 which is moderate to flooding. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather conditions. Proper drainage canals are also recommended to install.

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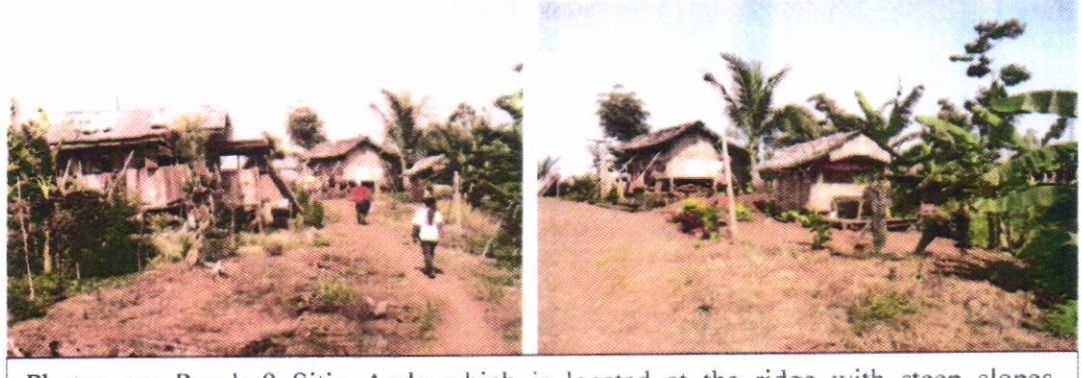
Photos are areas at Purok 7 which are located at the ridge characterized with moderately steep slopes. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes.

Photos are some houses of Purok 8 which are located at the ridge and are rated moderate to high to landslide. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also develop an early warning system regarding landslide and pre-emptive evacuation during inclement weather conditions is recommended.



Photos are Purok 9 Sitio Agda which is located at the ridge with steep slopes. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also develop an early warning system regarding landslide and pre-emptive evacuation during inclement weather conditions is recommended. Relocating the residents located at very steep slopes is also recommended.

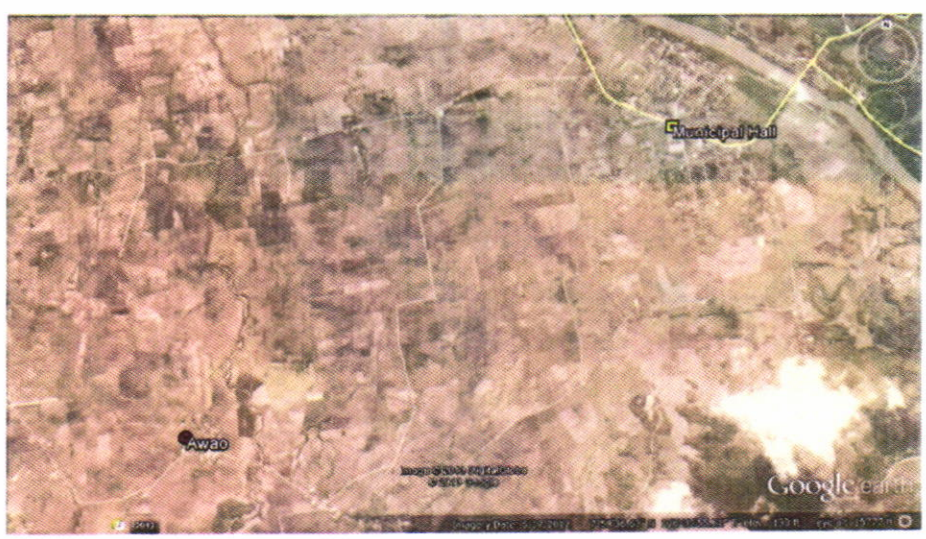
Houses of Purok 10 Sitio Kayakalan are located at the ridge with steep to very steep slopes and are highly susceptible to landslide. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also develop an early warning system regarding landslide and pre-emptive evacuation during inclement weather conditions is recommended. Relocating the entire purok is also recommended.

Photos show houses of Purok 11 Sitio Mahayahay which is rated moderate to landslide. The purok is underlain with limestone and is susceptible to sinkhole. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also observe for ground depressions possibly indicating a presence of sinkholes.

Photo above is Purok 12 which is located close to the Awao River and is rated moderate to flooding. Observe for abnormalities in the water level along the river and pre-emptive evacuation is recommended during extreme weather events. Also prohibit future settlement towards the river embankments.

Houses of Purok 13 Sitio Tagbayog are rated moderate to high to landslide due to moderate to steep slopes where the purok is located. Observe for presence of mass movements and pre-emptive evacuation is recommended during extreme weather events. Also develop an early warning system regarding landslide and prohibit settlement directly located at the foot of slopes.

Photo above is a portion of the Awao River near the steel bridge which flooding to the most of the puroks of the barangay ususally starts. Recommend a flood protective structure to mitigate or if not lessen the impact of flooding in the barangay. GPS coordinates 07°58' 02.4"N/ 126°00'11.5"E



Locaton of Barangay Awao via Google Earth Satellite Imagery. GPS coordinates 07°58'03.9"N/126°00'02.0"E

Photos are Purok 1 which is moderate to flooding due to the Awao River overflow. Pre-emptive evacuation is recommended if abnormalities in the water level in the river are observed or if unusual flooding is experienced. For long term solution, relocating the purok to a much safer site is recommended

Photos are portions of Purok 2 which is affected by moderate to high flooding due to Awao River overflow. Pre-emptive evacuation is recommended if abnormalities in the water level in the river are observed or if unusual flooding is experienced. For long term solution, relocating the purok to a much safer site is recommended.

Photos are areas in Purok 3. The purok is rated moderate to high to flooding. Flooding is caused by the Awao river overflow during extreme weather events. Recommend pre-emptive evacuation if abnormalities in the water level at the river is observed. For long term solutions, relocating the entire purok is recommended.

The photos are Purok 4 which experiences moderate to high flooding. Observe for rapid increase/decrease of water level at the Awao River and pre-emptive evacuation is advised during inclement weather conditions. For long term solution, relocating the entire purok is recommended.

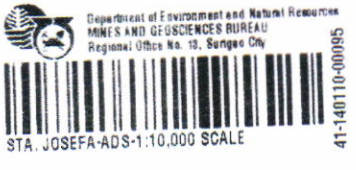
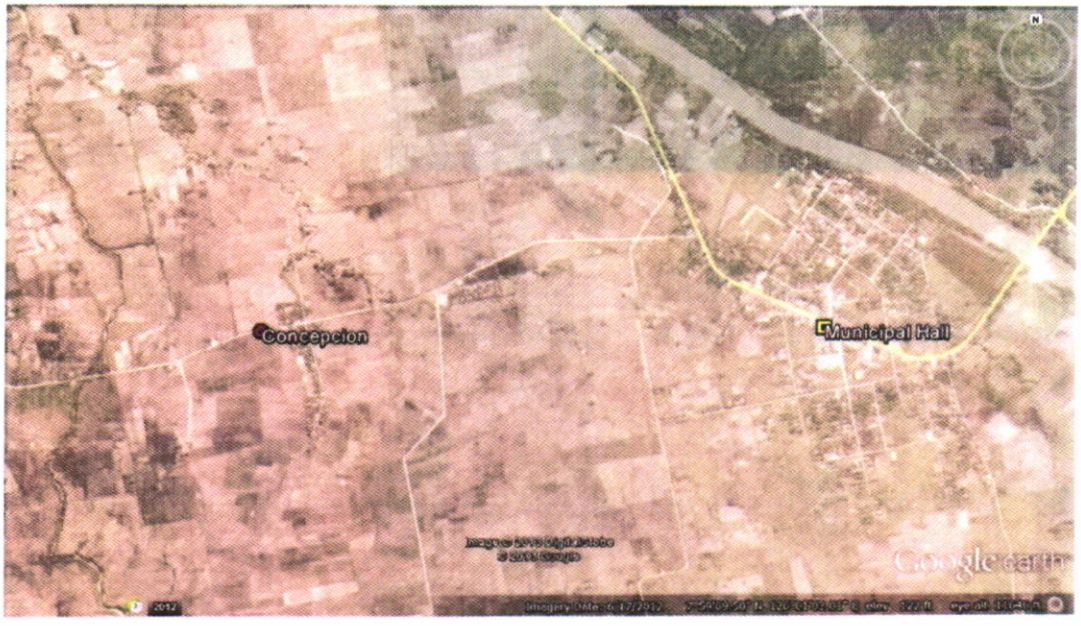


Photo above is Purok 5 which experiences high flooding. Pre-emptive evacuation is advised during inclement weather conditions. For long term solution, relocating the entire purok is recommended.

Photo is a panoramic view of Purok 6 which is not affected by flooding from the Awao River. Pre-emptive evacuation during inclement weather conditions is advised.



Location of Barangay Concepcion via Google Earth Satellite Imagery. GPS coordinates 07°59'07.1"N/126°00'28.5"E

BRGY. PAG-ASA

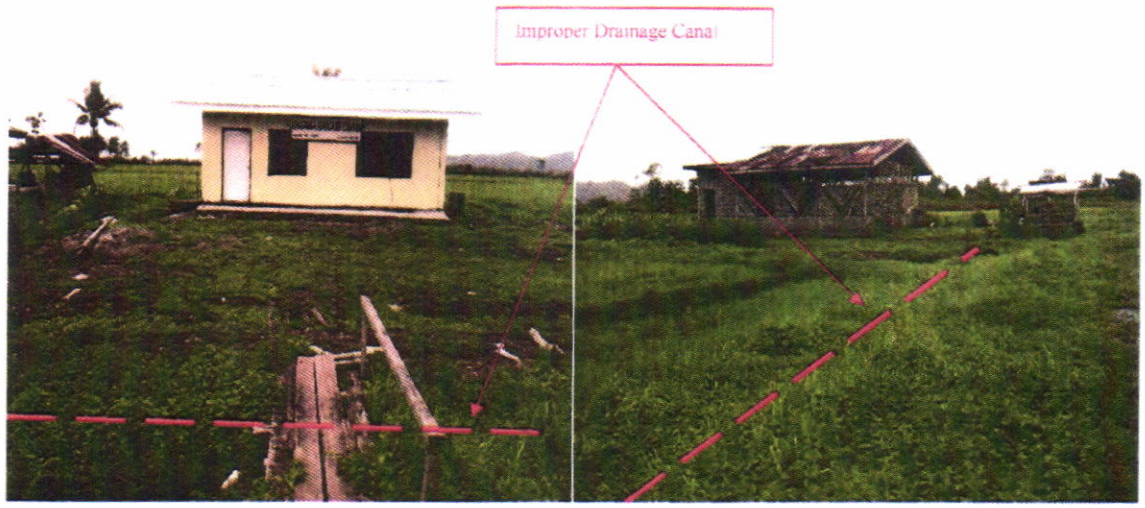


Fig. 1 Improper drainage canals were noted at Purok 1, Brgy. Pag-asa, Sta. Josefa, ADS. Daycare Center and Church buildings are situated within the flood-prone section. GPS reading is 8°04'36.2"-N/ 126°00'02.8"-E and 8°04'35.9"-N/126°00'05.6"-E, respectively.

Fig. 2 The Barangay Hall is moderately damaged and completely damaged building of Barangay Multi-purpose by typhoon "Pablo" were observed at Purok 1. GPS reading is 8°04'37.2"-N/ 126°00'01.4"-E and 8°04'36.8"-N/126°00'01.9"-E, respectively. Flood rating is moderate.

Fig. 3 Construction of concrete drainage canals are highly recommended at San Vicente Elementary School of Purok 1. GPS reading is 8°04'34.7"-N/126°00'02.2"-E.

Fig. 4 These sections of Purok 1 are highly recommended for concreting drainage canals.

Fig. 5 Concreting of road and drainages are highly recommended at Purok 2. GPS reading is 8°04'45.5"-N/126°00'00"-E.

Fig. 6 Local residents are resided along NIA Irrigation canal at Purok 2. Road and NIA Irrigation canals are highly for concreting.

Fig. 7 No concrete road and no concrete drainage canal were noted at Purok 3. GPS reading is 8°04'59.3"-N/125°59'59.9"-E.

Fig. 8 Wooded bridges are main access across Lukad River. Construction of proper concrete bridge across Lukad River is highly recommended. GPS reading is 8°05'11.8"-N/126°00'17"-E.

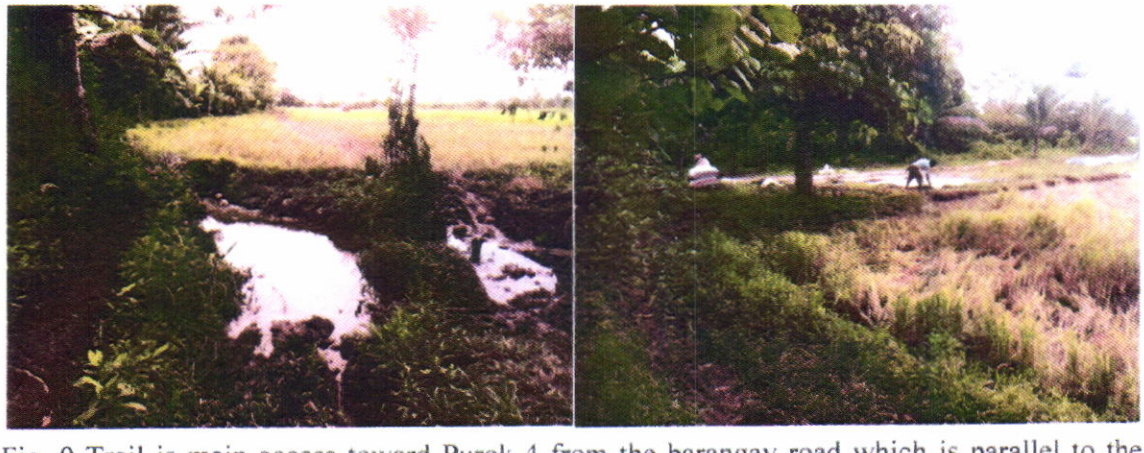


Fig. 9 Trail is main access toward Purok 4 from the barangay road which is parallel to the Lukad River. Proper road-piloting is highly recommended.

Fig. 10 Most of the local residents of Purok 4 are located along Lukad River embankment which is prone to flooding and river-scouring. GPS reading is 8°04'55.4"-N/126°00'24.2"-E.

Fig. 11 Geographic location of Purok 5 situated along NIA Irrigation drainage canal or within the flood-prone section. GPS reading is 8°05'26.1"-N/126°00'00.3"-E.

Fig. 12 No proper drainage canals and no concrete road were observed at Purok 6. Construction of concrete drainage canals and concrete roads are highly recommended. GPS reading is 8°04'10.1"-N/126°00'48.5"-E.

Fig. 13 Construction of proper concrete drainage canals is highly recommended at this school campus of Malipayon Elementary School of Purok 6. GPS reading is 8°04'08.3"-N/126°00'50.7"-E.

Fig. 14 Deepening, widening and de-clogging is highly recommended on this drainage canal or RCP culvert of Purok 6. GPS reading is 8°04'07.3"-N/126°00'49.7"-E.

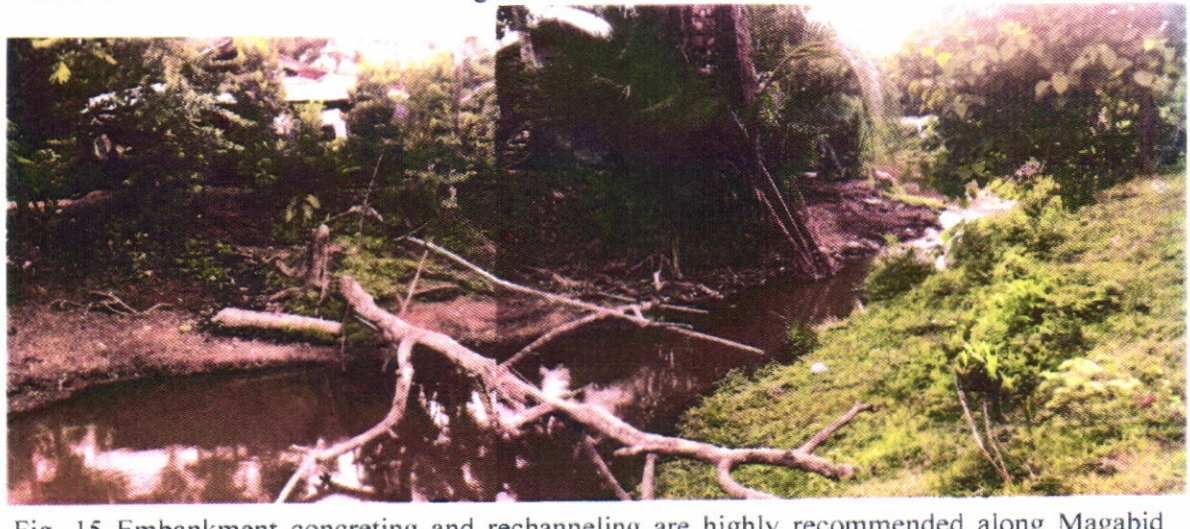


Fig. 15 Embankment concreting and rechanneling are highly recommended along Magabid Creek. Prohibit settlement along creek/river embankment should be implemented.

Fig. 16 No concrete drainage road and no drainage canal at Purok 7. GPS reading is 8°04'03.6"-N/126°00'48.3"-E.

Fig. 17 Geographic location of Brgy. Pag-asa, Sta. Josefa, ADS with their puroks/sitios based on Google Earth 2013. General geohazard on the area is flooding and liquefaction.

Fig. 1 Geographic location of Sitio Lilo, Brgy. Patrocinio, Sta. Josefa, ADS. It is situated along Agusan River embankment which is prone to river-flooding, flash-flood and river-scouring. Total relocation is highly recommended. GPS reading is 7°57'17"-N/126°03'20.7"-

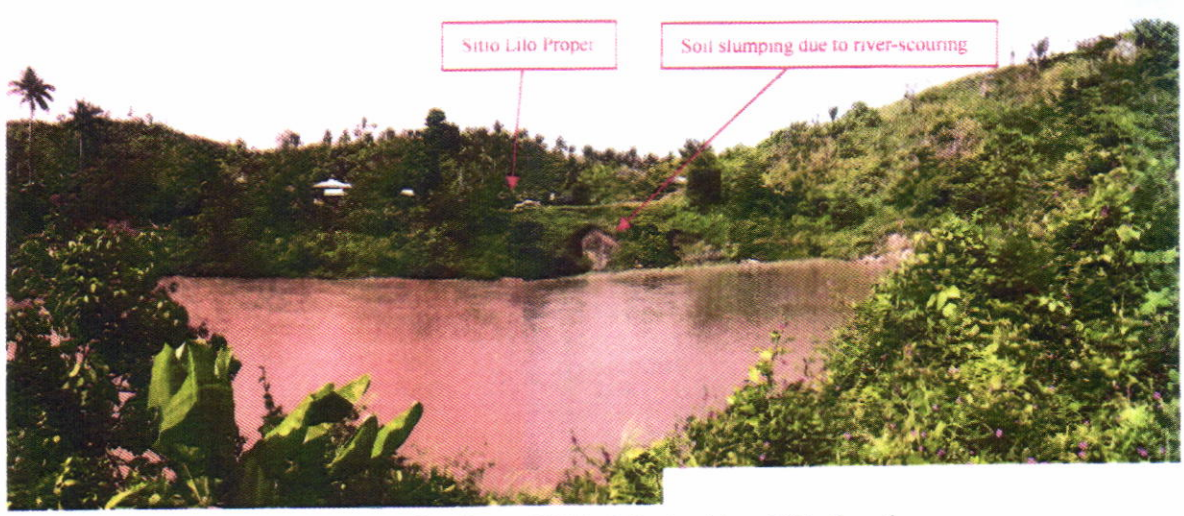


Fig. 2 Panoramic-view of Sitio Lilo looking SW direction.

Fig. 3 Sitio Lilo waiting-shed is completely damaged by typhoon "Pablo" and Sr. San Isidro Labrador Chapel is prone to landslide.

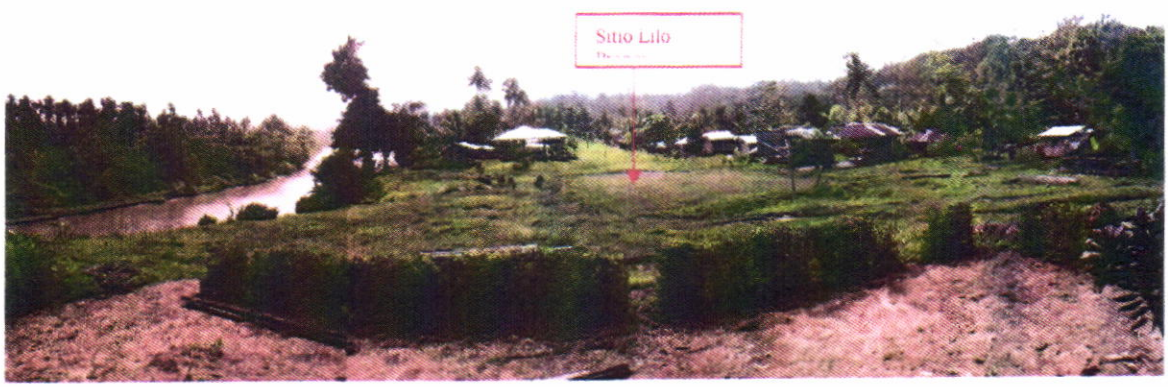


Fig. 4 Closer panoramic-view of Sitio Lilo proper situated along Agusan River embankment.

Photos are portions of Purok 1 which is characterized with gentle to moderately steep slopes and is rated moderate to landslide. Observe for presence of mass movements and prohibit future settlement at the foot of slopes. Proper concrete drainage canals are also recommended to facilitate surface run-off during heavy precipitation.

Photos are Purok 2 which is located near the Agusan River. Observe for the water level along Agusan River especially during inclement weather conditions. Pre-emptive evacuation is advised if unusual water level along the river is observed. Also, prohibit future settlement at the river embankments. Conduct regular maintenance on existing canals and installation of drainage canals to the other portions of the purok is recommended.

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Proper concrete drainage canals are recommended to be installed at Purok 3 to facilitate surface run-off especially during heavy rainfall.

Photo above shows the proximity of some houses at Purok 3 to the Agusan River. According to the residents, Agusan River overflow does not reach the purok but only levels at its embankments. Prohibit future settlement towards and along the Agusan River embankments. Vigilance of residents closest to the river is recommended especially during extreme weather

Photos above are houses of Purok 4 which are low to moderate to landslide. Provision of concrete drainage canals at the purok is recommended to facilitate surface run-off.

Photos are Purok 5. Installation of concrete drainage canals at the purok is recommended to facilitate surface run-off.

The creek on the above photo is the Mahaba Creek which traverses at Purok 6 Magalibobo and causes flooding up to waist-level at the purok since the existing culvert (close-up at right photo) could not cater too much volume of water during heavy rainfall. Replacing the existing culvert into box-type culvert is recommended to address the problem. GPS coordinates 07°59'48.9"N/126°03'42.3"E

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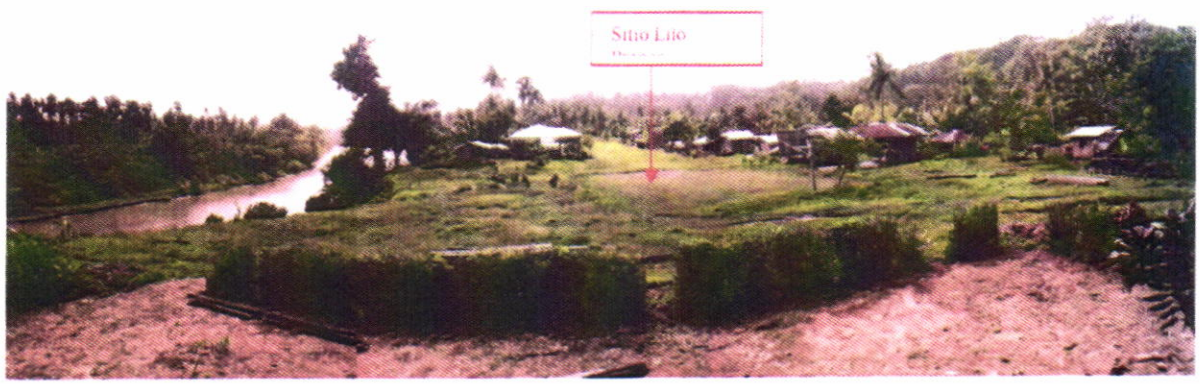
STA. JOSEFA-ADS-1:10,000 SCALE

41-140110-00095

Sitio Lilo waiting-shed is completely damaged by typhoon "Pablo" and Sr. San Isidro Labrador Chapel is prone to landslide.



Closer panoramic-view of Sitio Lilo proper situated along Agusan River embankment.

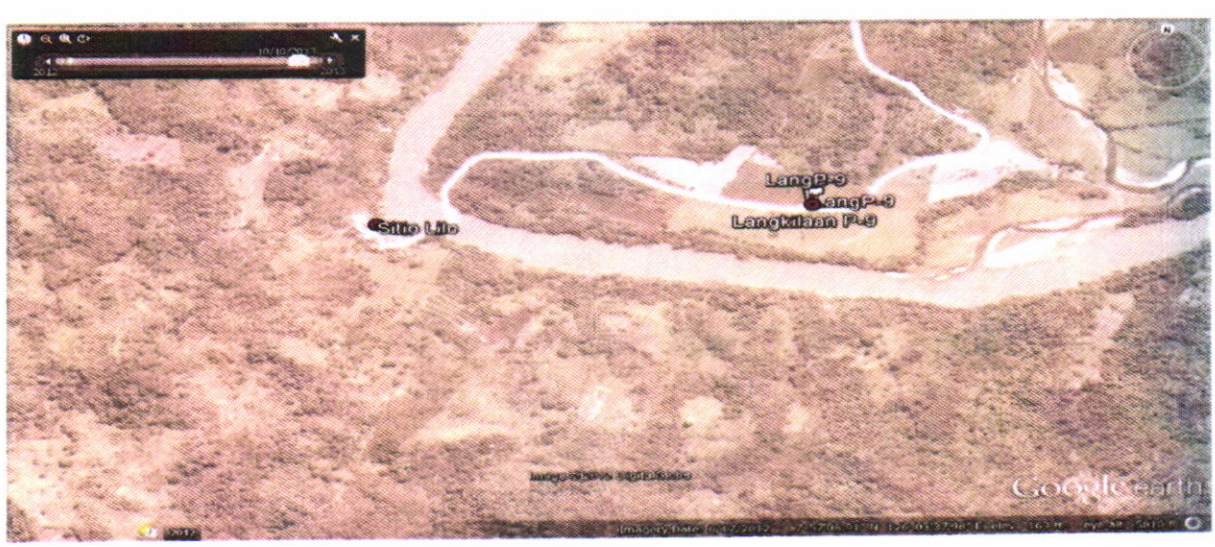


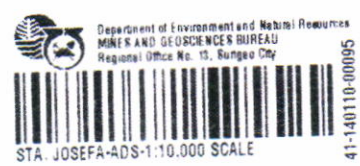
Fig. 1 Geographic location of Sitio Lilo, Brgy. Patrocinio, Sta. Josefa, ADS. It is situated along Agusan River embankment which is prone to river-flooding, flash-flood and river-scouring. Total relocation is highly recommended. GPS reading is 7°57`17"-N/126°03`20.7"-E.

Photo above is Purok 8 Sitio Lemon which houses are located at the top ridge along the calamansi farmland and are moderate to landslide. Recommend to observe for presence of mass movements and prohibit future settlement at the ridge edges and at the foot of slopes.

Photo is Purok 9 Sitio Marang which is rated moderate to landslide. Observe for presence of mass movements and prohibit future settlement at the ridge edges and at the foot of slopes.

Photo is Purok 10 Sitio Bacilisi which is close to the Agusan River. Recommend to observe for rapid increase/decrease of water level along the river. Pre-emptive evacuation is recommended if abnormalities in the water level of the river are observed.

Location of Barangay Patrocinio via Google Earth Satellite Imagery. GPS coordinates 07°58'43.4"N/126°02'57.2"E



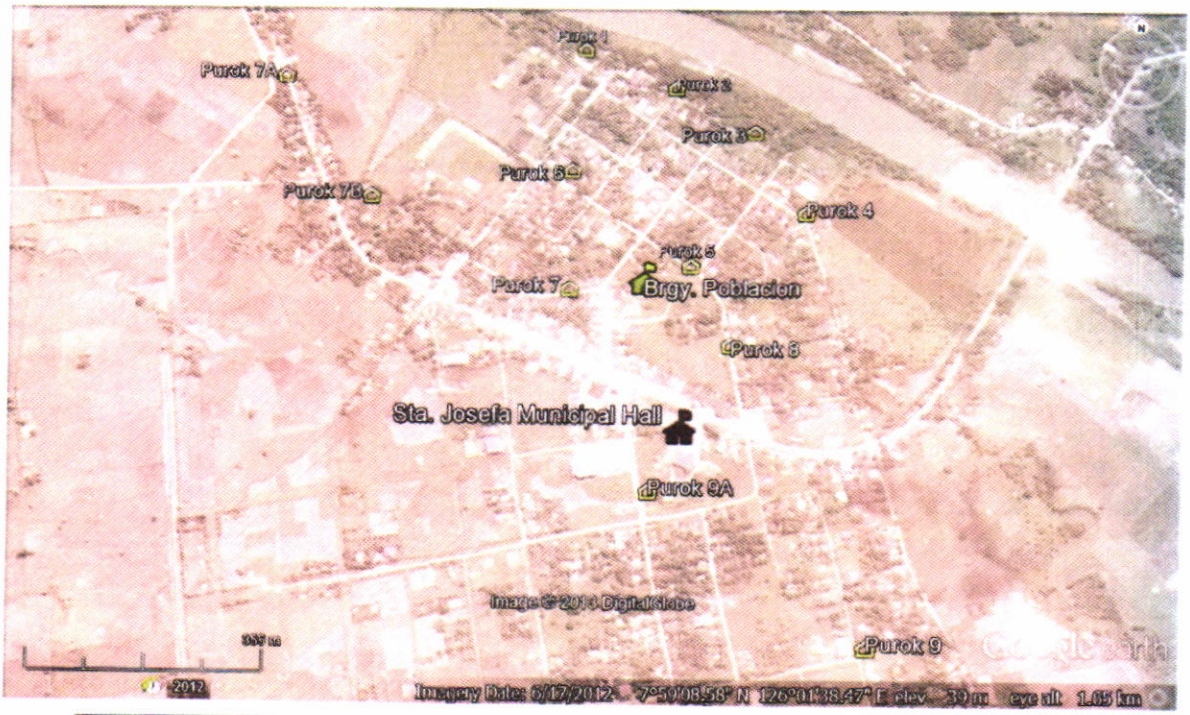
BRGY. POBLACION

A view of drainage canal located at the back of Sta. Josefa Nat'l High School at Purok 7B that is recommended to be defined, conducted with regular maintenance and concretized so as to properly facilitate surface run-off at the area.

RCP culvert located at Purok 7A that needs to be conducted with regular maintenance to properly drain-out floodwaters from the area.

A view o of RCP culvert located at Purok 4 that seems to be inadequate in draining the water from the area. Replacing the existing culvert into a sufficient culvert and defining its outlet is recommended.

Some examples of existing drainage canals of Brgy. Poblacion located at Purok 9, 9A, 7B and 6(photos in clockwise direction) that need to be improved.



Satellite image of Brgy. Poblacion with a GPS image of: N 7° 59' 16.9"/ E 126°

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BRGY. SAN JOSE

A view of the school grounds of San Jose Elem. School that is recommended to be provided with concrete line canal. Also being shown is the damaged school building due to Typhoon Pablo.

Closer view of the damaged school building of San Jose Elem. School located at Purok 3.

Barangay road located at Purok 5 that is recommended to be improved for evacuation and quick response.

Houses located along the Agusan riverbank at Purok 4 that are subject for relocation since they are directly vulnerable to flashflood and river scouring.

Satellite image of Brgy. San Jose with a GPS reading of: N 8° 00' 16.4"/ E 125° 59' 59.1".

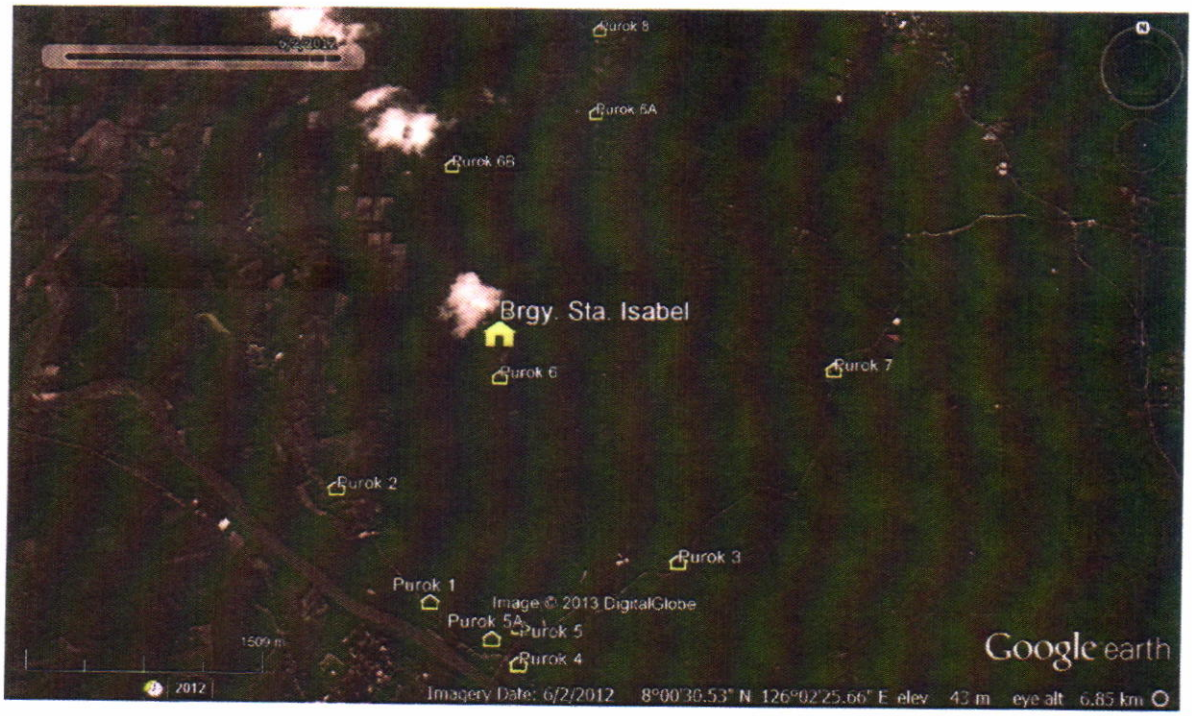
BRGY. STA. ISABEL

Photo showing the remaining part of an old and damaged bridge that obstructs the flow of Agusan River, causing river scouring on a riverbank located at Purok 1. Removing the obstruction is recommended.

A double-barrel RCP located at Purok 8 that is recommended to be replaced into box-type culvert so as to sufficiently facilitate surface run-off at the area.

A view showing the Tadeco canal located downstream of the double barrel RCP at Purok 8. Defining and clearing the obstructions at the canal as well as conducting regular maintenance are recommended so as to prevent its overflow.

Houses located at Purok 7 that has a high landslide susceptibility rating.



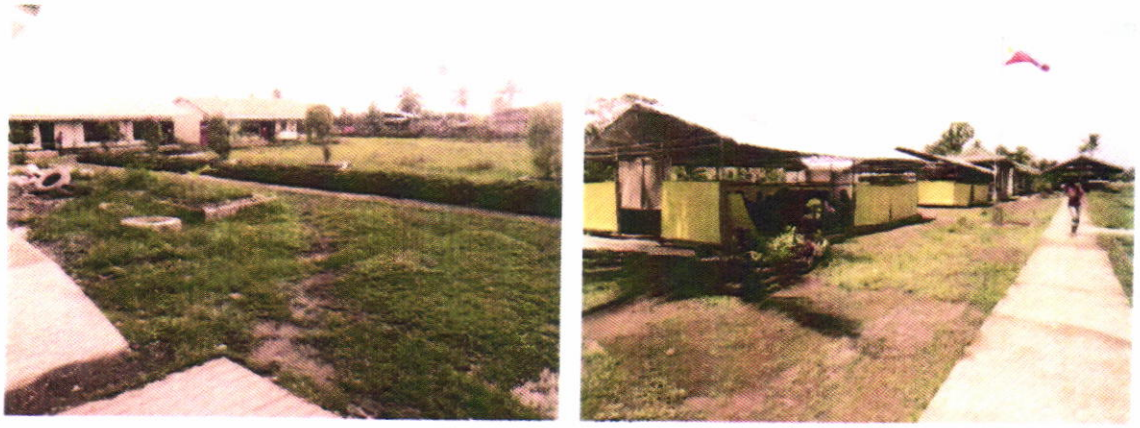
Satellite image of Brgy. Sta. Isabel with a GPS reading of: N 8° 00' 35.4"/ E 126° 01' 57.2".

BRGY. SAYON

Photos showing the meandering segments of Sayon creek traversing across Puroks 1, 2, 3, 4 and 5 and that also causes major flooding and in the areas. One of the recommendations is to rechannel this creek.

A creek located at Purok 7 that floods nearby houses when it overflows. Rechanneling the creek is also recommended.

Flood height at Sayon Elem. School located at Purok 2 that approximately reached up to 0.5 meters due to a flashflood event from Sayon creek during Typhoon Pablo.



School grounds of Sayon Elem. School (left photo) and Sta. Josefa Nat'l High School (Annex) (right photo) that are recommended to be provided with proper drainage system to prevent ponding of water at the area and to properly facilitate surface run-off.

Houses located on the ridge at Purok 9 which is highly susceptible to landslide. For long term solution, relocation of houses on the edge of the ridge is recommended since they are at risk for a possible landslide occurrence.

Top view of the houses at Purok 8 Tagmanuro located at the foot slope which is rated to be moderately susceptible to landslide.

Satellite image of Brgy. Sayon with a GPS reading of: N 7° 59' 04.2"/ E 125° 59' 10.0".

A closer view of the satellite image of Sayon Creek traversing across the barangay. GPS reading: N 7° 59' 05.6"/ E125° 59' 06.1".

BRGY. TAPAZ

Photos showing the Tadeco canal (left photo) that sometimes overflow and flood nearby houses. Flood height that approximately reached 0.5 meter was experienced at the area as shown by a resident (right photo).

Photos showing the Kanobahan lake (left photo) and its outlet that needs to be widened and that needs to be defined (right photo) located at Purok 1. According to residents, the overflow of Kanobahan Lake is one of the causes of major flooding on the area during heavy rainfall events.

A view of Agusan River located at the barangay proper which is the main cause of flooding at the barangay.

Drainage canal located at Purok 7 Paraiso Nangka which needs to be conducted with regular maintenance.

Tapaz Elem. School located at Purok 3 that needs to be provided with proper drainage system to prevent localized flooding at the area.

Proposed relocation site located at Purok 6 with a GPS reading of N 8° 01' 59.2"/E 125° 59' 39.2".

Satellite image of Brgy. Tapaz with a GPS reading of: N 8° 01' 21.8"/E 125° 59' 33.4".

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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Dominador D. Sanchez**
Brgy. Angas
Sta. Josefa Municipality
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 and flood hazard assessment in your barangay on October 11, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'30.8"N/126°01'56.1"E
2	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'18.3"N/126°01'58.1"E
3	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'12.7"N/126°01'57.6"E
4 (Lower Angas)	Low to Moderate	Low	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located

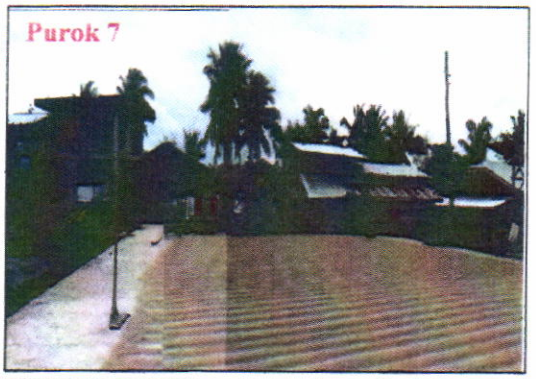
BRGY. ANGAS

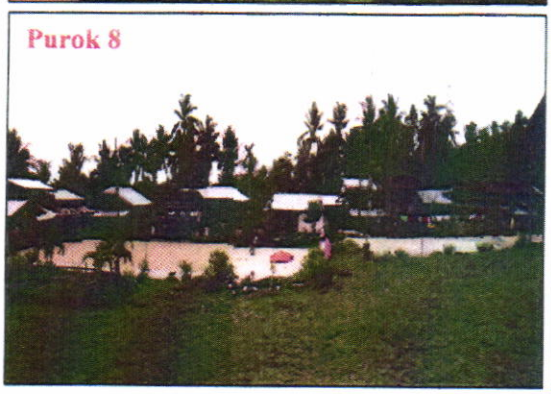
Photos are Purok 1 which is recommended to install proper concrete drainage canals to facilitate surface run-off especially

Photos above are areas at Purok 2 including Angas Elementary School. Installation of proper concrete drainage canals at the purok and at the school is recommended.

Photos are Purok 3 which is recommended to install proper concrete drainage canals to facilitate surface run-off.

Photos are Purok 4 Lower Angas. Installation of proper concrete drainage canals to facilitate surface run-off is recommended.



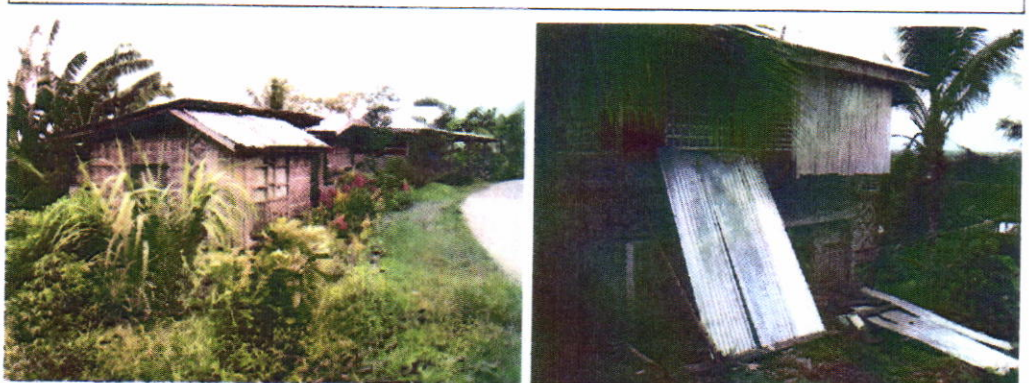


Photos above are Puroks 16, 17, 18, and 19 of Sitio Bacilisi which the location is characterized with gentle to moderately steep slopes. Recommend to install proper concrete drainage canals to the sitio to facilitate surface run-off especially during heavy rainfall. Also prohibit settlement directly located at the foot of slopes.

Photo above is an unstable slope with progress of erosion located at Purok 10 Sitio Bacilisi. Stabilization of the slope is recommended. GPS coordinates 07°57'58.3"N/126°02'28.5"E

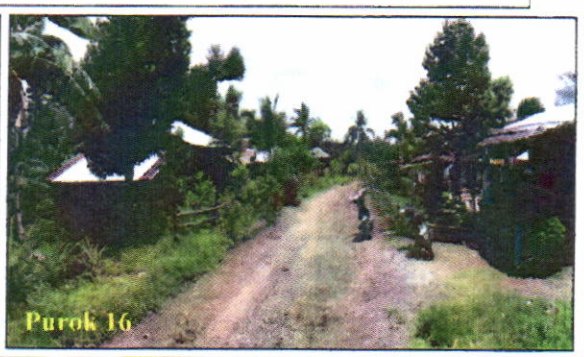
Photo above is a panoramic view of Purok 11 Sitio Cebuli which is rated low to landslide and flooding.

Photos above are houses of Purok 12 which are located at the ridge and rated moderate to landslide. Observe for presence of mass movements and prohibit future settlement along ridge edges and footslopes.



Photos are some of the houses of Purok 13 which are on the ridge edges and highly susceptible to landslide. Prohibit future settlement along ridge edges and footslopes. For long term solution, relocating the residents located at the ridge with very steep slopes is highly recommended.

Photo is Purok 14 which is moderate to landslide. Observe for presence of mass movements and prohibit future settlement along ridge edges and footslopes.



Photos are Puroks 15, 16, 17, and 26 located at Sitio Durian. The puroks are elevated from its surrounding ricefields and are rated low to landslide and flooding. Proper drainage canals are recommended to be installed to facilitate surface run-off especially during heavy precipitation.

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Photos are Purok 18 Sitio Dao which is rated low to moderate to flooding. Right photo is a resident showing the flood height the purok experienced during typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Also prohibit future settlement on the creeks embankments.

Photos are Purok 19 Sitio Dao which is rated low to moderate to flooding. Right photo is a resident showing the flood height the purok experienced during typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Proper concrete drainage canals are also recommended to install.

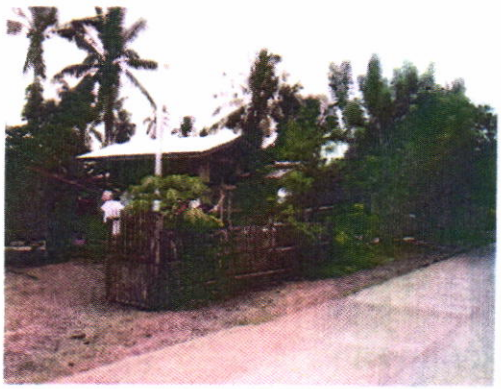
Photos are Purok 20 Sitio Dao and some of its existing drainage canals. The purok had experienced a moderate flooding during the typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Proper concrete drainage canals are also recommended to install.

Photos are Purok 21 Sitio Dao which also experienced moderate flooding during typhoon Pablo. Recommend to develop an early warning system regarding flooding, and pre-emptive evacuation is advised during typhoons or if unusual flooding is experienced. Proper concrete drainage canals are also recommended to install.

Photo above is the Purok 22 which experiences moderate to high flooding every time the Hinalinan Creek overflows. Recommend to observe for water level at the creek during inclement weather conditions and pre-emptive evacuation is advised. Also prohibit future settlement at the creeks embankments. For long term solution, relocating the entire purok is recommended.

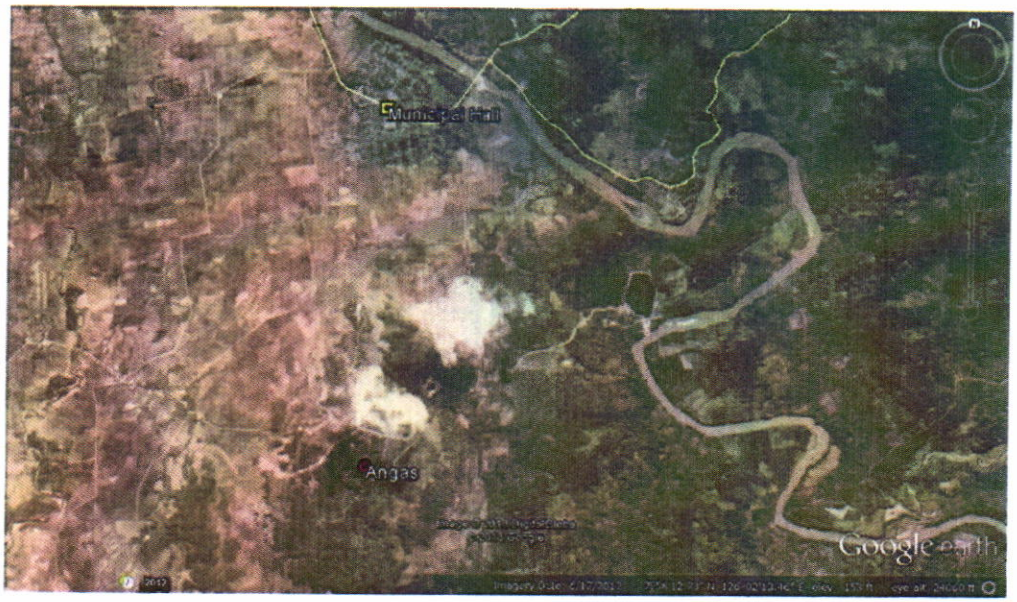
Photos are Purok 23 which is low to flooding.

Photos above are houses of Purok 24 which are elevated from the surrounding ricefields. The purok is both low to landslide and flooding.



Photos are areas of Purok 25 which are recommended to install proper concrete drainage canals to facilitate surface run-off.

The two photos above are the proposed relocation sites of Barangay Angas both located at Purok 13. The sites are subject for detailed mapping and/or Geohazard identification Report.



Location of Barangay Angas via Google Earth Satellite Imagery. GPS coordinates 07°57'27.9"N/126°01'35.1"E

BRGY. AURORA

Photo showing the damaged Sitio Hall of Kaangayan 1 due to the strong winds brought by Typhoon Pablo.

A view of Kaangayan Primary School located at Purok 10 which needs proper drainage system.

Drainage canals at Sitio Kaangayan 1 that needs to be defined and deepened so as to prevent its overflow.

Photo showing the school ground located at Aurora Nat'l High School that needs to be provided with concrete line canals.

Barangay road located at Sitio Kaangayan 2 that is recommended to be elevated and to be provided with drainage canals to lessen the effects of flooding at the area.

Area at Purok 13 located at Sitio Kaangayan 2 that is recommended to be provided with additional box-type culvert to aid in draining out water from the area.

School grounds of Pag-asa Elem. School at Purok 15 located at Sitio Kaangayan 2 that is recommended to be elevated and to be provided with proper drainage system.

Photo showing the drainage canal at Pag-asa Elem. School that is recommended to be concretized and have its outlet defined to properly drain run-off and prevent further erosion at the school grounds.

A view of Lucad creek flowing under the steel bridge located at Purok 15 which is the main cause of the major flooding at Sitio Kaangayan 2. Rechanneling the creek is recommended.

Also under the Lucad steel bridge is a part of barangay road (above photo) installed with box-type culvert which obstructs the flow of the Lucad creek during inclement weather condition causing it to overflow. Removing such obstructions as well as realigning the barangay road directly to the steel bridge is recommended.

Satellite image of Brgy. Aurora with a GPS reading of: N 8° 00' 34.9"/ E 126° 01' 03.9".

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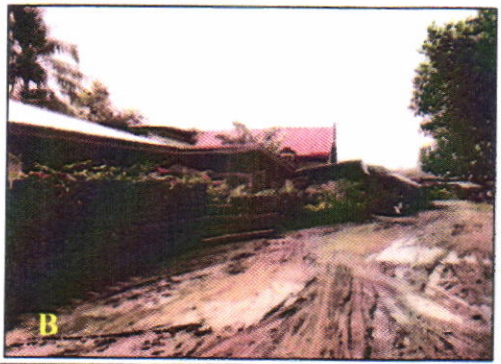
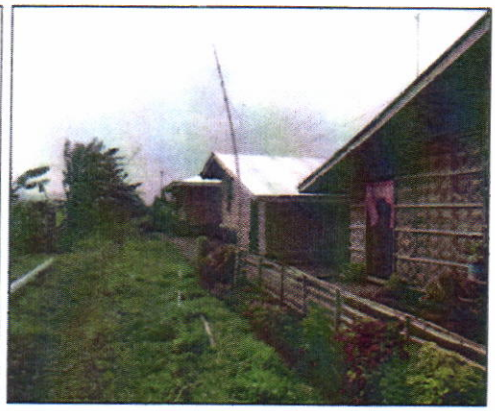
BRGY. AWAO



Photos above are areas of Purok 1 and Purok 2 which are experiencing high flooding due to Awao River overflow during extreme weather events. Photo E shows the flood height the houses experienced during flooding. Observe for increase/decrease of water level along the river. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather conditions. Proper drainage canals are also recommended.

Photo above is an area ok Purok 3 which is moderate to flooding due to the Awao River overflow. Observe for increase/decrease of water level along the river. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather

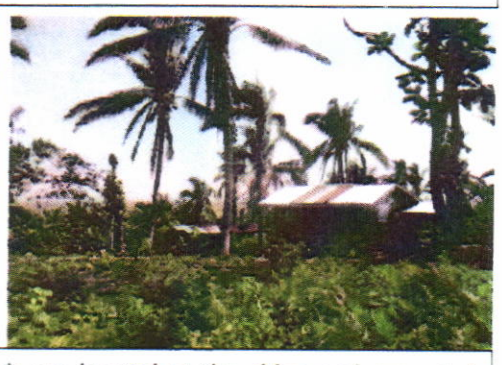
Photos are Purok 4 which is rated moderate to flooding. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather conditions. Proper drainage canals are also recommended to install



Photos are houses of Purok 5. The purok is rated low to flooding. According to the residents, Awao River overflow do not reach up to

Photos are Purok 6 which is moderate to flooding. Develop an early warning system and pre-emptive evacuation is recommended during inclement weather conditions. Proper drainage canals are also recommended to install.

Photos are areas at Purok 7 which are located at the ridge characterized with moderately steep slopes. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes.



Photos are some houses of Purok 8 which are located at the ridge and are rated moderate to high to landslide. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also develop an early warning system regarding landslide and pre-emptive evacuation during inclement weather conditions is recommended.

Photos are Purok 9 Sitio Agda which is located at the ridge with steep slopes. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also develop an early warning system regarding landslide and pre-emptive evacuation during inclement weather conditions is recommended. Relocating the residents located at very steep slopes is also recommended.

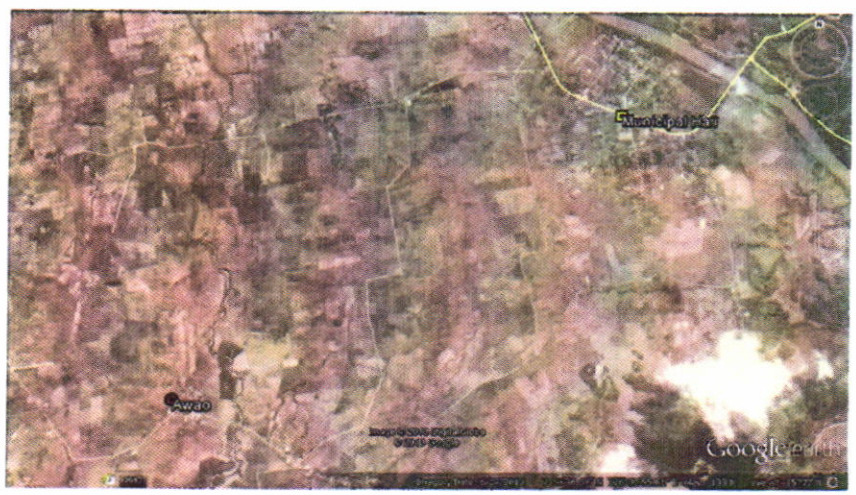
Houses of Purok 10 Sitio Kayakalan are located at the ridge with steep to very steep slopes and are highly susceptible to landslide. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also develop an early warning system regarding landslide and pre-emptive evacuation during inclement weather conditions is recommended. Relocating the entire purok is also recommended.

Photos show houses of Purok 11 Sitio Mahayahay which is rated moderate to landslide. The purok is underlain with limestone and is susceptible to sinkhole. Observe for presence of mass movements and prohibit future settlement at the ridge edges and foot of slopes. Also observe for ground depressions possibly indicating a presence of sinkholes.

Photo above is Purok 12 which is located close to the Awao River and is rated moderate to flooding. Observe for abnormalities in the water level along the river and pre-emptive evacuation is recommended during extreme weather events. Also prohibit future settlement towards the river embankments.

Houses of Purok 13 Sitio Tagbayog are rated moderate to high to landslide due to moderate to steep slopes where the purok is located. Observe for presence of mass movements and pre-emptive evacuation is recommended during extreme weather events. Also develop an early warning system regarding landslide and prohibit settlement directly located at the foot of slopes.

Photo above is a portion of the Awao River near the steel bridge which flooding to the most of the puroks of the barangay ususally starts. Recommend a flood protective structure to mitigate or if not lessen the impact of flooding in the barangay. GPS coordinates 07°58' 02.4"N/ 126°00'11.5"E



Locaton of Barangay Awao via Google Earth Satellite Imagery. GPS coordinates 07°58'03.9"N/126°00'02.0"E

BRGY.CONCEPTION

Photos are Purok 1 which is moderate to flooding due to the Awao River overflow. Pre-emptive evacuation is recommended if abnormalities in the water level in the river are observed or if unusual flooding is experienced. For long term solution, relocating the purok to a much safer site is recommended

Photos are portions of Purok 2 which is affected by moderate to high flooding due to Awao River overflow. Pre-emptive evacuation is recommended if abnormalities in the water level in the river are observed or if unusual flooding is experienced. For long term solution, relocating the purok to a much safer site is recommended.

Photos are areas in Purok 3. The purok is rated moderate to high to flooding. Flooding is caused by the Awao river overflow during extreme weather events. Recommend pre-emptive evacuation if abnormalities in the water level at the river is observed. For long term solutions, relocating the entire purok is recommended.

The photos are Purok 4 which experiences moderate to high flooding. Observe for rapid increase/decrease of water level at the Awao River and pre-emptive evacuation is advised during inclement weather conditions. For long term solution, relocating the entire purok is recommended.

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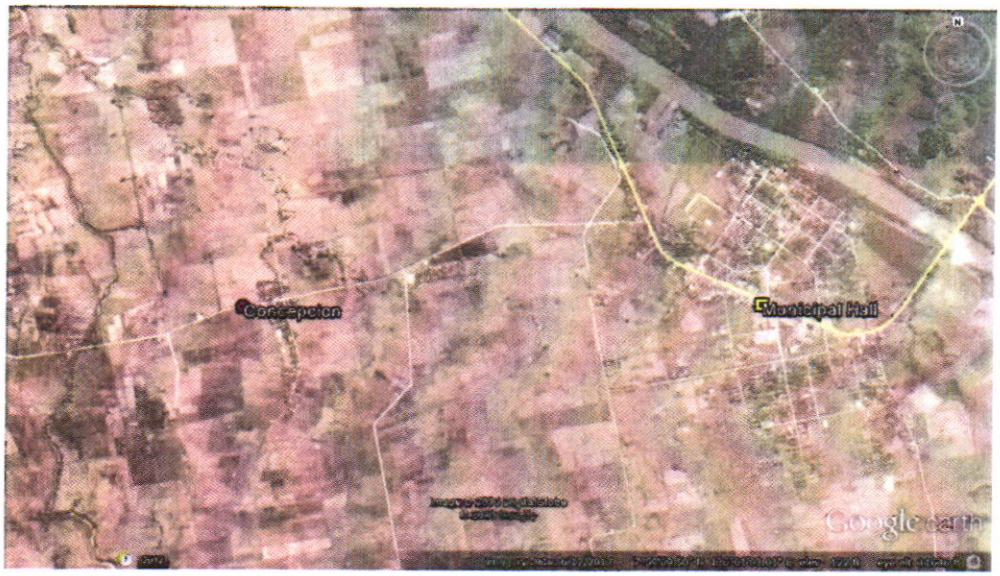
Photo above is Purok 5 which experiences high flooding. Pre-emptive evacuation is advised during inclement weather conditions. For long term solution, relocating the entire purok is recommended.

Photo is a panoramic view of Purok 6 which is not affected by flooding from the Awao River. Pre-emptive evacuation during inclement weather conditions is advised.



Location of Barangay Concepcion via Google Earth Satellite Imagery. GPS coordinates 07°59'07.1"N/126°00'28.5"E

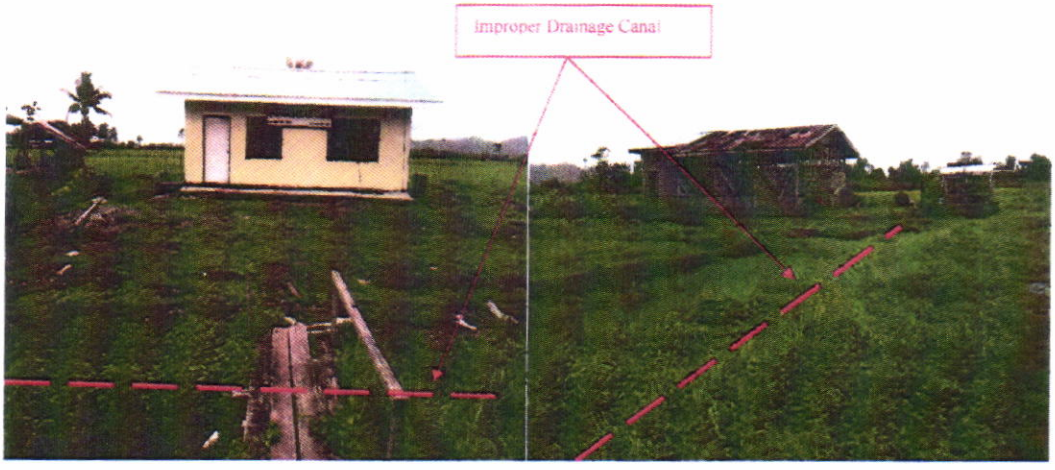


Fig. 1 Improper drainage canals were noted at Purok 1, Brgy. Pag-asa, Sta. Josefa, ADS. Daycare Center and Church buildings are situated within the flood-prone section. GPS reading is 8°04'36.2"-N/ 126°00'02.8"-E and 8°04'35.9"-N/126°00'05.6"-E, respectively.

Fig. 2 The Barangay Hall is moderately damaged and completely damaged building of Barangay Multi-purpose by typhoon "Pablo" were observed at Purok 1. GPS reading is 8°04'37.2"-N/ 126°00'01.4"-E and 8°04'36.8"-N/126°00'01.9"-E, respectively. Flood rating is moderate.

Fig. 3 Construction of concrete drainage canals are highly recommended at San Vicente Elementary School of Purok 1. GPS reading is 8°04'34.7"-N/126°00'02.2"-E.

Fig. 4 These sections of Purok 1 are highly recommended for concreting drainage canals.

Fig. 5 Concreting of road and drainages are highly recommended at Purok 2. GPS reading is 8°04'45.5"-N/126°00'00"-E.

Fig. 6 Local residents are resided along NIA Irrigation canal at Purok 2. Road and NIA Irrigation canals are highly for concreting.

Fig. 7 No concrete road and no concrete drainage canal were noted at Purok 3. GPS reading is 8°04'59.3"-N/125°59'59.9"-E.

Fig. 8 Wooded bridges are main access across Lukad River. Construction of proper concrete bridge across Lukad River is highly recommended. GPS reading is 8°05'11.8"-N/126°00'17"-E.

Fig. 9 Trail is main access toward Purok 4 from the barangay road which is parallel to the Lukad River. Proper road-piloting is highly recommended.

Fig. 10 Most of the local residents of Purok 4 are located along Lukad River embankment which is prone to flooding and river-scouring. GPS reading is 8°04'55.4"-N/126°00'24.2"-E.

Fig. 11 Geographic location of Purok 5 situated along NIA Irrigation drainage canal or within the flood-prone section. GPS reading is 8°05'26.1"-N/126°00'00.3"-E.

Fig. 12 No proper drainage canals and no concrete road were observed at Purok 6. Construction of concrete drainage canals and concrete roads are highly recommended. GPS reading is 8°04'10.1"-N/126°00'48.5"-E.

Fig. 13 Construction of proper concrete drainage canals is highly recommended at this school campus of Malipayon Elementary School of Purok 6. GPS reading is 8°04'08.3"-N/126°00'50.7"-E.

Fig. 14 Deepening, widening and de-clogging is highly recommended on this drainage canal or RCP culvert of Purok 6. GPS reading is 8°04'07.3"-N/126°00'49.7"-E.

Fig. 15 Embankment concreting and rechanneling are highly recommended along Magabid Creek. Prohibit settlement along creek/river embankment should be implemented.

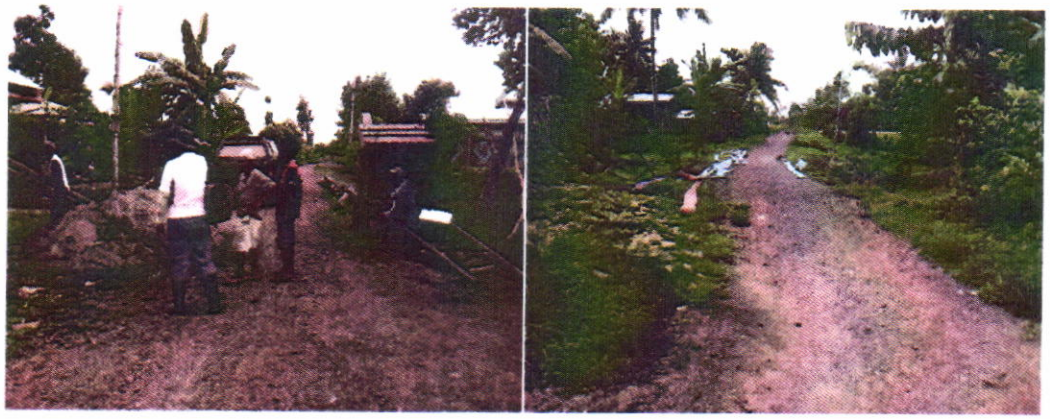


Fig. 16 No concrete drainage road and no drainage canal at Purok 7. GPS reading is 8°04'03.6"-N/126°00'48.3"-E.

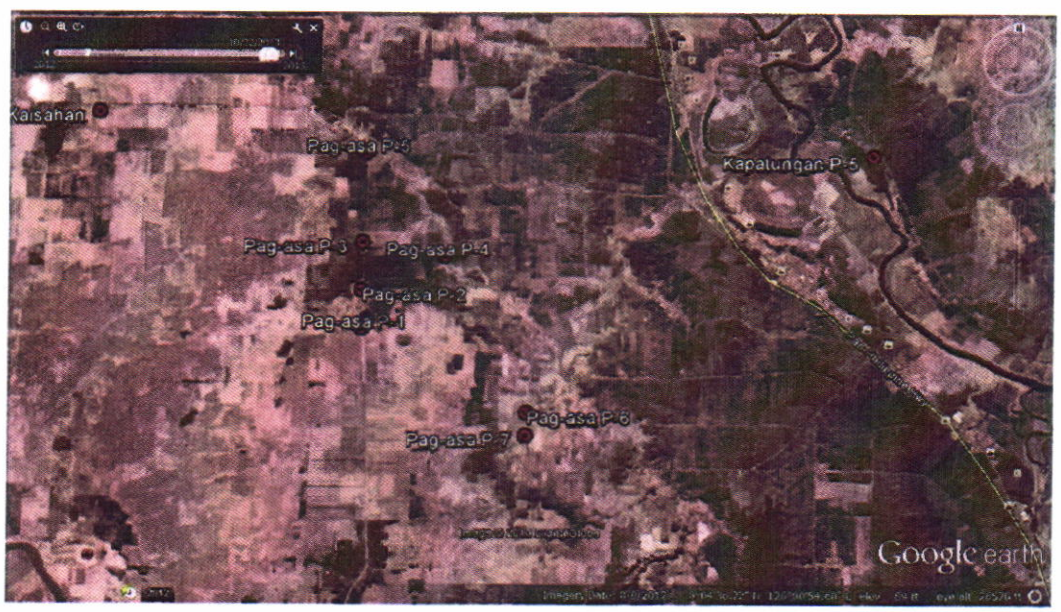


Fig. 17 Geographic location of Brgy. Pag-asa, Sta. Josefa, ADS with their puroks/sitios based on Google Earth 2013. General geohazard on the area is flooding and liquefaction.

Fig. 1 Geographic location of Sitio Lilo, Brgy. Patrocinio, Sta. Josefa, ADS. It is situated along Agusan River embankment which is prone to river-flooding, flash-flood and river-scouring. Total relocation is highly recommended. GPS reading is 7°57'17"-N/126°03'20.7"-

Fig. 2 Panoramic-view of Sitio Lilo looking SW direction.

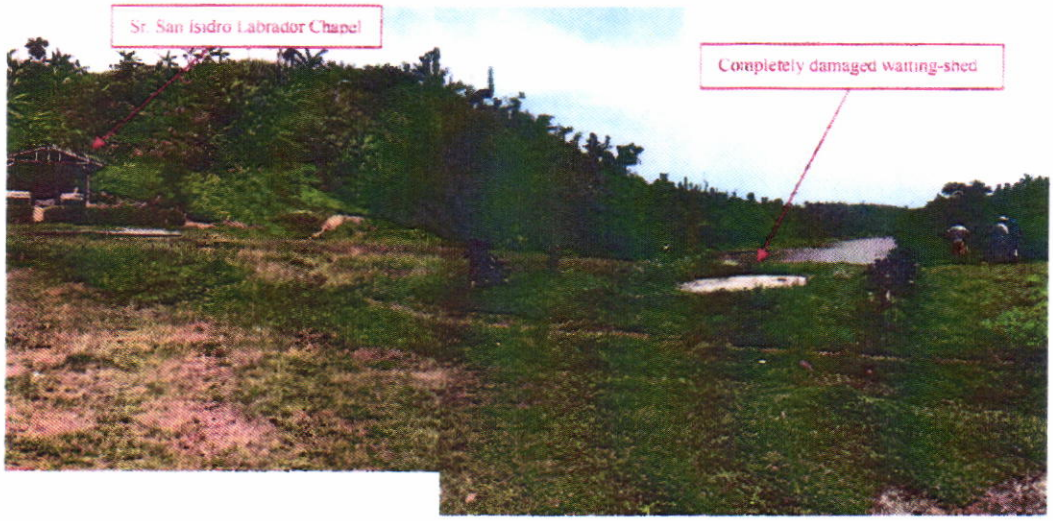


Fig. 3 Sitio Lilo waiting-shed is completely damaged by typhoon "Pablo" and Sr. San Isidro Labrador Chapel is prone to landslide.

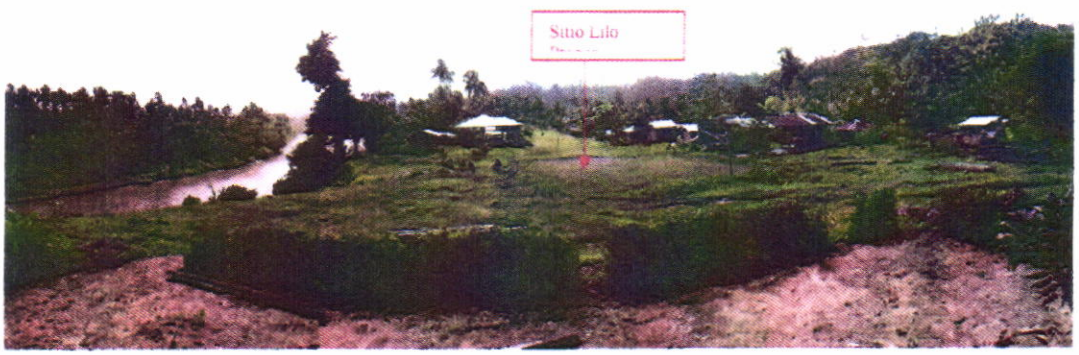


Fig. 4 Closer panoramic-view of Sitio Lilo proper situated along Agusan River embankment.

Photos are portions of Purok 1 which is characterized with gentle to moderately steep slopes and is rated moderate to landslide. Observe for presence of mass movements and prohibit future settlement at the foot of slopes. Proper concrete drainage canals are also recommended to facilitate surface run-off during heavy precipitation.

Photos are Purok 2 which is located near the Agusan River. Observe for the water level along Agusan River especially during inclement weather conditions. Pre-emptive evacuation is advised if unusual water level along the river is observed. Also, prohibit future settlement at the river embankments. Conduct regular maintenance on existing canals and installation of drainage canals to the other portions of the purok is recommended.

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Proper concrete drainage canals are recommended to be installed at Purok 3 to facilitate surface run-off especially during heavy rainfall.

Photo above shows the proximity of some houses at Purok 3 to the Agusan River. According to the residents, Agusan River overflow does not reach the purok but only levels at its embankments. Prohibit future settlement towards and along the Agusan River embankments. Vigilance of residents closest to the river is recommended especially during extreme weather

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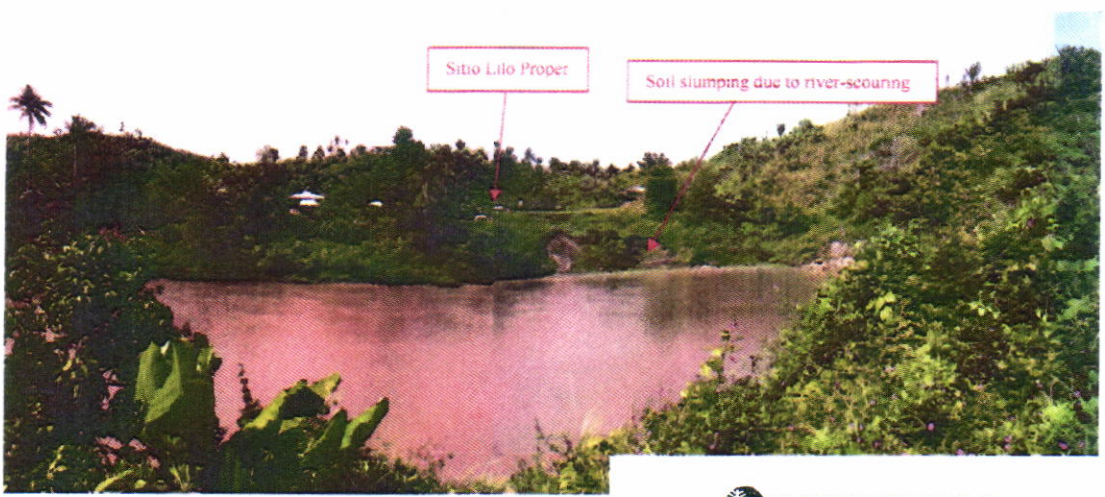
Photos above are houses of Purok 4 which are low to moderate to landslide. Provision of concrete drainage canals at the purok is recommended to facilitate surface run-off.

Photos are Purok 5. Installation of concrete drainage canals at the purok is recommended to facilitate surface run-off.

The creek on the above photo is the Mahaba Creek which traverses at Purok 6 Magalibobo and causes flooding up to waist-level at the purok since the existing culvert (close-up at right photo) could not cater too much volume of water during heavy rainfall. Replacing the existing culvert into box-type culvert is recommended to address the problem. GPS coordinates 07°59'48.9"N/126°03'42.3"E



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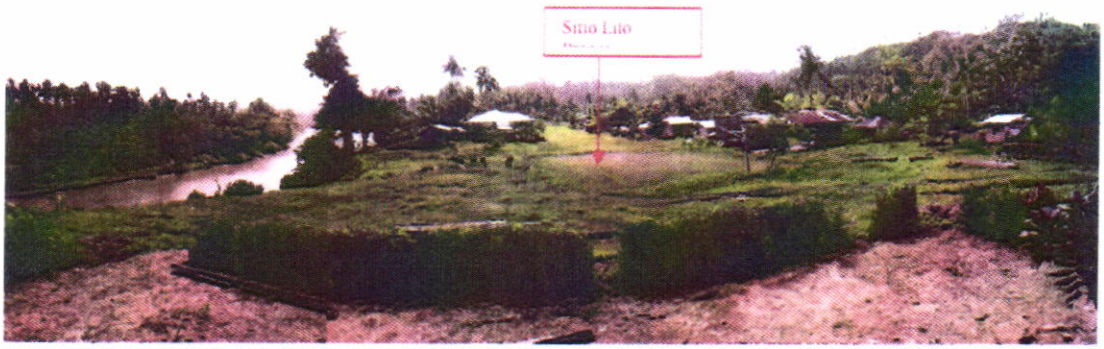
Sitio Lilo waiting-shed is completely damaged by typhoon "Pablo" and Sr. San Isidro Labrador Chapel is prone to landslide.



Closer panoramic-view of Sitio Lilo proper situated along Agusan River embankment.

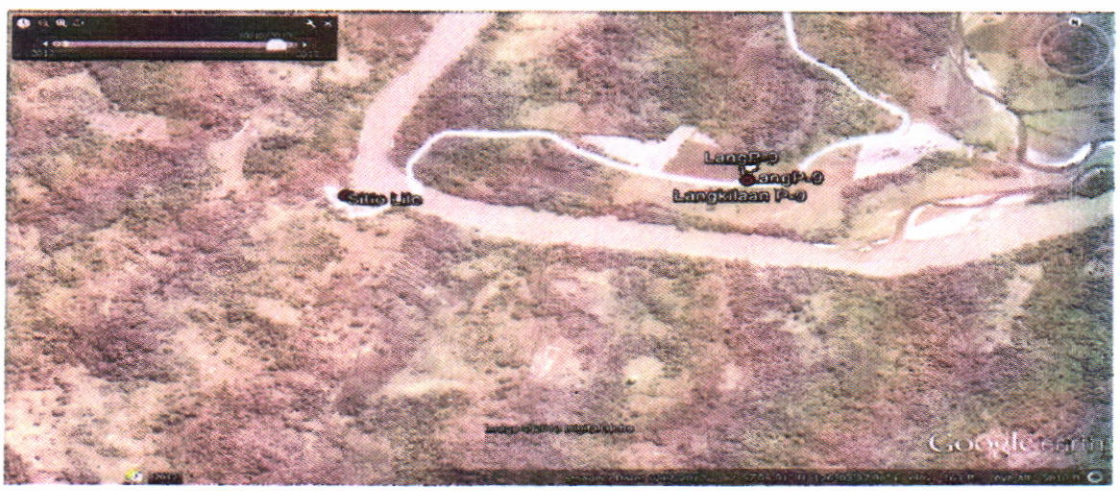
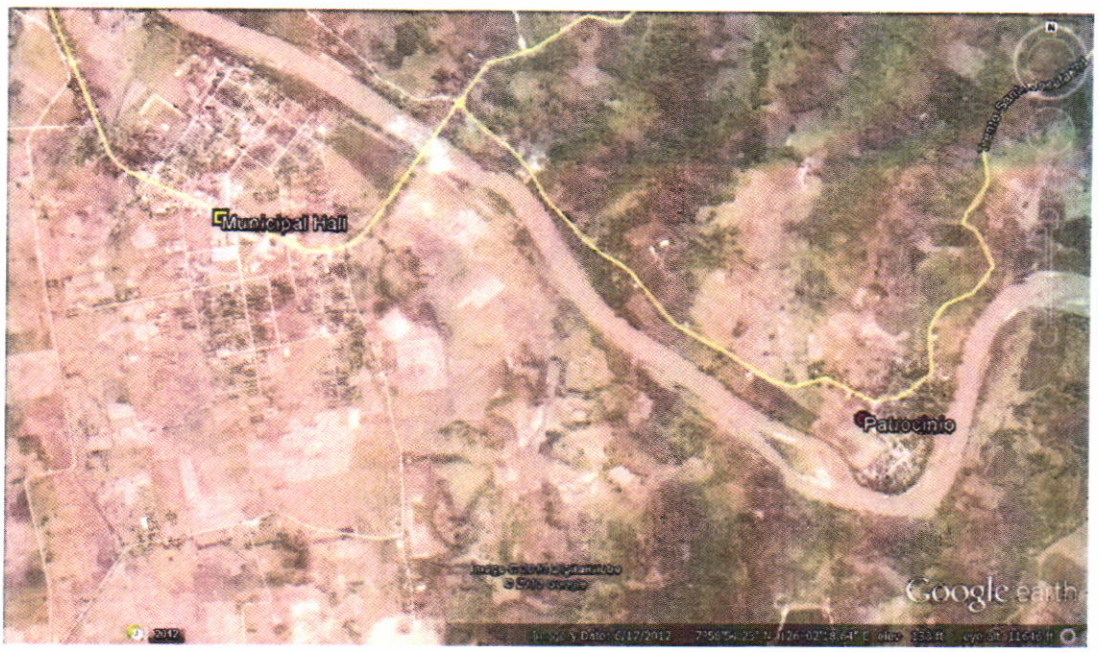


Fig. 1 Geographic location of Sitio Lilo, Brgy. Patrocinio, Sta. Josefa, ADS. It is situated along Agusan River embankment which is prone to river-flooding, flash-flood and river-scouring. Total relocation is highly recommended. GPS reading is 7°57'17"-N/126°03'20.7"-E.

Photo above is Purok 8 Sitio Lemon which houses are located at the top ridge along the calamansi farmland and are moderate to landslide. Recommend to observe for presence of mass movements and prohibit future settlement at the ridge edges and at the foot of slopes.

Photo is Purok 9 Sitio Marang which is rated moderate to landslide. Observe for presence of mass movements and prohibit future settlement at the ridge edges and at the foot of slopes.

Photo is Purok 10 Sitio Bacilisi which is close to the Agusan River. Recommend to observe for rapid increase/decrease of water level along the river. Pre-emptive evacuation is recommended if abnormalities in the water level of the river are observed.



Location of Barangay Patrocinio via Google Earth Satellite Imagery. GPS coordinates 07°58'43.4"N/126°02'57.2"E

BRGY. POBLACION

A view of drainage canal located at the back of Sta. Josefa Nat'l High School at Purok 7B that is recommended to be defined, conducted with regular maintenance and concretized so as to properly facilitate surface run-off at the area.

RCP culvert located at Purok 7A that needs to be conducted with regular maintenance to properly drain-out floodwaters from the area.

A view o of RCP culvert located at Purok 4 that seems to be inadequate in draining the water from the area. Replacing the existing culvert into a sufficient culvert and defining its outlet is recommended.

Some examples of existing drainage canals of Brgy. Poblacion located at Purok 9, 9A, 7B and 6(photos in clockwise direction) that need to be improved.

Satellite image of Brgy. Poblacion with a GPS image of: N 7° 59' 16.9"/ E 126°

A view of the school grounds of San Jose Elem. School that is recommended to be provided with concrete line canal. Also being shown is the damaged school building due to Typhoon Pablo.

Closer view of the damaged school building of San Jose Elem. School located at Purok 3.

Barangay road located at Purok 5 that is recommended to be improved for evacuation and quick response.

Houses located along the Agusan riverbank at Purok 4 that are subject for relocation since they are directly vulnerable to flashflood and river scouring.

Satellite image of Brgy. San Jose with a GPS reading of: N 8° 00' 16.4"/ E 125° 59' 59.1".

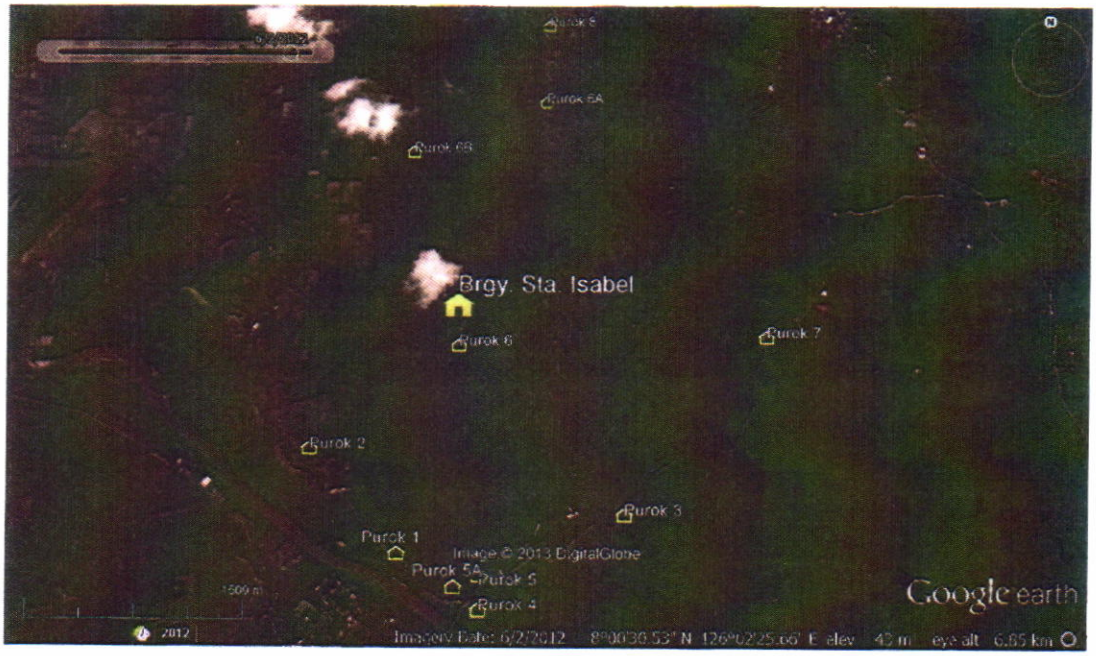
BRGY. STA. ISABEL

Photo showing the remaining part of an old and damaged bridge that obstructs the flow of Agusan River, causing river scouring on a riverbank located at Purok 1. Removing the obstruction is recommended.

A double-barrel RCP located at Purok 8 that is recommended to be replaced into box-type culvert so as to sufficiently facilitate surface run-off at the area.

A view showing the Tadeco canal located downstream of the double barrel RCP at Purok 8. Defining and clearing the obstructions at the canal as well as conducting regular maintenance are recommended so as to prevent its overflow.

Houses located at Purok 7 that has a high landslide susceptibility rating.



Satellite image of Brgy. Sta. Isabel with a GPS reading of: N 8° 00' 35.4"/ E 126° 01' 57.2".

BRGY. SAYON

Photos showing the meandering segments of Sayon creek traversing across Puroks 1, 2, 3, 4 and 5 and that also causes major flooding and in the areas. One of the recommendations is to rechannel this creek.

A creek located at Purok 7 that floods nearby houses when it overflows. Rechanneling the creek is also recommended.

Flood height at Sayon Elem. School located at Purok 2 that approximately reached up to 0.5 meters due to a flashflood event from Sayon creek during Typhoon Pablo.

School grounds of Sayon Elem. School (left photo) and Sta. Josefa Nat'l High School (Annex) (right photo) that are recommended to be provided with proper drainage system to prevent ponding of water at the area and to properly facilitate surface run-off.

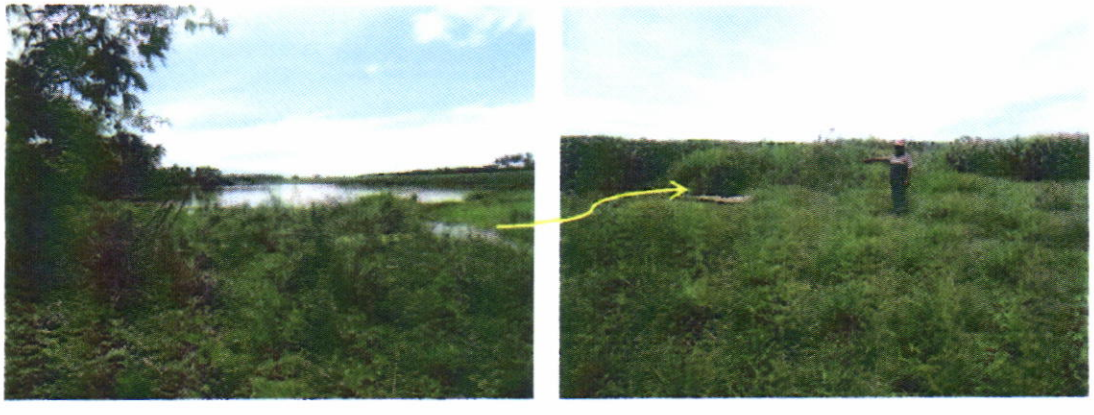
Houses located on the ridge at Purok 9 which is highly susceptible to landslide. For long term solution, relocation of houses on the edge of the ridge is recommended since they are at risk for a possible landslide occurrence.

Top view of the houses at Purok 8 Tagmanuro located at the foot slope which is rated to be moderately susceptible to landslide.

Satellite image of Brgy. Sayon with a GPS reading of: N 7° 59' 04.2"/ E 125° 59' 10.0".

A closer view of the satellite image of Sayon Creek traversing across the barangay. GPS reading: N 7° 59' 05.6"/ E125° 59' 06.1".

Photos showing the Tadeco canal (left photo) that sometimes overflow and flood nearby houses. Flood height that approximately reached 0.5 meter was experienced at the area as shown by a resident (right photo).



Photos showing the Kanobahan lake (left photo) and its outlet that needs to be widened and that needs to be defined (right photo) located at Purok 1. According to residents, the overflow of Kanobahan Lake is one of the causes of major flooding on the area during heavy rainfall events.

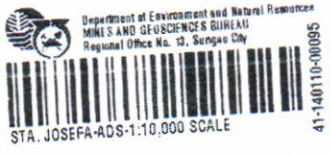
A view of Agusan River located at the barangay proper which is the main cause of flooding at the barangay.

Drainage canal located at Purok 7 Paraiso Nangka which needs to be conducted with regular maintenance.

Tapaz Elem. School located at Purok 3 that needs to be provided with proper drainage system to prevent localized flooding at the area.

Proposed relocation site located at Purok 6 with a GPS reading of N 8° 01' 59.2"/E 125° 59' 39.2".

Satellite image of Brgy. Tapaz with a GPS reading of: N 8° 01' 21.8"/E 125° 59' 33.4".



Republic of the Philippines
Department of Environment and Natural Resources
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Calixto P. Abayato**
Brgy. Captain
Brgy. Angas
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 11, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'30.8"N/126°01'56.1"E
2	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'18.3"N/126°01'58.1"E
3	None	Low	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'12.7"N/126°01'57.6"E
4 (Lower Angas)	Low to Moderate	Low	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located

			at the foot of slope during inclement weather conditions. Prohibit future settlement directly located at the foot of slopes. Observe for rapid increase/decrease on the water level at Angas Creek possibly accompanied with increased turbidity (soil content). Prohibit settlement at the creeks embankments. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'55.8"N/126°02'00.1"E
6 (Sitio Bacilisi)	**Low**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Activate BDCC at all times. Geographic coordinates 07°57'59.1"N/126°02'25.1"E
7 (Sitio Bacilisi)	**Low**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Activate BDCC at all times. Geographic coordinates 07°58'00.2"N/126°02'23.8"E
8 (Sitio Bacilisi)	**Low**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Activate BDCC at all times. Geographic coordinates 07°58'00.7"N/126°02'24.6"E
9 (Sitio Bacilisi)	**Low to Moderate**	**Low**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement directly located at the foot of slopes. Recommend to provide concrete line canals to facilitate surface run-off especially

			during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'00.6"N/126°02'25.8"E
10 **(Sitio Bacilisi)**	**Moderate**	**None**	Monitor and observe for progress of mass movements on the road cut. Observe for other presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report such observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slopes during inclement weather conditions. Prohibit future settlement directly located at the foot of slopes. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Stabilize the reported mass movements present at the purok. Activate BDCC at all times. Geographic coordinates 07°57'58.3"N/126°02'28.5"E
11 **(Sitio Cebuli)**	**Low**	**Low**	Observe for rapid increase/decrease on the water level at Angas Creek possibly accompanied with increased turbidity (soil content). Prohibit settlement at the creeks embankments. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'23.5"N/126°01'54.7"E
12	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes and on the ridge edges. Provide an evacuation site which is safe from landslide and flooding. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°57'27.9"N/126°01'35.7"E
13	**Moderate to High**	**None**	Observe for presence of mass

			movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning system regarding landslide. Prohibit future settlement at the foot of slopes and on the ridge edges. Provide an evacuation site which is safe from landslide and flooding. Residents located at the ridge edges characterized with steep slopes are recommended to be relocated. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°57'27.6"N/126°01'30.4"E
14 (Proper Angas)	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes and on the ridge edges. Provide an evacuation site which is safe from landslide and flooding. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°57'31.2"N/126°01'31.8"E
15 (Sitio Durian)	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'44.8"N/126°01'17.6"E
16 (Sitio Durian)	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'44.0"N/126°01'15.4"E
17 (Sitio Durian)	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site

			which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'42.1"N/126°01'11.5"E
18 (Sitio Dao)	**None**	**Low to Moderate**	Observe for rapid increase/decrease on the water level at the creek traversing the purok possibly accompanied with increased turbidity (soil content). Prohibit settlement at the creeks embankments. Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times. Geographic coordinates 07°57'48.4"N/126°00'40.3"E
19 (Sitio Dao)	**None**	**Low to Moderate**	Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times. Geographic coordinates 07°57'51.0"N/126°00'34.4"E
20 (Sitio Dao)	**None**	**Low to Moderate**	Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times. Geographic coordinates 07°57'51.4"N/126°00'37.4"E
21 (Sitio Dao)	**None**	**Low to Moderate**	Develop an early warning system regarding flooding thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced.

			Provide an evacuation site which is safe from landslide and flooding. Recommend to conduct regular maintenance on the existing drainage canals. Concrete line canals are also recommended. Activate BDCC at all times. Geographic coordinates 07°57'51.8"N/126°00'40.0"E
22	**None**	**Moderate to High**	Observe for rapid increase/decrease on the water level at Hinalinan Creek possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Prohibit settlement at the creeks embankments. Pre-emptive evacuation is recommended if storm signal warnings are raised or unusual flooding is experienced. Provide an evacuation site which is safe from landslide and flooding. For long term solutions, relocating the entire purok is recommended. Activate BDCC at all times. Geographic coordinates 07°58'32.0"N/126°01'25.1"E
23	**None**	**Low**	The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'34.0"N/126°01'37.0"E
24	**Low**	**Low**	The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'13.1"N/126°01'28.3"E
25	**None**	**Low**	Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°58'24.8"N/126°01'58.7"E
26 (Sitio Durian)	**Low**	**Low**	Recommend proper drainage canals to facilitate surface run-off during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. Activate BDCC at all times. Geographic coordinates 07°57'39.2"N/126°01'24.1"E
Proposed Relocation Site (Purok 13) Site 1- 07°57'27.6"N/			The proposed relocation sites are subject for detailed mapping and/or The proposed relocation site is subject for detailed mapping and/or Geohazard Identification Report

126°01'31.3"E Site 2- 07°57'26.6"N/ 126°01'28.3"E			(GIR).

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authority of the OIC, MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Leader

Received by: CRISTO P. ABAYATO

PRINTED NAME **SIGNATURE**

Date: 01-15-2014

Republic of the Philippines
Department of Environment and Natural Resources
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Glen M. Plaza**
Brgy. Captain
Brgy. Aurora
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 12, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low	Provide concrete line canals.
2	None	Low	Provide concrete line canals. Provide concrete line canals at Aurora Elem. School and at Aurora Nat'l High School.
3	None	Moderate; partly high	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the riverbanks. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Provide proper drainage canals.
4	None	Moderate with High portion at the boundary near Purok 5	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the riverbanks. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed

			boat, pump boat or out board) for immediate response. Elevate the road, define and deepen existing drainage canals and replace RCP into box-type culvert at the boundary between Purok 4 and 5.
5	None	**Low with High portion at the boundary near Purok 4**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the riverbanks. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Elevate the road, define and deepen existing drainage canals and replace RCP into box-type culvert at the boundary between Purok 4 and 5.
6	None	Low	Define and deepen existing drainage canals.
7	None	Low	Define and deepen existing drainage canals.
8 (Kaangayan 1)	None	Low	Define and deepen existing drainage canals.
9 (Kaangayan 1)	None	Low	Define and deepen existing drainage canals.
10 (Kaangayan 1)	None	Low	Define and deepen existing drainage canals.
11 (Kaangayan 1)	None	Low	Define and deepen existing drainage canals and also conduct regular maintenance on drainage canals near Kaangayan Primary School.
12 (Kaangayan 2)	None	Moderate	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Lucad Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Elevate barangay road. Provide proper drainage canals.
13 (Kaangayan 2)	None	Moderate	Develop an early warning system

			and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Buhanginon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Provide proper drainage canals. Rechannel Buhanginon creek. Elevate barangay road. Provide additional box-type culvert.
14 (Kaangayan 2)	**None**	**Moderate with High portion along the Buhanginon creek banks**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Buhanginon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Buhanginon creek. Elevate barangay road. Relocate all houses and prohibit future settlement and construction of new structures at or near the creek banks.
15 (Kaangayan 2)	**None**	**Moderate**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Lucad Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. At Pag-asa Elem. School, elevate the school grounds, concretize existing canal and define its outlet. Also, provide proper drainage system at the school.

			Remove obstructions (e.g. access road, plants and structure like culvert) under Lucad Bridge. Realign and elevate barangay road. Provide protective structure on Lucad Creek. Rechannel Lucad creek.

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authority of the OIC,MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Member

Received by: RODOLFO P. OLAJAY

Date: 01-16-2014

Republic of the Philippines
Department of Environment and Natural Resources
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Roberto R. Buntas**
Brgy. Captain
Brgy. Awao
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 14, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	High	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. A flood protective structure is also recommended to install along Awao River where flooding usually starts from near the steel bridge (07°58' 02.4"N/126°00'11.5"E). Proper concrete drainage canals are also recommended to install. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'05.0"N/126°00'02.6"E
2	None	High	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended

			during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'07.2"N/126°00'01.5"E
3	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Proper concrete drainage canals are also recommended to install. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°57'44.0"N/125°59'42.8"E
4	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Proper concrete drainage canals are also recommended to install. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°57'56.3"N/126°00'21.3"E
5	**None**	**Low**	Provision of evacuation sites which is

			safe from landslide and flooding is highly recommended. Activate BDCC at all times. Geographic coordinates 07°58'20.1"N/126°00'19.6"E
6	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Proper drainage canals are recommended to facilitate surface run-off. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'01.8"N/125°59'32.7"E
7	**Low to Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend proper drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'36.7"N/125°59'11.9"E
8	**Moderate to High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot

			of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend proper drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'36.3"N/125°58'48.1"E
9 (Sitio Agda)	**High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. For long term solution, relocating the residents located at the ridges with very steep slopes is recommended. Activate BDCC at all times. Geographic coordinates 07°57'11.5"N/125°57'59.2"E
10 (Sitio Kayakalan)	**High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. For long term solution, relocating the entire purok is recommended. Activate BDCC at all times. Geographic coordinates 07°56'39.0"N/125°57'40.9"E
11 (Sitio Mahayahay)	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned

			municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend proper drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'05.4"N/125°57'40.9"E
12	**None**	**Moderate**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°57'31.9"N/126°00'06.8"E
13 **(Sitio Tagbayog)**	**Moderate to High**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Develop an early warning sign regarding landslide. Prohibit future settlement at the foot of slopes and ridge edges. Provision of evacuation site which is safe from landslide and flooding is recommended. Pre-emptive evacuation during inclement weather conditions is recommended. Recommend to install proper concrete drainage canals to facilitate surface run-off. Activate BDCC at all times. Geographic coordinates 07°57'16.7"N/125°58'50.3"E

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authiroty of the OIC, MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Leader

Received by: ROBERTO R. BUNTAS ~~SALVADOR P. ABAYATA JR~~

PRINTED NAME **SIGNATURE**

Date: 01-15-2014

Republic of the Philippines
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Robert P. Espiton**
Brgy. Captain
Brgy. Conception
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 15, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Moderate	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'12.1"N/126°00'29.4"E
2	None	Moderate to High	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level

			along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'07.8"N/126°00'28.8"E
3	**None**	**Moderate to High**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'07.6"N/126°00'28.2"E
4	**None**	**Moderate to High**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long

			term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'59.7"N/126°00'30.6"E
5	**None**	**High**	Observe for rapid increase/decrease of water level along the Awao River possibly accompanied with increased turbidity (soil content). Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. Conduct regular maintenance on the existing drainage canals to facilitate surface run-off more sufficiently. For long term solutions, relocation of the entire purok is recommended. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'15.6"N/126°00'45.1"E
6	**None**	**Low**	Develop an early warning system thru periodic conduct of evacuation drills. Pre-emptive evacuation is recommended during inclement weather conditions or if abnormalities in the water level along creeks/rivers are observed; thus, provision of evacuation sites which is safe from landslide and flooding is highly recommended. Prohibit future settlement along creeks/rivers embankments. The barangay is recommended to acquire rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°59'36.2"N/126°01'08.0"E

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authiroty of the OIC, MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Leader

Received by: Robert P Espiton _____

PRINTED NAME **SIGNATURE**

Date: 01-15-14

Republic of the Philippines
Department of Environment and Natural Resources
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Fe L. Intoy**
Brgy. Pag-asa
Sta. Josefa Municipality
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 and flood hazard assessment in your barangay on October 6, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**None**	**Moderate**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 1 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'34.5"-N/126°00'00"-E.
2	**None**	**Moderate**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and

			construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 2 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'45.5"-N/126°00'00"-E.
3	**None**	**Moderate**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 3 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS

			reading is 8°04'59.3"-N/126°59'59.9"-E.
4	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 4 situated along Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'55.4"-N/126°00'24.2"-E.
5	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are

			highly recommended for rapid evacuation. Geographic location of Purok 5 is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°05'26.1"-N/126°00'00.3"-E.
6 Malipayon	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 6 "Malipayon" is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'10.1"-N/126°00'48.4"-E.
7 Malipayon	**None**	**High**	The area is underlain by recent alluvial deposits; Construct proper concrete drainage canals and concrete road on this area to facilitate surface run-off ; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses

			situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the time for quick response during emergency; Acquisition of mobile dump trucks and rubber boats are highly recommended for rapid evacuation. Geographic location of Purok 7 "Malipayon" is adjacent to Lukad River. Concreting of the river-banks and re-channeling are highly recommended. GPS reading is 8°04'03.6"-N/126°00'48.3"-E.

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authority of the OIC, MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Leader

Received by: Virgilio N. Alongagay Jr.

PRINTED NAME **SIGNATURE**

Date: 01. 15 14

Republic of the Philippines
Department of Environment and Natural Resources
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Cesar L. Pulido**
Brgy. Patrocinio
Sta. Josefa Municipality
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 and flood hazard assessment in your barangay on October 16, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes. Recommend to provide concrete line canals to facilitate surface run-off especially during heavy precipitation. Provision of evacuation site which is safe from landslide and flooding is also recommended. Activate BDCC at all times. Geographic coordinates 07°58'53.9"N/126°03'00.5"E
2	**None**	**Low to Moderate**	Observe rapid increase/decrease of water level along Agusan River possibly accompanied with increased turbidity (soil content). Vigilance of residents near the Agusan River is advised during inclement weather conditions. Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. The barangay should provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is advised if abnormalities in the water level along the Agusan River are observed especially during extreme weather events. Prohibit

			future settlement directly located at the Agusan River embankments. Rechanneling of the Agusan River is also recommended. Proper drainage canals are recommended to facilitate surface run-off especially during heavy precipitation. The barangay should provide rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'45.7"N/126°02'58.0"E
3	**None**	**Low to Moderate**	Observe rapid increase/decrease of water level along Agusan River possibly accompanied with increased turbidity (soil content). Vigilance of residents near the Agusan River is advised during inclement weather conditions. Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. The barangay should provide an evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is advised if abnormalities in the water level along the Agusan River are observed especially during extreme weather events. Prohibit future settlement and construction of classrooms or school site expansion at Patrocinio Elementary School towards the Agusan River. Rechanneling of the Agusan River is also recommended. Proper drainage canals are recommended to facilitate surface run-off especially during heavy precipitation. The barangay should provide rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'41.8"N/126°02'56.5"E
4	**Low to Moderate**	**Low**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement at the foot of slopes. Prohibit settlement at the river embankments. Prohibit future settlement and construction of classrooms or school site expansion at Patrocinio Elementary School towards the Agusan River. Proper drainage canals are recommended to

			facilitate surface run-off especially during heavy precipitation. The barangay should provide an evacuation site which is safe from landslide and flooding. The barangay should provide rubber boats and/or mobile trucks for rescue operation purposes. Activate BDCC at all times. Geographic coordinates 07°58'49.0"N/126°02'53.1"E
5	**None**	**Low**	Recommend to provide proper concrete line canals to facilitate surface run-off especially during heavy precipitation. Provision of an evacuation site which is safe from landslide and flooding is also recommended. Activate BDCC at all times. Geographic coordinates 07°59'03.5"N/126°02'25.1"E
6 **(Magalibobo)**	**Low**	**High**	Observe for rapid increase/decrease of water level along Mahaba Creek possibly accompanied with increased turbidity (soil content) especially during extreme weather events. Develop an early warning system. Pre-emptive evacuation is recommended during typhoons or if unusual flooding is experienced. Prohibit future settlement at the creek embankments and foot of slopes. Provision of evacuation site which is safe from landslide and flooding is also recommended. Recommend to replace existing RCP culverts along Mahaba Creek to box-type to accommodate more volume of water especially during heavy precipitation. Activate BDCC at all times. Geographic coordinates 07°59'48.9"N/126°03'42.3"E
7 **(Lilo)**	**High; Very High**	**high**	The area is underlain by highly weathered/fractured tuffaceous sandstone-siltstone-shale interbeds; Identify and construct permanent evacuation site which is safe from flooding and landslide; Prohibit settlement along intermittent/perennial creeks/rivers should be implemented which is prone to flooding; Observed for sunken or displaced road surfaces; Develop an early warning (e.g., signages) at (for critical areas only) on steep-slopes where houses situated foot-slopes; Prohibit settlement directly located on foot-slopes; Develop an early warning device/system; Activate BDCC all the

			time for quick response during emergency. Geographic location of Purok 7 "Lilo" situated along Agusan River embankment which is prone to flooding and flash-flood. Some houses are located foot-slopes. River-bank soil slumping due to scouring is common features on the area. Total relocation of the entire Purok is highly recommended. GPS reading is 7°57'16.8"-N/125°03'20.5"-E.
8 (Sitio Lemon)	**Generally Moderate to High; portion Very High at the recent landslide scarp along National Road**	**None**	Monitor for progress of mass movement at the recent landslide incident along the national road (GPS coordinates 08°00'02.5"N/126°03'00.7"E). Observe for other presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement directly at the foot of slopes and ridge edges with very steep slopes. Provision of an evacuation site which is safe from landslide and flooding is also recommended. Houses located close to the identified landslide and located on steep slopes are advised for relocation and future settlement should be prohibited. Retaining walls are also recommended to stabilize slopes along road cuts and on the identified landslide. Conduct regular maintenance on existing drainage canals along the highway. Activate BDCC at all times. Geographic coordinates 08°00'02.0"N/126°03'05.9"E
9 (Sitio Marang)	**Moderate**	**None**	Observe for presence of mass movements (e.g. landslide, tension cracks). Observe for saturated grounds or seeps. Report observations to the concerned municipal authorities or to the MGB; for vigilance of the residents located at the foot of slope during inclement weather conditions. Prohibit future settlement directly at the foot of slopes and ridge edges with very steep slopes. Provision of an evacuation site which is safe from landslide and flooding is also recommended. Activate BDCC at all

			times. Geographic coordinates 07°59'42.2"N/126°03'29.5"E
10 **(Sitio Bacilisi)**	**Low**	**Low to Moderate**	Observe rapid increase/decrease of water level along Agusan River possibly accompanied with increased turbidity (soil content). Vigilance of residents near the Agusan River is advised during inclement weather conditions. Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. The barangay should provide evacuation site which is safe from landslide and flooding. Pre-emptive evacuation is advised if abnormalities in the water level along the Agusan River are observed especially during extreme weather events. Prohibit future settlement directly located at the Agusan River embankments. Activate BDCC at all times. Geographic coordinates 07°58'12.0"N/126°02'49.4"E

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

For and in the absence of the Regional Director:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Member

Received by: CESAR L. PULIDO

PRINTED NAME **SIGNATURE**

Date: JAN. 22, 2014

"MINING SHALL BE PRO-PEOPLE AND PRO-ENVIRONMENT
IN SUSTAINING WEALTH CREATION AND IMPROVED QUALITY OF LIFE."

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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Carpin M. Plaza Jr.**
Brgy. Poblacion
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 10, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	**Low but prone to scouring**	Provide proper drainage canals. Prohibit further settlement and construction of new establishments at/near the banks of Agusan River.
2	None	Low	Provide proper drainage canals.
3	None	Low	Provide proper drainage canals.
4	None	Low	Provide proper drainage canal. Provide sufficient culvert and provide define outlet of Binagyohan creek.
5	None	Low	Provide proper drainage canals.
6	None	Low	Provide proper drainage system
7	None	Low	Provide proper drainage canals. Elevate barangay road.
7A	None	**Low; partly high due to still on-going NIA irrigation project**	Provide proper drainage canals and drainage outlet. Continue the drainage canal near NIA and provide drainage outlet. To request the Municipal LGU to organize a consultation with NIA to address the concern of the barangay on flooding in their area.
7B	None	Low	Provide proper drainage canals. Define, concretize and clear the obstructions at drainage canal at the back of Sta. Josefa Nat'l High School
8	None	Low	Provide proper drainage canals.
9	None	Low	Provide proper drainage canals on other parts of this purok.
9A	None	**Low; partly high due to still on-going NIA irrigation project**	Provide proper drainage canals and drainage outlet. Continue the drainage canal near NIA and provide drainage outlet. To request the Municipal LGU to organize a consultation with NIA to address the concern of the barangay on flooding in their area.

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By Authority of the OIC,MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Member

Received by: RODOLFO P. OLAJAY

Date: 1-16-2014

Republic of the Philippines
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Nelson B. Duno**
Brgy. San Jose
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 16, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low	Provide proper drainage system.
2	None	Low	Provide concrete line canal.
3	None	Low	Provide concrete line canal at the area and at San Jose Elem. School
4	None	High (prone to flashflood and river scouring)	Prohibit future settlement and construction of new establishments at/near the Agusan riverbanks. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Relocate all the houses on this Purok.
5	None	Low	Improve barangay road as an evacuation route towards Nat'l Highway.
6	None	Moderate to High	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Binongahan creek and Agusan River's water levels and flows during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek and river. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Provide concrete line canal and proper drainage outlet.
7	None	Low with High	Develop an early warning system

		portion near Binongahan creek	and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Binongahan creek and Agusan River's water levels and flows during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek and river. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. For long term solution, relocate houses near Binongahan creek and Agusan River that are greatly affected by flooding.

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authority of the OIC, MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Leader

Received by: _____ _____

PRINTED NAME **SIGNATURE**

Date: 01/15/14

Republic of the Philippines
Department of Environment and Natural Resources
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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Artur Gumban**
Brgy. Captain
Brgy. Sta. Isabel
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 17, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	Low but prone to river scouring at Agusan River	Remove the remaining parts of the damaged overflow bridge at Agusan River.
2	None	Low	
3	Gen. Moderate with High portion near cliff	Low	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition. Prohibit future settlement and construction of new establishments on areas at the cliff, slope and at/near the foot slope. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response.
4	Low	None	
5	Moderate	None	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition. Prohibit future settlement and construction of new establishments on areas at the cliff, slope and at/near the foot slope. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response.
5A	Low	Low	
6	Low	None	
6A	None	Low	

6B	**None**	**Low**	
7	**Moderate**	**None**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for vigilance of residents in areas located near the foot of slope during inclement weather condition. Prohibit future settlement and construction of new establishments on areas at the slope and at/near the foot slope. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response.
8	**None**	**Low with Moderate portions near Lucad creek and Tadeco canal**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Lucad Creek and Tadeco canal's water levels and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new establishments near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Replace existing double barrel RCP into box-type culvert. Rechannel Lucad creek. Define and clear obstructions at the Tadeco canal. Conduct regular maintenance on the creek and Tadeco canal.

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authority of the OIC, MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Leader

Received by: ARTHUR GUMBAN

PRINTED NAME

SIGNATURE

Date: JAN. 15, 2014

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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Pab J. Bangelisan**
Brgy. Captain
Brgy. Sayon
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 12, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	High (prone to flashflood)	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Prohibit future settlement and construction of new establishments near the banks of creek. Elevate provincial road. Rechannel Sayon creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
2	None	High (prone to flashflood)	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate

			response. Rechannel Sayon creek. Prohibit future settlement and construction of new establishments at/near the banks of creek. Provide proper drainage system at Sayon Elem. School. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
3	**None**	**High (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Sayon creek. Prohibit future settlement and construction of new establishments near the banks of creek. Rechannel Sayon creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
4	**None**	**High (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Rechannel Sayon creek. Prohibit future settlement and construction of new establishments near the banks of creek. For long term solution, relocate all houses and establishments at/near the banks of the creek that are greatly affected by flooding.
5	**None**	**Moderate (prone to flashflood)**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Sayon Creek's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation.

			the creek that are greatly affected by flooding.
8 (Tagmanuro)	**Moderate**	**Low**	Observe for presence of mass movement (e.g., landslides, tension cracks). Report situation to the concerned municipal authorities; for

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LANDSLIDE AND FLOOD THREAT ADVISORY

To: **Hon. Delia B. Hiponia**
Brgy. Tapaz
Sta. Josefa Municipality
Province of Agusan del 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 and flood hazard assessment in your barangay on October 18, 2013. The following are the results and recommendations following the assessment:

Purok	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
1	None	High (due to Kanobahan Lake and Agusan River overflow)	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Kanobahan lake and Agusan Rivers's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boat (e.g. speed boat, pump boat or out board) for immediate response. Define and provide box-type culvert and protective structure on a canal outlet. Elevate provincial road. Define and widen outlet of Kanobahan Lake. For long term solution, relocate all houses at/near the Agusan riverbank and Kanobahan Lake that are greatly affected by flooding.
2	None	Low	Provide concrete line canal.
3	None	Gen. Low with High portion near Agusan River	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from

			Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Activate BDCC at all times for quick response. Identify evacuation site that is safe from landslide and flooding. Consider constructing box-type culverts as a drain-out structure on future projects.
9	**None**	**High**	Develop an early warning system and flood preparedness plan thru periodic conduct of evacuation drills. Monitor Agusan River's water level and flow during extreme rainfall events and initiate readiness and if necessary, pre-emptive evacuation. Prohibit future settlement and construction of new structures near the banks of creek. Identify evacuation site that is safe from landslide and flooding. Activate BDCC at all times for quick response. Acquire mobile truck and rescue boats (e.g. speed boat, pump boat or out board). For long term solution, relocate all houses at/near Agusan Riverbanks that are greatly affected by flooding.

Relocation Site	Landslide Susceptibility Rating	Flood Susceptibility Rating	Recommendations
Purok 6 (GPS reading: N 8° 01' 59.2"/E 125° 59' 39.2")	**None**	**Low**	May be suitable as relocation site but it is still subject for further detailed geohazard identification survey.

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 landslide and flood rating could advance (e.g. from low to moderate, moderate to high and high to very high) as mass movement progresses and/or due to changes in the riverine conditions. 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,

By the Authority of the OIC, MMD:

ROMEO M. DALODADO
Chief, GSD
GMAT-MGB Team Leader

Received by: Delia B. Hipolito _____

PRINTED NAME **SIGNATURE**

Date: 1/15/14