APPENDICES

APPENDIX **M**

F/S OF SOCIAL SURVEY

APENDIX M1-1: NGIR-NGIR-PADAS ROAD REHABILITATION

IBNA Pre-Feasibility Study

1. Title and Location

Road Rehabilitation in Barangays Ngingir, and Padas, Municipality of Pagayawan, Lanao del Sur Province

2. Present Situation and Needs

Pagayawan is a municipality in Lanao del Sur Province, with a significant transportation problem due to poor road conditions. The existing road which is approximately 8 kilometers in length starts at the Municipal Hall in Barangay Ngingir and ends in Barangay Padas. This road is an all earth road and severely damaged, which makes it difficult for light passenger vehicles to pass through especially during rainy season.

The road has an average of 3.5 meters width that is difficult for vehicles to maneuver. The road was constructed in 1963 when the municipality of Pagayawan was created. The proposed road rehabilitation project passes three barangays namely, Ngingir, Linindingan, and Padas. Other adjacent barangays, like, Kalaludan, Ilian, and Rangiran would also benefit the project.

The municipality is upland with rolling terrain, favorable climatic conditions and fertile soil suitable for agriculture. The main sources of livelihood are farming of rice and corn, abaca, banana, cassava, coffee, and fruits. Farming areas comprise 70% of the total land area of the municipality.

Farmers experienced very high cost in terms of transportation of their agricultural products due to bad road. During raining seasons, residents have to use animals in bringing their products to the market. There are utility vehicle, and motorcycles that plying on this road daily, but the high fare rates compel many local people to walk. They are charging as much as PhP 50 per person and PhP 70 per sack of agricultural products up to the Narciso Ramos National Highway. From there, they transport again their produce either to Marawi City, the provincial capital or to the nearest municipality of Malabang with additional PhP 100 or more.

The road condition also hampers the access of social services such as education and health service. Children have difficulty in their commute to five elementary schools and a high school in the municipality. There is no regular transportation service to these schools. In terms of health service, people hire an expensive rent-a-car to hospital in case of emergency. It costs PhP 2,500 for one way and most people cannot afford.

The maintenance of the road would be entirely the responsibility of the local government unit (LGU). The LGU has its own equipment and crew for maintenance of the road. The Provincial Government of Lanao del Sur is also expected to provide the counterpart contribution of the project, such as the right-of-way acquisition.

3. Project Concept

This particular subproject would consist of several components.

1. The rehabilitation of approximately 8 kilometers of badly damaged earthen road section to an all-weather road along the Ngingir-Linindingan-Padas Provincial Road. The rehabilitation would commence at Barangay Ngingir at the municipal hall and end at Barangay Padas in the south section of Pagayawan Municipality. The road rehabilitation would include the installation of sub-base and base course materials and the widening of the road to meet current standards.
2. The clearing and removal of all debris would be done along the road of an approximate width of 10 meters. Excavation is necessary to widen the existing road, including its alignment and grade.

3. The preparation of a sub-grade, placement of sub-base and base course materials would be conducted to stabilize the existing roadbed.

4. Approximately 50 linear meters of reinforced concrete pipe culverts of various sizes would be installed at key locations throughout the 8 kilometers of the road length, including the construction of head walls, toe walls and wing walls.

5. Lined canals and side ditches would be constructed along the road to control rain water.

6. Security and safety information would be upgraded, including guardrails and road signs.

4. Benefits

The project would directly and indirectly provide economic benefit at least approximately 4,000 people or 40% of entire population of the municipality of Pagayawan. Health services would also improve; patients could be brought to the nearest health center with substantially lesser costs. The proposed road rehabilitation and expansion would provide farmers, students, businessmen and traders in the area an all-weather road, boosting economic activity, creating more job opportunities, and providing essential services to the community. The proposed road rehabilitation would save time of motorists connecting to Barangay Ngingir-Linindingan-Padas, and other adjacent barangays, and the municipality of Marogong.

5. Potential Risks

The LGU or the Provincial Engineering Office (PEO) should maintain the road periodically so that the project would sustain for several years. These maintenance works are the ditching of canals, crowning of roads, patching of uneven grounds especially during raining seasons when landside could occur along the road.

6. Costs Estimates

The initial estimated cost of the project is PhP 17.28 million, and broken down as follows. The cost can be increased depending on the Detailed Engineering Survey.

Description of Items	Estimated Cost
1) Item 100; Clearing and Grubbing for 8 km @ P 20/sq.m. (8,000m x 10m = 80,000 sq.m)	P 1.60 M
2) Item 105; Roadway and Drainage Excavation @ P 100/cu.m. (Approximate, 0.10m x 8,000m x 10m = 8,000 cu. m.)	P 0.80 M
3) Item 106; Excavation for Structures @ P 200/cu.m. (Approximate of 6000 cu. m. within the 8 km roadway)	P 1.20 M
4) Item 107; Borrow (Surplus Common Excavation) @ P100/cu.m. (Approximate of = 5,000 cu.m.)	P 0.50 M
5) Item 108; Aggregate Sub-base @ P 400/cu.m. (8,000m x 10m x 0.15m = 12,000 cu.m.)	P 0.48 M
6) Item 300; Gravel Surface Course @ 1300/cu. m. (0.15m x 8000m x 6.0m = 7,200 cu. m.)	P 9.36 M
7) Item 413; Reinforced Concrete Culvert Pipe (RCCP); and Provision of side ditch and lined canal (broken section) Lump Sum	P 1.0 M
8) Incidental structures, traffic signs, and others (lump sum)	P 0.20 M
9) Detailed and Pre-Engineering Survey @ P 60,000/kilometer 8 km x P 60,000	P 0.48 M

Total	P 15.98 M
10 % Contingency	P 1.56 M
Total Estimated Cost	**P 17.28 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Lanao del Sur Province is 4.98%, based on the 2007 National Census.

Growth rate (r) is 4.98%.

Numbers of beneficiaries are 4,000 persons.

Project Life is 15 years.

Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years.

Below is the computation of projected annual population:

Table 1

Year	Projected Population $= P*(1+r)^n$
1	4,000
2	4,199
3	4,408
4	4,628
5	4,858
6	5,100
7	5,354
8	5,621
9	5,901
10	6,195
11	6,503
12	6,827
13	7,167
14	7,524
15	7,899

- **Cost**

Initial Cost: PhP 17.28.

Operation and Maintenance:

   a) Assume cost of maintaining the road at PhP 100,000 per kilometer/annum, including labor and equipment:

   Total Cost = PhP 100,000*8 km = PhP 800,000; Assume an increase of 5% per annum

   Below is the computation of projected annual cost:

Table 2

Year	Total O&M projected at 5% per annum $= P*(1+r)^n$ (PhP)
1	800,000
2	840,000
3	882,000
4	926,100
5	972,405
6	1,021,025
7	1,072,077

Year	Total O&M projected at 5% per annum $= P*(1+r)^n$ (PhP)
8	1,125,680
9	1,181,964
10	1,241,063
11	1,303,116
12	1,368,271
13	1,436,685
14	1,508,519
15	1,583,945

- **Benefits**

Savings in the Passenger Transportation Cost:

Using the data from Table 1, projected population

    a) Assume that PhP 20 is save for transportation for each travel.

    b) Assume that the number of times travelled twice a month (especially students) or 24 times a year.

    c) Annual transportation saving cost: PhP 20*24*2 (vice-versa) = PhP 960, and increasing at 5% yearly.

    d) Assume that only 50% of the populace are traveling.

Below is the computation of projected annual transportation cost saving:

Table 3

Year	Projected Population (Table 1, 50% of populace)	Annual Transport Cost per Person	Total Annual Transport Cost Saving (PhP)
1	2,400	960	1,920,000
2	2,520	1,008	2,116,397
3	2,645	1,058	2,332,883
4	2,777	1,111	2,571,514
5	2,915	1,167	2,834,554
6	3,060	1,225	3,124,500
7	3,213	1,286	3,444,105
8	3,935	1,351	3,796,403
9	3,540	1,418	4,184,737
10	3,717	1,489	4,612,794
11	3,902	1,564	5,084,636
12	4,096	1,642	5,604,744
13	4,300	1,724	6,178,053
14	4,514	1,810	6,810,006
15	4,739	1,901	7,506,602

Savings in the Product Transportation Cost:

    a) Annual corn production and other farm produce is 800 tons (800,000 kg), average per year.

    b) Assume that PhP 0.5/kilogram is saved of product. Assume an increase of 5% yearly.

Below is the computation of product transport cost savings:

Table 4

Year	Average Annual Corn Produce (kg)	Transport Cost Saving per kg (PhP)	Product Transport Saving Cost (PhP)
1	800,000	0.50	400,000
2	800,000	0.53	420,000
3	800,000	0.55	441,000
4	800,000	0.58	463,050
5	800,000	0.61	486,203
6	800,000	0.64	510,513
7	800,000	0.67	536,038
8	800,000	0.70	562,840
9	800,000	0.74	590,982
10	800,000	0.78	620,531
11	800,000	0.81	651,558
12	800,000	0.86	684,136
13	800,000	0.90	718,343
14	800,000	0.94	754,260
15	800,000	0.99	791,973

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%

All values are in million pesos

Table 5

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Annual Transport Saving Cost (Table 3)	Product Transport Saving Cost (Table 4)	Subtotal Benefit (PhP)		
T	17.28		17.28				17.28	17.28
T-1		0.80	0.80	1.92	0.40	2.32	1.52	1.38
T-2		0.84	0.84	2.12	0.42	2.54	1.70	1.40
T-3		0.88	0.88	2.33	0.44	2.77	1.89	1.42
T-4		0.93	0.93	2.57	0.46	3.03	2.11	1.44
T-5		0.97	0.97	2.83	0.49	3.32	2.35	1.46
T-6		1.02	1.02	3.12	0.51	3.64	2.61	1.48
T-7		1.07	1.07	3.44	0.54	3.98	2.91	1.49
T-8		1.13	1.13	3.80	0.56	4.36	3.23	1.51
T-9		1.18	1.18	4.18	0.59	4.78	3.59	1.52
T-10		1.24	1.24	4.61	0.62	5.23	3.99	1.54
T-11		1.30	1.30	5.08	0.65	5.74	4.43	1.55
T-12		1.37	1.37	5.60	0.68	6.29	4.92	1.57
T-13		1.44	1.44	6.18	0.72	6.90	5.46	1.58
T-14		1.51	1.51	6.81	0.75	7.56	6.06	1.59
T-15		1.58	1.58	7.51	0.79	8.30	6.71	1.61

Solving for NPV, and IRR;
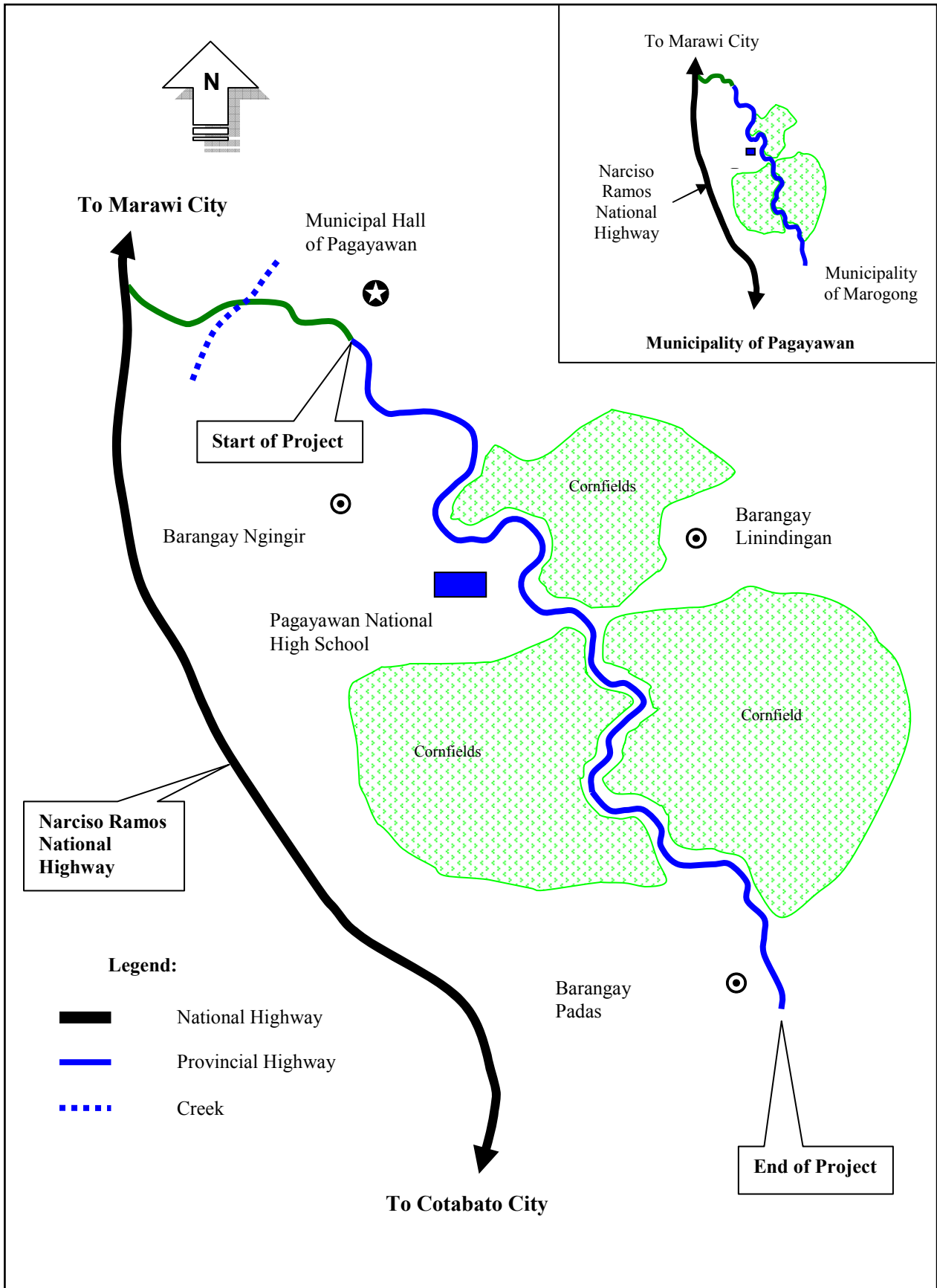
NPV = $\sum$ Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)

NPV = 5.27

IRR = r ;where $\sum$Cash Flow (T-n)/ $(1+r)^n$-T=0, (n=1-15)
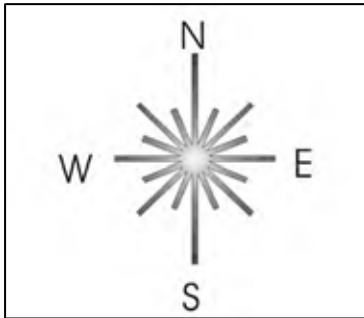**IRR = 13.8%**

8. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Ngingir – Padas Road Rehabilitation as well as captioned photographs highlighting the road and its vicinity.

VICINITY MAP

Municipality of Pagayawan (inset map, upper right)

To Marawi City

Municipal Hall of Pagayawan

Start of Project

Barangay Ngingir

Pagayawan National High School

Narciso Ramos National Highway

Cornfields

Barangay Linindingan

Cornfield

Cornfields

Barangay Padas

End of Project

To Cotabato City

Legend:

▬▬▬	National Highway
▬▬▬	Provincial Highway
▪▪▪▪	Creek

LOCATION MAP

MUNICIPALITY OF PAGAYAWAN, PROVINCE OF LANAO DEL SUR

PHOTOGRAPHS

1 Start of project

2 Residents used animal to haul their produce

3 Severely damaged road

4 Very narrow road and difficult to maneuver

5 Muddy and narrow road

Start of Project

1

2

3

4

5

6

7

End of Project

6 Vehicle stranded on the muddy road

7 Student walking along the road because if limited transportation

8 End of the Proposed Project

APPENDIX M2-1: MAITUM-LAKE SEBU ROAD REHABILITATION

IBNA Pre-Feasibility Study

1. Title and Location
Road Rehabilitation in Barangays Tuanadatu and Upo, Municipality of Maitum, Sarangani Province

2. Present Situation and Needs
Maitum is a 3rd class municipality in Sarangani, Province. According to the 2007 National Census, it has a population of 37,054 people, with a land area of 324.35 km². It is bordered on the west by the province of Sultan Kudarat, on the east by the municipality of Kiamba, on the north by the province of South Cotabato, and on the south by the Celebes Sea. The majority of the populations are of Ilocano origin. One of indigenous peoples living in mountainous areas is known as T'boli.

The main sources of livelihood are farming and fishing. The area is often called the "rice-granary" of Sarangani. Aquaculture is the second biggest income earner, notably the culture of milkfish and shrimps. Other agricultural products are coconuts, sugarcane, bananas, pineapples, and mangoes.

Barangays Tuanadatu and Upo have the population of about 4,000 persons based on 2007 National Census. Taunadatu is approximately 27 km away from the Poblacion of Maitum. It is situated on the farthest northwest of Maitum. Its topographic features are from steep to rolling, and mountainous.

Barangay Tuanadatu can only be reached by means of motorbike or "habal-habal" as popularly used by the residents as their public utility vehicles due of bad roads. This motorbike charges a fare rate of PhP 100 to 120 per person depending on the distance. For farm produce, the charge is at PhP 2 per kilograms or PhP 100 per sack. Agricultural production is hindered by the high cost of transportation services for which 20% of crop income is spent. Students also have no choice but to board a house in Poblacion Maitum.

The existing road to Barangay Maitum is a long uphill earthen road. This is a provincial road constructed in 1960's. It connects to the adjacent nearby province of South Cotabato. Sometime in the 3rd quarter of 2007 the road was heavily damaged due to tropical storm Lando and Mina. A portion of approximately 2 km of the road was further damaged and it has been more difficult for motorbike to travel. Since some sections of the road were collapsed, an area was isolated for few days. During raining seasons, it is often not passable and residents have to wait for several days or have to walk to their destinations.

A part of the road at the lower portion is graveled and maintained by DPWH. The road is uphill and steep slope and very difficult to maneuver due to uneven grounds. It is very slippery especially at portion where no aggregates base course on the road. The Sarangani Province has earlier requested for financial assistance for the improvement of the Maitum-Lake Sebu Road to the Office of the President and the National Office of DPWH. The gravelling for 7.7 km up to the municipality of Lake Sebu, Province of South Cotabato was proposed. During the IBNA, the residents prioritized the rehabilitation of the road, which has been their problem for many years now.

The DPWH-proposed road rehabilitation would start at Barangay Upo, which is located at approximately 17 km from the Municipal Hall of Maitum, to Barangay Tuanadatu, covering two barangays of Maitum municipality. The total distance is approximately 8 km. This would provide an all-weather road, boosting economic activity and providing essential services to the residents. This would also save time of motorists and reduce their operational costs. Other adjacent barangays in the nearby province of South Cotabato would also benefit from the project.

3. Project Concept
This particular subproject would consist of several components.

1. The approximately 8 km of badly damaged earthen road section would be rehabilitated from Barangay Upo up to Barangay Tuanadatu. The rehabilitation would include side cutting to increase the road width, road excavation, construction of concrete line canal, base preparation, laying-in of aggregate base course, installation of reinforced pipe culvert, and stone masonry or grouted riprap for slope protection.
2. The clearing and removal of all debris along the entire 8 km with an approximate width of 10 meters. Excavation would be necessary and include its alignment and grade.
3. The preparation of a sub-grade, placement of sub-base and base course materials would be done to stabilize roadbed.
4. Approximately 100 linear meters of reinforced concrete pipe culverts of various sizes would be installed at key locations, including the construction of head walls, toe walls and wing walls.
5. Lined canals and side ditches would be constructed along the road to control water during rains. Side cutting of both side of road would increase the width.
6. The safety and information would be improved with guardrails, and road signs.

4. Benefits
The project would benefit approximately 5,000 people living in Barangays Tuanadatu and Upo and neighboring barangays. The benefits would range from economic benefits, safety benefits since the road would be more passable – up to social benefit from better health services. Public transportation plying the road is expected to increase and would result in time savings to commuters.

As for economic benefits, this would improve accessibility and reduce the transport cost of agricultural produce. It would encourage farmers to produce more. Aside from 5,000 local residents, an additional 2,000 residents from the neighboring municipalities of Lake Sebu, province of Sultan Kudarat would also benefit from the project. Further economic benefits would occur as a result of development that might follow. This would lead to greater employment and livelihood opportunities.

5. Potential Risks
The possible risk could be observed after the completion of the project. The Provincial Engineering Office (PEO), and DPWH should facilitate maintaining the road periodically. These maintenance works would be the ditching of canals, crowning of roads, patching of uneven grounds especially during raining seasons. Also there would a possibility of landside similar to what had happened last year along the road. This is a high risk element and, and there is a possibility of flash floods as well.

6. Costs Estimates
The initial estimated cost of the project is PhP 56.26 million and broken down as follows:

Description of Items	Estimated Cost
1) Item 100; Clearing and Grubbing for 8 km @ PhP 20/sq.m. (10,000m x 10m = 100,000 sq.m)	P 0.50 M
2) Item 105; Roadway, Foundation and Drainage Excavation @ PhP 100/cu.m. (Approximate, 0.30m x 10,000m x 10m = 30,000 cu. m.)	P 3.00 M
3) Item 106; Excavation for Structures @ PhP 200/cu.m. (Approximate of 10,000 cu. m. within the 10 km roadway)	P 2.00 M
4) Item 107; Borrow (Surplus Common Excavation) @ PhP 100/cu.m. (Approximate of = 150,000 cu.m.)	P 15.00 M

5) Item 108; Aggregate Sub-base @ PhP 500/cu.m. (10,000m x 10m x 0.20m = 15,000 cu.m.)	P 7.50 M
6) Item 300; Gravel Surface Course @ PhP 1000/cu. m. (0.15m x 10,000m x 8.0m = 12,000 cu. m.)	P 12.00 M
7) Item 413; Reinforced Concrete Culvert Pipe (RCCP); and Provision of side ditch and lined canal (broken section) Lump Sum	P 5.00 M
8) Stone Masonry/Grouted Riprap, Slope Protection	P 5.00 M
8) Incidental structures, traffic signs, and others (lump sum)	P 0.50 M
9) Detailed Engineering Survey @ P 60,000/kilometer 10 km x P 60,000	P 0.60 M
Total	P 51.10 M
10 % Contingency	P 5.16 M
Total Estimated Cost	**P 56.26 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Sarangani Province is 2.04%, based on the 2007 National Census.

Growth rate (r) is 2.04%.

Number of beneficiaries are 5,000 persons, and additional of 2,000 of neighboring municipalities.

Total beneficiaries are 7,000 persons.

Project Life is 15 years.

Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years

Below is the computation of projected annual population:

Table 1

Year	Projected Population $= P*(1+r)^n$
1	7,000
2	7,143
3	7,289
4	7,437
5	7,589
6	7,744
7	7,902
8	8,063
9	8,227
10	8,395
11	8,566
12	8,741
13	8,920
14	9,102
15	9,287

- **Cost**

Initial Cost: PhP 56.26

Operation and Maintenance

   a) Assume cost of maintaining the road at PhP 150,000 per kilometer/year including labor and equipment:

     Total Cost = PhP 150,000*8 km = PhP 1,200,000; Assume an increase of 5% yearly.

Below is the computation of projected annual operation and maintenance cost:

Table 2

Year	Total O&M projected at 5% yearly $= P*(1+r)^n$ (PhP)
1	1,200,000
2	1,260,000
3	1,323,000
4	1,389,150
5	1,458,608
6	1,531,538
7	1,608,115
8	1,688,521
9	1,772,947
10	1,861,594
11	1,954,674
12	2,052,407
13	2,155,028
14	2,262,779
15	2,375,918

- **Benefits**

Savings in the Passenger Transportation Cost.

Using the data from Table 1, projected population;

    a) Assume that PhP 30 is saved for transportation for each travel

    b) Assume that the number of times travelled 2 times a month/person or 24 times a year.

    c) Annual transportation saving cost: PhP 30*24 mo/yr*2(vice-versa) = PhP 1,440 and increasing at 5% yearly.

    d) Assume that only 50% of the populace are travelling.

Below is the computation of projected annual transportation saving cost:

Table 3

Year	Projected Population (Table 1) 50% travelers	Annual Transport Cost per Person	Total Annual Transport Saving Cost (PhP)
1	3,500	1,440	5,040,000
2	3,571	1,512	5,399,957
3	3,644	1,588	5,785,622
4	3,719	1,667	6,198,831
5	3,794	1,750	6,641,551
6	3,872	1,838	7,115,891
7	3,951	1,930	7,624,108
8	4,031	2,026	8,168,622
9	4,114	2,128	8,752,025
10	4,198	2,234	9,377,094
11	4,283	2,346	10,046,806
12	4,371	2,463	10,764,349
13	4,460	2,586	11,533,139
14	4,551	2,715	12,356,836
15	4,644	2,851	13,239,361

Savings in the Product Transportation Cost
   a) The total farm product is 900 tons or 900,000 kgs/year, assume no increase on farm products
   b) Assume that the PhP 0.50 saved, is increasing at 5% yearly
Below is the computation of product transport saving cost:
Table 4

Year	Farm Produce, corn, rice (kg)	Transport Saving Cost, (PhP 0.5/kg)	Product Transport Saving Cost (PhP)
1	900,000	0.50	450,000
2	900,000	0.53	472,500
3	900,000	0.55	496,125
4	900,000	0.58	520,931
5	900,000	0.61	546,978
6	900,000	0.64	574,327
7	900,000	0.67	603,043
8	900,000	0.70	633,195
9	900,000	0.74	664,855
10	900,000	0.78	698,098
11	900,000	0.81	733,003
12	900,000	0.86	769,653
13	900,000	0.90	808,135
14	900,000	0.94	848,542
15	900,000	0.99	890,969

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%

All values are in million pesos

Table 5

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Annual Transport Saving Cost (Table 3)	Produce Transport Saving Cost (Table 4)	Subtotal Benefit (PhP)		
T	56.26		56.26				56.26	56.26
T-1		1.20	1.20	5.04	0.45	5.49	4.29	3.90
T-2		1.26	1.26	5.40	0.47	5.87	4.61	3.81
T-3		1.32	1.32	5.79	0.50	6.28	4.96	3.73
T-4		1.39	1.39	6.20	0.52	6.72	5.33	3.64
T-5		1.46	1.46	6.64	0.55	7.19	5.73	3.56
T-6		1.53	1.53	7.12	0.57	7.69	6.16	3.48
T-7		1.61	1.61	7.62	0.60	8.23	6.62	3.40
T-8		1.69	1.69	8.17	0.63	8.80	7.11	3.32
T-9		1.77	1.77	8.75	0.66	9.42	7.64	3.24
T-10		1.86	1.86	9.38	0.70	10.08	8.21	3.17
T-11		1.95	1.95	10.05	0.73	10.78	8.83	3.09
T-12		2.05	2.05	10.76	0.77	11.53	9.48	3.02
T-13		2.16	2.16	11.53	0.81	12.34	10.19	2.95
T-14		2.26	2.26	12.36	0.85	13.21	10.94	2.88
T-15		2.38	2.38	13.24	0.89	14.13	11.75	2.81

Solving for NPV, and IRR;
NPV = ∑Cash Flow $(T-n)/ (1+oc)^n$-T, (n=1-15)
NPV = -6.29

IRR = r ;where ∑Cash Flow $(T-n)/ (1+r)^n$-T=0, (n=1-15)
IRR = 8.3%

8. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Maitum – Lake Sebu Road Rehabilitation as well as captioned photographs highlighting the road and its vicinity.

VICINITY MAP

To Lake Sebu, Road connecting
to South Cotabato Province

PROVINCE OF SOUTH COTABATO

Brgy Tuanadatu

Proposed Maitum –
Lake Sebu
Road Rehabilitation

Maitum – Lake Sebu Road
Provincial Road

To Sultan
Kudarat
Province

Brgy Ticulab

Brgy Upo

Maitum – General Santos
National Highway

To General
Santos City

CELEBES SEA

MUNICIPALITY OF MAITUM, SARANGANI PROVINCE

LOCATION MAP

KEY MAP
OF
MINDANAO

THIS SITE
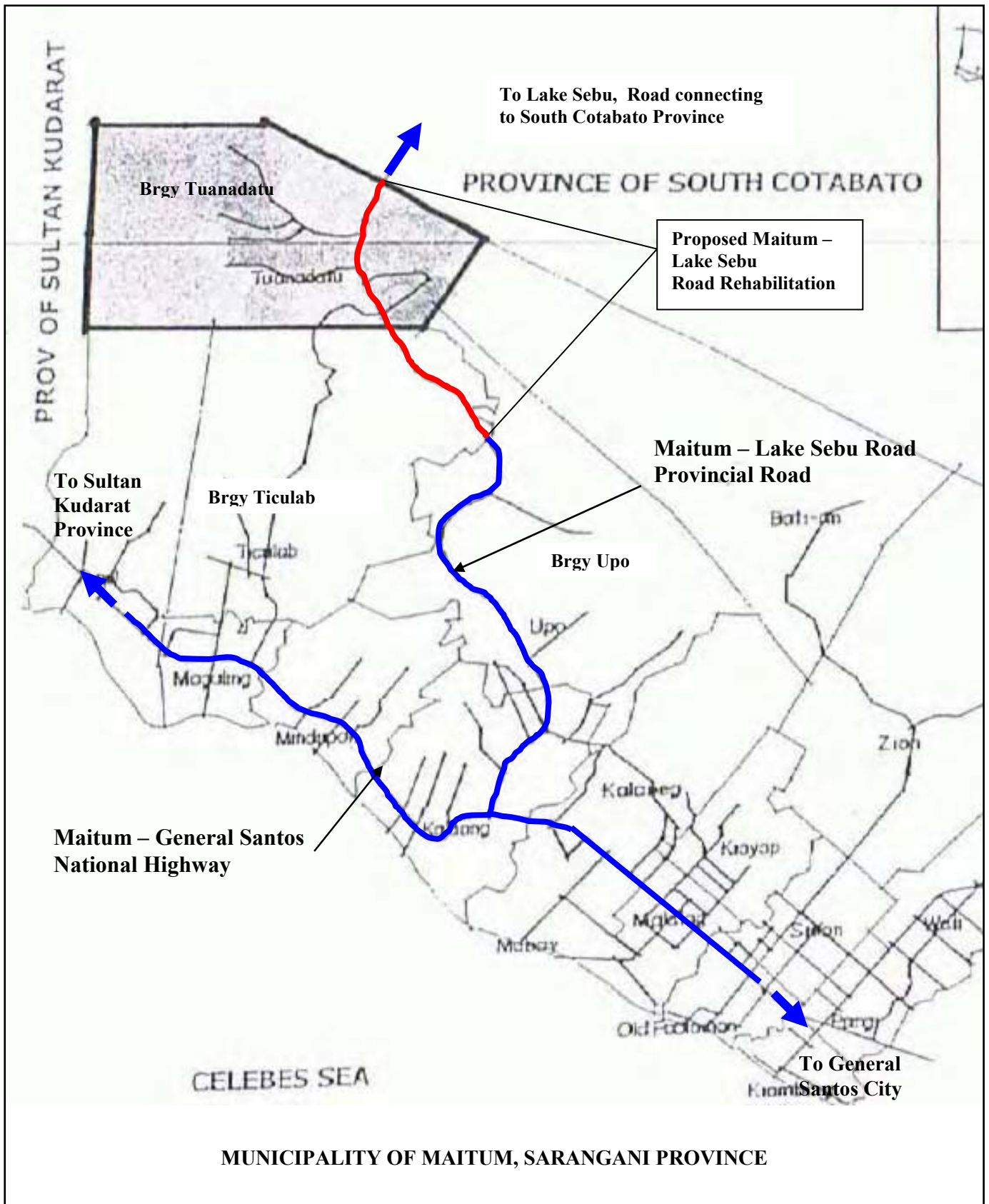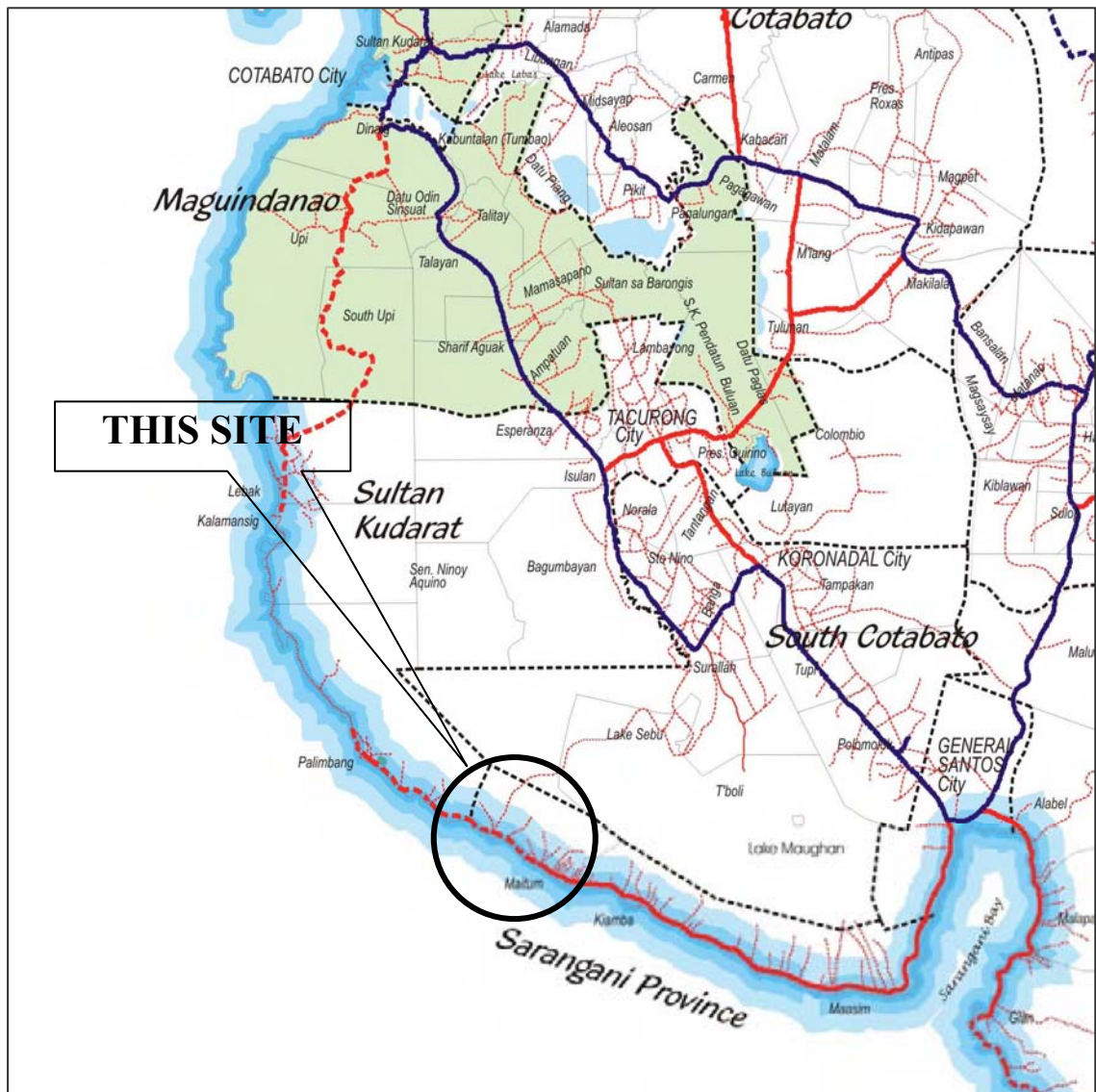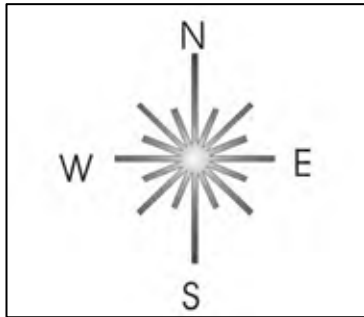
MUNICIPALITY OF MAITUM, SARANGANI PROVINCE

PHOTOGRAPHS

Start of the Project

Narrow road needs to be widen

Only motorbike can reach the area

End of the project at Barangay Tuanadatu

To Lake Sebu, South Cotabato

The Proposed 8 kilometer Maitum-Lake Sebu Road Rehabilitation

Farmers produce ready for market

Severely damaged road

Beginning of the project at Barangay Upo

To Maitum Proper

Road side needs to be slope protected

Line canal should be constructed at both sides of road to protect water run-off from running on different directions

Road very dangerous to maneuver

APPENDIX M3-1: KAYUPO WAREHOUSE & SOLAR DRYER CONSTRUCTION

IBNA Pre-Feasibility Study

1. Title and Location
Warehouse and Solar Dryer Construction in Barangay Kayupo, Municipality of Pandag, Maguindanao Province

2. Present Situation and Needs
Pandag is a new municipality in the province of Maguindanao. It was created out of 8 barangays of Buluan, Maguindanao, by virtue of Muslim Mindanao Autonomy Act No. 203. It has comprises of eight barangays with a total population of 20,557 (the 2007 National Census). The municipality of Pandag is bounded by Municipality of S. K. Pendatun at the north, the Municipality of Buluan at the south, the Municipality of Datu Paglas at the east, and the Province of Sultan Kudarat at the west.

Barangay Kayupo in Pandag has a population of 3,930 persons. Barangay Kayupo is three km away from the municipal hall of Pandag and five km from the Matalam-Tacurong National Highway. The Barangay Kayupo is relatively plain and depends entirely on agriculture producing rice, corn, coconuts, banana, beans, vegetables and other crops. Rice and corn constitute the biggest local produce.

However, growth in agricultural production is hampered for the decades by the lack of irrigation and post harvest facilities. Without irrigation infrastructures the farmers can only harvest rice at once or twice a year. Also, the high cost of transportation services (up to 10% of crop income is spent on transportation costs) squeezes the farmers. The production area extends 500 ha with 300 ha planted with rice, 200 ha corn. There are 60 farmers members of the Kapuyo Multi-Purpose Cooperative, which was established in 1990.

With poorly dried grains the farmers are forced to sell their products at a low price of four pesos per kg. The farmers can generate an average yield of 4.5 tons per ha per cropping cycle and they plant two cropping in a year. Due to the lack of drying facilities, the farmers use jute sacks instead, which entail a longer drying period of one week and result in more post harvest losses. Neither have they a warehouse for storage, and the farmers use their houses for storage. And on drying their harvest, they are using the road as the dryer facility. As a result, farmers are forced to sell wet or poorly dried grains at a low price.

A good quality of rice and corn can save a farmer 4 pesos per kg. This means that the provision of solar dryer and storage facilities would help farmers increase income 200 peso per sack of rice/corn. The project would provide the cooperative with a 64-m^2 warehouse and a 288 m^2 pavement-type solar dryer. It can dry at an average of eight tons of rice/corn per week.

3. Project Concept
This particular subproject would consist of several components.

1. The backfilling of the site of approximately 500 m^2 to elevate a warehouse and a solar dryer.
2. The construction of one 8m x 8m (64 m^2) warehouse with steel trusses, including electrical facilities.
3. The construction of one 12m x 24m (288 m^2) concrete solar dryer.

4. Benefits
The project would directly and indirectly provide economic benefit at least approximately 25% (800 farmers) of entire population of the municipality of Barangay Kayupo.

Fully dried rice and corn sells at 4 peso higher price than undried or inadequately dried rice and corn. Farmers can hold the grains in the warehouse for some time and wait for better selling price. Dried rice and corn at the peak of the harvest season when there is a large supply in the market. Price mark-up of about 0.5 peso per kg is experienced at the tail-end of harvest season (about three to four weeks after the peak of the harvest season).

5. Potential Risks

The potential risk of the project is about the operation and maintenance of the provided facilities. The Kapuyo Multi-Purpose Cooperative would be responsible for handling the facilities, collecting utility fees from members and setting funds for the operation and maintenance.

The Kapuyo Multi-Purpose Cooperative in cooperation with the local government unit (LGU), would also have to rehabilitate the road leading to the proposed warehouse and solar dryer. The works would include clearing and grubbing, embankment of aggregate wearing course, crowning of road, and compaction.

6. Costs Estimates

The initial estimated cost of the project is PhP 1.16 million, the cost be increased depending on the actual engineering survey, and broken down as follows:

Work Description	Total Cost
1. Earthworks (Embankment)	0.10 M
2. Warehouse (8m x 8m)	0.75 M
3. Solar Dryer (12m x 24m)	0.20 M
Total	PhP 1.05 M
10% Contingency	0.11 M
Total Estimated Cost	**PhP 1.16 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Maguindanao Province is 6.99%, based on the 2007 National Census.
Number of beneficiaries is 800 farmers more or less, or 25% of population.
Project Life is 15 years.

a) The dryer can produce dried rice at 8 tons a week or 8,000 kilograms
b) Total yield for 7 months period = 7 months/year*4 week/month*8,000 kgs/week
c) Total Annual Dried Products = 224,000 kg/year, assume no increase of production
Below is the computation of projected annual population:
Table 1

Year	Total Annual Dried Product (Kg)
1	288,000
2	288,000
3	288,000
4	288,000
5	288,000
6	288,000
7	288,000
8	288,000
9	288,000
10	288,000
11	288,000

Year	Total Annual Dried Product (Kg)
12	288,000
13	288,000
14	288,000
15	288,000

- **Cost**

Initial Cost: PhP 1.16 Million.

Operation and Maintenance

 a) Assume cost of maintaining the building at PhP 30,000 per year, and cost of labor is 40%:
  Material Cost = PhP 30,000; Labor Cost = PhP 30,000*0.40 = PhP 12,000

 b) Total Annual Cost = PhP 42,000; Assume an increase of 5% per annum

Below is the computation of projected annual O&M cost:

Table 2

Year	Total Annual O&M projected $= P*(1+r)^n$ (PhP)
1	42,000
2	44,100
3	46,305
4	48,620
5	51,051
6	53,604
7	56,284
8	59,098
9	62,053
10	65,156
11	68,414
12	71,834
13	75,426
14	79,197
15	83,157

- **Benefits**

Additional Increase of Income

 a) An increase of income at PhP 4/kg for well dried rice.

 b) 70% of dried product get the higer price.

 c) Assume an increase of Price at 5% per year; Using the data from Table 1

Below is the computation of projected annual income:

Table 3

Year	Total Annual Dried Product (Table 1)	Increase of Cost per Kg (PhP)	Total Annual Additional Income (PhP)
1	224,000	4.00	627,200
2	224,000	4.20	658,560
3	224,000	4.41	691,488
4	224,000	4.63	726,062
5	224,000	4.86	762,366

Year	Total Annual Dried Product (Table 1)	Increase of Cost per Kg (PhP)	Total Annual Additional Income (PhP)
6	224,000	5.11	800,484
7	224,000	5.36	840,508
8	224,000	5.63	882,533
9	224,000	5.91	926,660
10	224,000	6.21	972,993
11	224,000	6.52	1,021,643
12	224,000	6.84	1,072,725
13	224,000	7.18	1,126,361
14	224,000	7.54	1,182,679
15	224,000	7.92	1,241,813

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%

All values are in million pesos

Table 4

| Year | Cost | | | Benefit | | Total Cash Flow | NPV TCF/ $(1+oc)^n$ |
	Initial Invest-ment	O&M (Table 2) (PhP)	Subtotal Cost (PhP)	Additional Increase of Income (Table 3)	Subtotal Benefit (PhP)		
T	1.16		1.16			1.16	1.16
T-1		0.04	0.04	0.63	0.63	0.59	0.53
T-2		0.04	0.04	0.66	0.66	0.61	0.51
T-3		0.05	0.05	0.69	0.69	0.65	0.48
T-4		0.05	0.05	0.73	0.73	0.68	0.46
T-5		0.05	0.05	0.76	0.76	0.71	0.44
T-6		0.05	0.05	0.80	0.80	0.75	0.42
T-7		0.06	0.06	0.84	0.84	0.78	0.40
T-8		0.06	0.06	0.88	0.88	0.82	0.38
T-9		0.06	0.06	0.93	0.93	0.86	0.37
T-10		0.07	0.07	0.97	0.97	0.91	0.35
T-11		0.07	0.07	1.02	1.02	0.95	0.33
T-12		0.07	0.07	1.07	1.07	1.00	0.32
T-13		0.08	0.08	1.13	1.13	1.05	0.30
T-14		0.08	0.08	1.18	1.18	1.10	0.29
T-15		0.08	0.08	1.24	1.24	1.16	0.28

Solving for NPV, and IRR;

NPV = $\sum$Cash Flow (T-n)/ $(1+oc)^{n-T}$, (n=1-15)

NPV = 4.72

IRR = r ;where $\sum$Cash Flow (T-n)/ $(1+r)^{n-T}=0$, (n=1-15)

IRR = 55.3%

8. Attachment

Attached are the project location map, the proposed development plan as well as captioned photographs highlighting the road and its vicinity.

VICINITY MAP

N

Drawn not to scale:

Legend:

- ☐ - Households
- ■ - Mosque, School
- ▨ - Ricefields

To Kidapawan City

Paglat Municipality

THIS SITE

Municipality of Pandag

To Tacurong City

To Paglat Municipality

To Buluan Municipality

Kayupo Elementary School

To President Quirino Municipality

Proposed Warehouse and Solar Dryer

BARANGAY KAYUPO, MUNICIPALITY OF PANDAG

LOCATION MAP

KEY MAP OF MINDANAO

THIS SITE
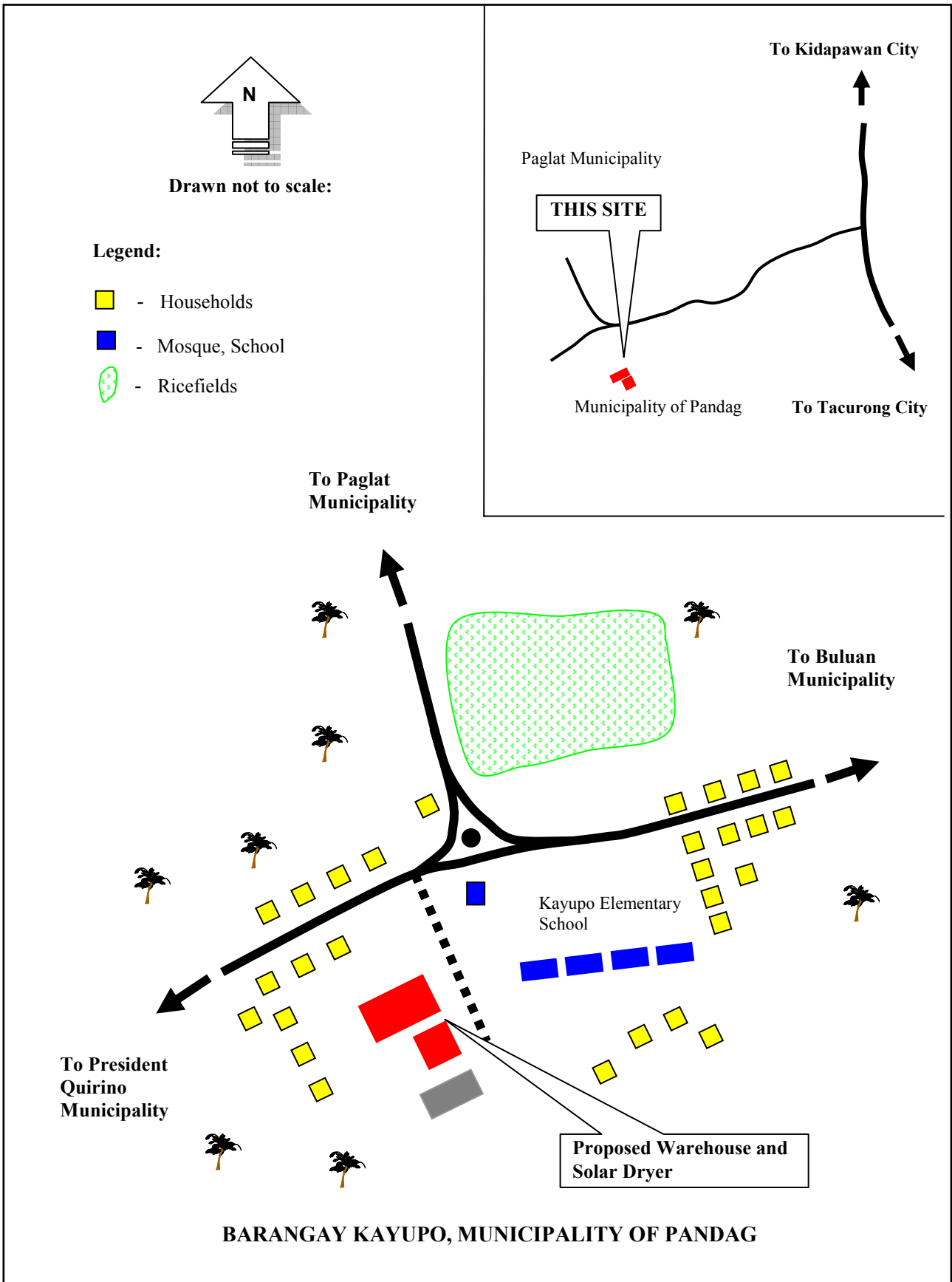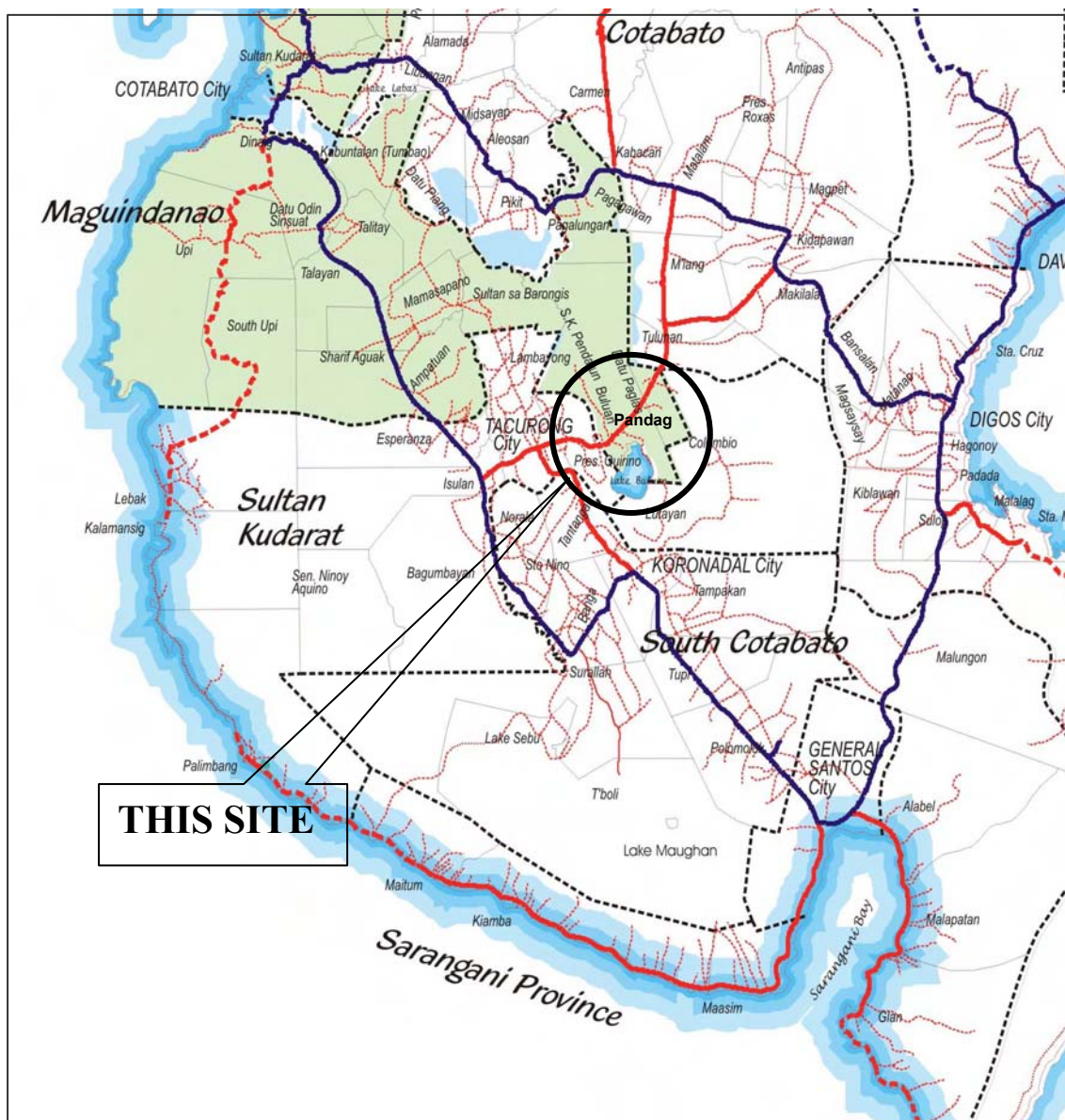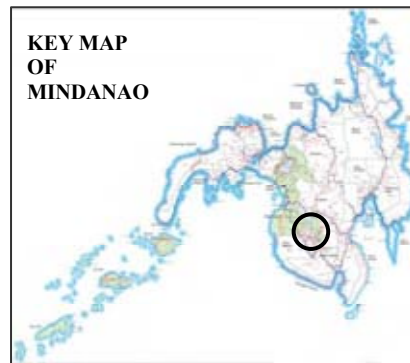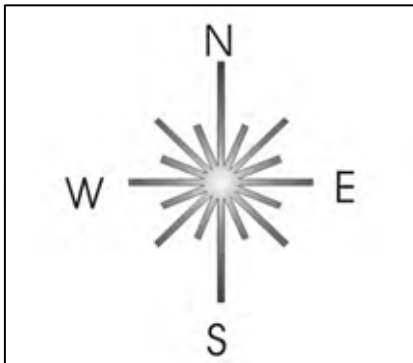
MUNICIPALITY OF PAGLAT, MAGUINDANAO PROVINCE

PHOTOGRAPHS

The proposed site of the warehouse building

The proposed site of the concrete solar dryer

Farmers are using the concrete pavement as dryer of their produce

Road leading to the warehouse and solar dryer needs to be rehabilitated

Rice and corn are abundant in Barangay Kayupo

APPENDIX M4-1: BALUT WATER SYSTEM CONSTRUCTION

IBNA Pre-Feasibility Study

1. Title and Location
Water Spring Development in Barangay Balut, Municipality of Marogong, Lanao del Sur Province

2. Present Situation and Needs
The Municipality of Marogong, classified as 6th class municipality, consists of 24 barangays with a municipal population of 21,120 (2007 Census). Out of these 24 barangays, only two are being served by Level II water system and the remaining by Level I system. One of these barangays that has no good source of water is Barangay Balut. Residents in this community are getting their potable water from spring with approximately three km away. Others are getting water from river and rain collectors; water is of doubtful quality.

Balut is a far flung barangay which is approximately 17 km northeast of the Narciso National Highway, and two km from the Poblacion. Reaching the barangay is difficulty with bad road condition which is only passable for light vehicles. Majority of the residents in the area are engaged in farming. Their current problem is potable water. Water source is very far and time-consuming. During rainy seasons, water turbidity is very high and cannot be drunk, and the only rainwater is available from water collector constructed of a roof catchment.

There is an existing water collector at Balut Elementary School built in 2001 by the SZOPAD Social Funds. Some of the residents are getting their drinking water from this water collector, but this water is not safe to drink because it is exposed and might contain bacteria. Rainfall catchment depends on weather, so water may not be always available. During IBNA, the residents selected potable water as their priority needs in the community. They hope to develop water supply from a spring and construct communal faucets in the community.

They want to utilize a spring located at barangay Piangologan approximately four km from Barangay Balut. The spring is located on hilly area near the forest favorable for a gravity flow system. The spring can supply water of approximately 4 liters per second. This can serve 2,000 people or 330 households good as Level II system.

The construction of 20 m^3 depends on the design of reservoir which would be located in Barangay Balut. Once completed, the project would also benefit the nearby barangays of Balut, Piangologan, and Cairantana, with some 250 m^3 of water daily. The combined population of these three barangays is estimated at 4,000, and out of which approximately 2,000 people or 330 households would be able to benefit from the project.

3. Project Concept
This particular subproject would consist of several components.

1. One unit intake box (spring box) would be constructed through gravity flow system with the capacity of 4 liters per second, connecting the water source to reservoir. The intake would be made of a screened intake pipe, and a reinforced structure.
2. New pipelines (transmission line) would be installed from the intake to the reservoir of approximately 4 km of 75 mm pipe diameter.
3. One reinforced concrete elevated reservoir (15 m^3 capacity) would be constructed to meet peak hour requirement.
4. Distribution pipe system of various sizes would be set out, ranging from 63mm diameter to 13mm diameter.
5. 10 communal public faucets would be provided at different locations.

4. Benefits

The number of direct beneficiaries from the improved water service is approximately 2000 of 400 families. This figure is projected to increase to 3000 persons of 600 families by 2010. Therefore, many people would be able to receive better service of the project.

The project will bring about health benefits with reduced incidence of waterborne diseases such as abdominal symptoms, cholera, diarrhea, and typhoid fever. There would also be improved sanitation because of more water availability to clean up.

5. Potential Risks

The potential risk of the project is after the turn-over to the local government units (LGU) or a local authority such as Barangay Water System (BAWASA). The operation and maintenance of the project is very important; if the facility is not properly maintained, it cannot last very long. Concerns for environmental protection and management including water population control, forest watershed conservation, water conservation, sanitation, and hygiene education shall be included in the training.

6. Costs Estimates

The initial estimated cost of the project is PhP 3.69 million and broken down as follows:

WORK DESCRIPTION	Total Cost
1. Mobilization	PhP 0.05 M
2. Construction of one (1) unit Spring Box	PhP 0.10 M
3. Construction of a reinforced elevated reservoir of 15 cubic meter (15,000 liters) capacity	PhP 0.35 M
3. Installation of transmission pipelines approximately 4,000 m long of 75 mm diameter	PhP 2.00 M
4. Installation of distribution pipelines of various sizes of approximately 1,500 meters with fittings ranging from 63 mm diameter to 13 mm diameter	PhP 0.75 M
5. Construction of 10 units communal faucets	PhP 0.10 M
Total	PhP 3.35 M
10% Contingency	PhP 0.34 M
Total Estimated Cost	**PhP 3.69 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Lanao del Sur is 4.98%, based on the 2007 National Census Growth rate (r) is 4.98%
Number of beneficiaries is approximately 2,000 persons or 500 families
Project Life is 15 years

Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years
Below is the computation of projected annual population, and household:
Table 1

Year	Projected Annual Population (r = 4.98%)	Number of Household (Projected/Ave HH = 6)
1	2,000	333
2	2,100	350
3	2,204	367
4	2,314	386
5	2,429	405
6	2,550	425
7	2,677	446

Year	Projected Annual Population (r = 4.98%)	Number of Household (Projected/Ave HH = 6)
8	2,810	468
9	2,950	492
10	3,097	516
11	3,252	542
12	3,414	569
13	3,584	597
14	3,762	627
15	3,949	658

- **Cost**

Initial Cost: PhP 3.69 Million

Operation and Maintenance

a) Assume 2 persons are in charge of the maintenance of water system, the rate is PhP 150/person.

Manpower Cost: PhP150/person*25 working days/month*12month = PhP 90,000 per year, an increase of 5% yearly

b) Assume material cost of PhP 5,000/month

Annual material cost: PhP 5,000*12 = Php 60,000, an increase of 5% yearly

Below is the computation of projected annual operation and maintenance cost:

Table 2

Year	Annual Cost of Manpower (5% increase yearly)	Annual Cost of Materials (5% increase yearly)	Total Operating and Maintenance Cost (PhP)
1	90,000	60,000	150,000
2	94,500	63,000	157,500
3	99,225	66,150	165,375
4	104,186	69,458	173,644
5	109,396	72,930	182,326
6	114,865	76,577	191,442
7	120,609	80,406	201,014
8	126,639	84,426	211,065
9	132,971	88,647	221,618
10	139,620	93,080	232,699
11	146,601	97,734	244,334
12	153,931	102,620	256,551
13	161,627	107,751	269,378
14	169,708	113,139	282,847
15	178,194	118,796	296,990

- **Benefits**

Savings in Water Cost

a) Assume water consumption is 10 cu.m/year/person

b) Assume a minimum water rate of PhP 110 per 10 cu.m., an increase of 5% yearly

Below is the computation of projected annual saving in water cost:

Table 3

Year	Projected Population (Table 1)	Minimum Water Rate (5% increase yearly)	Annual Water Cost (PhP)
1	2,000	110	220,000
2	2,100	116	242,504
3	2,204	121	267,310
4	2,314	127	294,653
5	2,429	134	324,793
6	2,550	140	358,016
7	2,677	147	394,637
8	2,810	155	435,005
9	2,950	163	479,501
10	3,097	171	528,549
11	3,252	179	582,615
12	3,414	188	642,210
13	3,584	198	707,902
14	3,762	207	780,313
15	3,949	218	860,131

Savings in Waterborne Diseases

Water supply and sanitation-related diseases (such as diarrhea, hepatitis, cholera, typhoid (Philippines – Environment Health Country Profile – World Health Organization, March 1, 2005)

   a) Assume 10% of population is reduced of water related illness.
   b) Assume fare to the hospital (30 km) is PhP 120/person*2 (patient and escort) = PhP 240.
   c) Assume hospitalization cost has an average of PhP 1,000 per patience

Total Cost: PhP 240 + PhP 1,000 = PhP 1,240, and an increase of 5% yearly.

Below is the computation of projected annual saving hospitalization cost:

Table 4

Year	Projected Population (Table 1)	10% of Projected Population (Table 1)	Hospitalization Cost (5% yearly increase)	Annual Saving Hospitalization Cost (PhP)
1	2,000	200.00	1,240	248,000
2	2,100	209.96	1,302	273,368
3	2,204	220.42	1,367	301,331
4	2,314	231.39	1,435	332,154
5	2,429	242.92	1,507	366,130
6	2,550	255.01	1,583	403,581
7	2,677	267.71	1,662	444,864
8	2,810	281.05	1,745	490,369
9	2,950	295.04	1,832	540,529
10	3,097	309.73	1,924	595,819
11	3,252	325.16	2,020	656,766
12	3,414	341.35	2,121	723,946
13	3,584	358.35	2,227	797,999
14	3,762	376.20	2,338	879,626
15	3,949	394.93	2,455	969,603

● **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%

All values are in million pesos

Table 4

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O & M (Table 2)	Subtotal Cost	Water Cost (Table 3)	Saving Cost on Disease (Table 4)	Subtotal Cost		
T	3.69		3.69				-3.69	-3.69
T-1		0.15	0.15	0.22	0.25	0.47	0.32	0.29
T-2		0.16	0.16	0.24	0.27	0.52	0.36	0.30
T-3		0.17	0.17	0.27	0.30	0.57	0.40	0.30
T-4		0.17	0.17	0.29	0.33	0.63	0.45	0.31
T-5		0.18	0.18	0.32	0.37	0.69	0.51	0.32
T-6		0.19	0.19	0.36	0.40	0.76	0.57	0.32
T-7		0.20	0.20	0.39	0.44	0.84	0.64	0.33
T-8		0.21	0.21	0.44	0.49	0.93	0.71	0.33
T-9		0.22	0.22	0.48	0.54	1.02	0.80	0.34
T-10		0.23	0.23	0.53	0.60	1.12	0.89	0.34
T-11		0.24	0.24	0.58	0.66	1.24	1.00	0.35
T-12		0.26	0.26	0.64	0.72	1.37	1.11	0.35
T-13		0.27	0.27	0.71	0.80	1.51	1.24	0.36
T-14		0.28	0.28	0.78	0.88	1.66	1.38	0.36
T-15		0.30	0.30	0.86	0.97	1.83	1.53	0.37

Solving for NPV, and IRR;
NPV = $\sum$Cash Flow $(T-n)/ (1+oc)^n$-T, (n=1-15)
NPV = 1.28

IRR = r ;where $\sum$Cash Flow $(T-n)/ (1+r)^n$-T=0, (n=1-15)
IRR = 14.2%

8. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Balut Water System Development as well as captioned photographs

VICITINY MAP

THIS SITE

Barangay
Balut

To Marawi City

Narciso
Ramos
Highway

To Cotabato City

Marogong Municipality

Legend:

Drawn not to scale:

Legend:

■ - Barangay Road

□ - Household

~ - River

■ - Communal Faucet

N

Distribution Line

To Marogong
Poblacion

**Balut Elementary
School**

**Proposed
Reservoir**

Transmission Line

Intake Box

The Intake Box
approximately 4000
meters from reservoir

BARANGAY BALUT
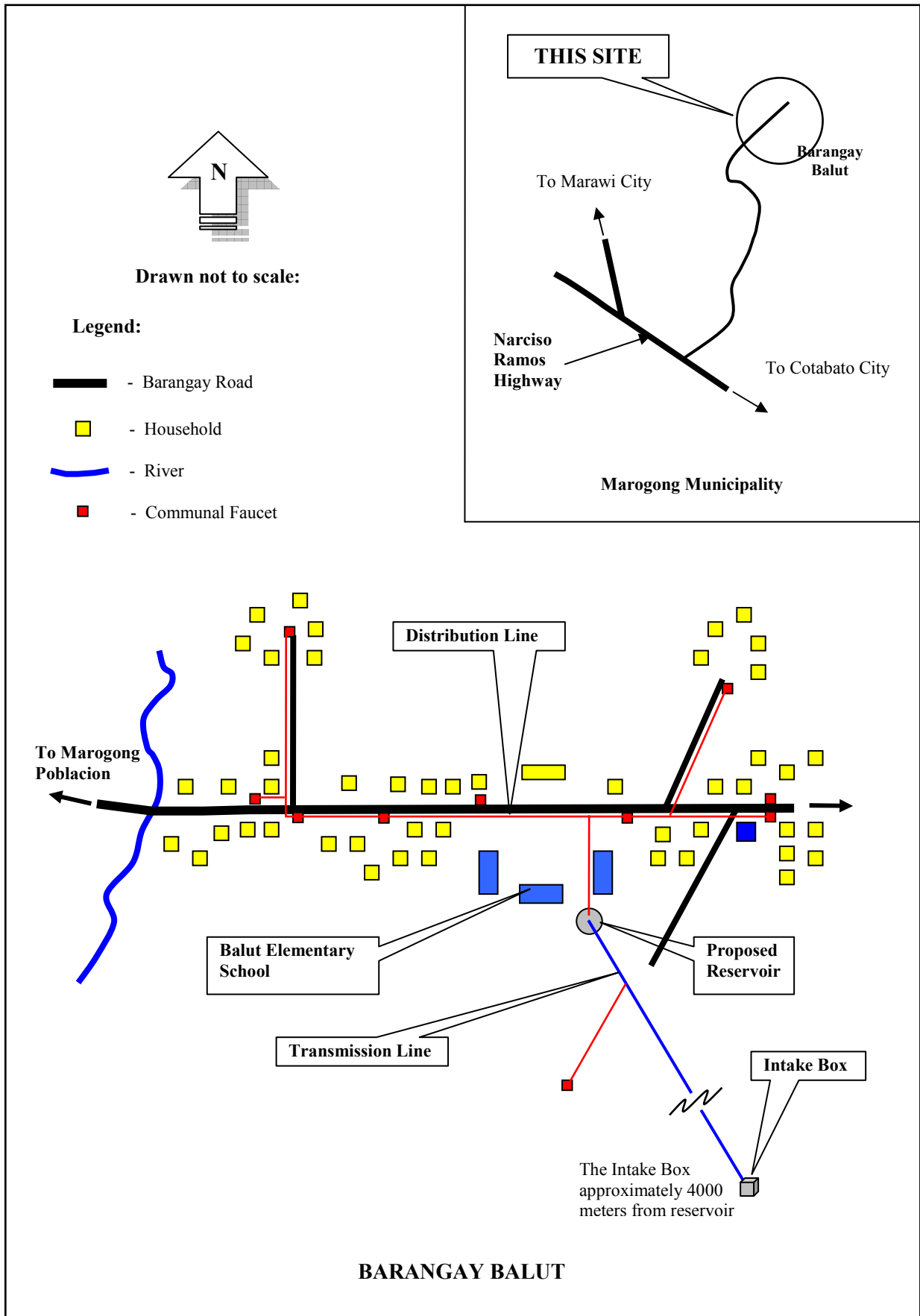
LOCATION MAP
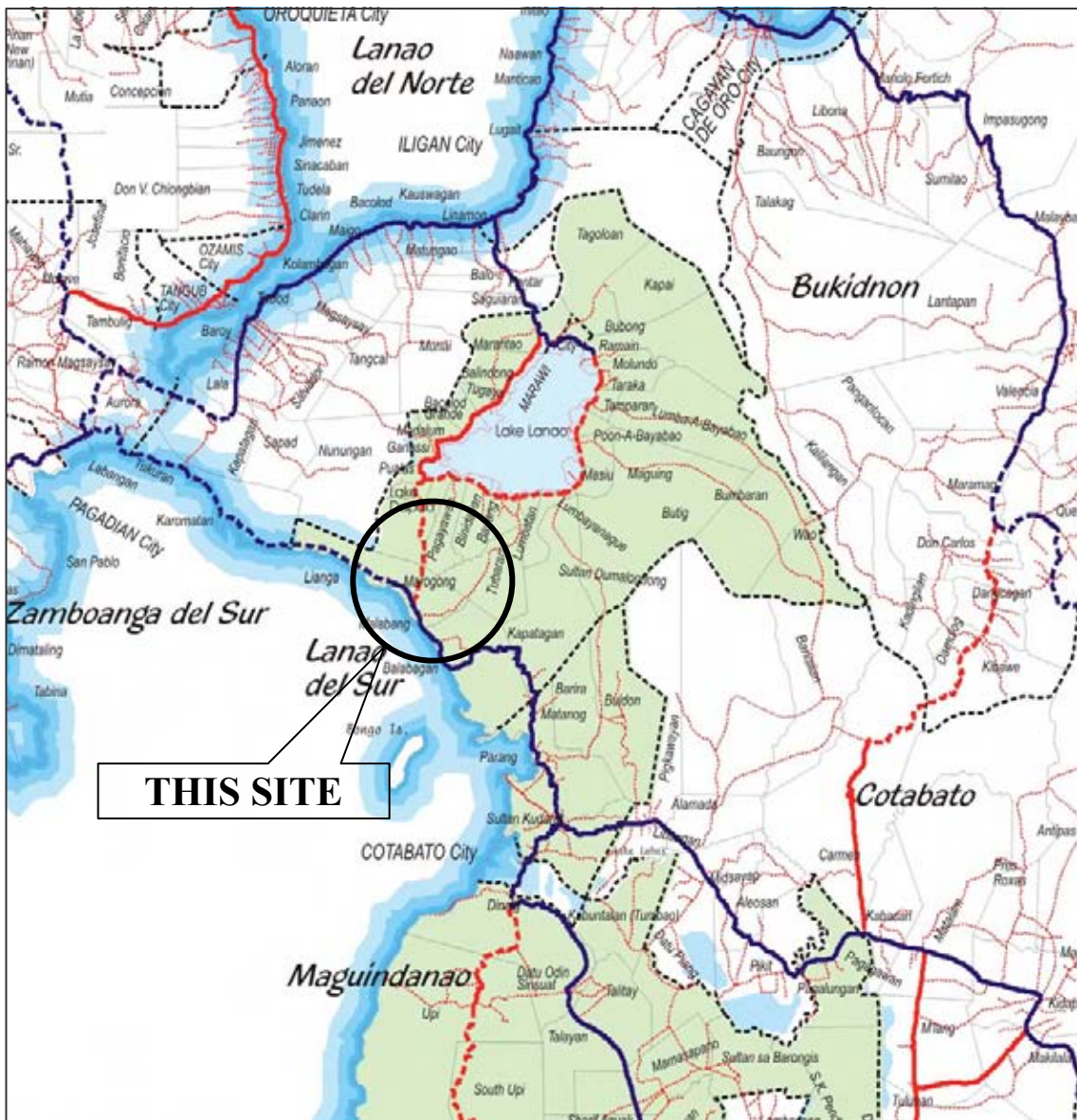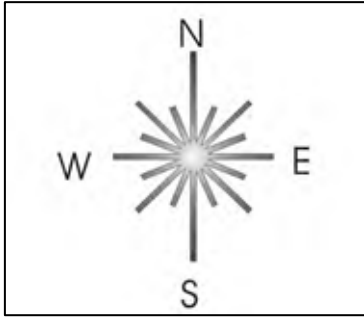
THIS SITE

MUNICIPALITY OF MAROGONG, PROVINCE OF LANAO DEL SUR

PHOTOGRAPHS

Along this road a communal faucet to be constructed

Water collector where residents are getting their potable water

The proposed transmission pipe be installed alongside with the road from the spring box to the reservoir

The intake box at Brgy. Piangologan having the same source of water spring

Proposed location of the elevated concrete reservoir

APPENDIX M5-1: UPPER IDTEG SCHOOL BUILDING CONSTRUCTION

IBNA Pre-Feasibility Study

1. Title and Location
School Building Construction in Barangay Upper Idteg, Municipality of Paglat, Maguindanao Province

2. Present Situation and Needs
Upper Idteg is one of the six barangays of Municipality Paglat, under the Autonomous Region in Muslim Mindanao (ARMM). Agriculture and fishing are the main source of income of the community. It is relatively plain and has a total land area of 1,938 hectares, 80% of which is well arable and 20% marshy. It has a population of 3,441 people based on 2007 Census.

During the IBNA, residents identified the building of school classrooms as their priority needs in the community. The construction of school building standard size measure 8m x 7m to be constructed at the Upper Idteg Elementary School to address the lack of classroom. In addition, the school needs a new toilet and chairs in the classroom.

Presently, there are 516 pupils enrolled at the school ranging from grade one to grade six. There are nine sections in the school, but only five sections have its own classroom. The school has only five classrooms. There are three sections for grade one, two classroom for grade two, and one each classroom for grade three to grade six.

There are two buildings with two classrooms each. One was constructed by the Department of Education and was handed over only last November 2007, and the other constructed by the Oxfam in April 2006. However, even with these new buildings, the growing population of the school children cannot be accommodated

To accommodate the require number of pupils, the school administration makeup the lack of classroom by using the school stage in their classes. There are also two units of classroom made up of wooden materials (sawali). The lack of classrooms makes the learning uneasy for children especially in the lower grades. In the grade one pupils, one section alone reaches as high as 85 pupils per classroom. This is far from the Department of Education standard requirement of 1.40 m² per pupils or 40 pupils per classroom. The proposed project will help address the need of additional classrooms to provide the children with quality education.

3. Project Concept
This particular subproject would consist of several components.

1. The construction of new one standard school building with three units 8 m x 7 m (56 m2) classroom
2. The provision of 120 monoblock chairs
3. The construction of two latrines intended for boys and girls

4. Benefits
The project will directly benefit all the 516 children at the school and their ten teachers. It will help them concentrate more to their lessons. The new building with the three classrooms could also be used for Madrasah classes during weekends.

5. Potential Risks
The risk is moderate since the school building would be turned-over to the administration of Upper Idteg Elementary School, and to the Department of Education of ARMM.

6. Costs Estimates

The initial estimated cost of the project is PhP 1.73 million, and broken down as follows:

Work Description	Total Cost
1. Construction of One (1) unit 3 Classroom School Building	1.30 M
2. Provision of 120 units chairs with arm (monoblock)	0.12 M
3. Construction of latrine (rest room)	0.15 M
Total	PhP 1.57 M
10% Contingency	0.16 M
Total Estimated Cost	**PhP 1.73 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Maguindanao Province is 6.99%, based on the 2007 Census
Growth rate (r) is 6.99%
Number of beneficiaries is 516 pupils and increasing yearly
Project Life is 15 years

Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years
Below is the computation of projected annual student population:
Table 1

Year	Projected Student, at rate of 6.99% $= P*(1+r)^n$
1	516
2	552
3	591
4	632
5	676
6	723
7	774
8	828
9	886
10	948
11	1,014
12	1,085
13	1,161
14	1,242
15	1,329

- **Cost**

Initial Cost: PhP 1.73 Million
Operation and Maintenance
   a) Assume cost of maintaining the building at PhP 30,000 per year, and cost of labor is 40%:
      Material Cost = PhP 30,000; Labor Cost = PhP 30,000*0.40 = PhP 12,000
      Total Cost = PhP 42,000; Assume increasing at the rate of 5% yearly
Below is the computation of projected annual operation and maintenance cost:

Table 2

Year	Total O&M projected at 5% per annum $= P*(1+r)^n$ (PhP)
1	42,000
2	44,100
3	46,305
4	48,620
5	51,051
6	53,604
7	56,284
8	59,098
9	62,053
10	65,156
11	68,414
12	71,834
13	75,426
14	79,197
15	83,157

- **Benefits**

Savings in the Transportation Cost:

Using the data from Table 1, projected student population.

    a) Assume 10% of students can reduce their transportation fee.

    b) Assume that PhP 20 is saved for transportation of pupils in 10 months at average of 20 days/month.

    c) Annual transportation cost is PhP 20*10 months*20 days/month = PhP 4,000, and increase at the rate of 5% yearly:

Below is the computation of projected annual transportation cost savings:

Table 3

Year	10% of Projected Population Pupil (Table 1)	Annual Transport Cost per Pupil	Total Annual Transport Cost Saving (PhP)
1	52	4,000	206,400
2	55	4,200	231,869
3	59	4,410	260,480
4	63	4,631	292,622
5	68	4,862	328,730
6	72	5,105	369,294
7	77	5,360	414,863
8	83	5,628	466,055
9	89	5,910	523,564
10	95	6,205	588,169
11	101	6,516	660,746
12	108	6,841	742,279
13	116	7,183	833,872
14	124	7,543	936,768
15	133	7,920	1,052,360

Increases Productivity and Earnings:

Research has established that every year of schooling increases individual wages for both men and women by a world average of about 10 percent. In poor countries, In poor countries, the gains are even greater. (Source: web.worldbank.org)

Using the data, from Table 1, projected student population;

    a) Assume that the minimum wage of ARMM is PhP 200/day; working day is 25days/month.
    b) Annual Wage is PhP 200*25 days*12month = PhP 60,000, and increase at the rate of 5% yearly.
    c) Assume that 10% of student can increase their wage in the future.
    d) Children start working the 11th year of the project.

Below is the computation of projected productivity and earnings:

Table 4

Year	10% of Projected Population (Table 1)	10% of Annual Wage Projected, at 5% yearly	Annual Wage Projected
1	0	6,000.00	0
2	0	6,300.00	0
3	0	6,615.00	0
4	0	6,945.75	0
5	0	7,293.04	0
6	0	7,657.69	0
7	0	8,040.57	0
8	0	8,442.60	0
9	0	8,864.73	0
10	0	9,307.97	0
11	52	9,773.37	504,306
12	55	10,262.04	566,535
13	59	10,775.14	636,442
14	63	11,313.89	714,976
15	68	11,879.59	803,200

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%.

All values are in million pesos.

Table 5

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Annual Transport Saving Cost (Table 3)	Increases Productivity and Earning (Table 4)	Subtotal Benefit (PhP)		
T	1.73		1.73				-1.73	-1.73
T-1		0.04	0.04	0.21	0.00	0.21	0.16	0.15
T-2		0.04	0.04	0.23	0.00	0.23	0.19	0.16
T-3		0.05	0.05	0.26	0.00	0.26	0.21	0.16
T-4		0.05	0.05	0.29	0.00	0.29	0.24	0.17
T-5		0.05	0.05	0.33	0.00	0.33	0.28	0.17
T-6		0.05	0.05	0.37	0.00	0.37	0.32	0.18
T-7		0.06	0.06	0.41	0.00	0.41	0.36	0.18
T-8		0.06	0.06	0.47	0.00	0.47	0.41	0.19

Year	Cost			Benefit			Total Cash Flow	NPV TCF/$(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Annual Transport Saving Cost (Table 3)	Increases Productivity and Earning (Table 4)	Subtotal Benefit (PhP)		
T-9		0.06	0.06	0.52	0.00	0.52	0.46	0.20
T-10		0.07	0.07	0.59	0.00	0.59	0.52	0.20
T-11		0.07	0.07	0.66	0.50	1.17	1.10	0.38
T-12		0.07	0.07	0.74	0.57	1.31	1.24	0.39
T-13		0.08	0.08	0.83	0.64	1.47	1.39	0.40
T-14		0.08	0.08	0.94	0.71	1.65	1.57	0.41
T-15		0.08	0.08	1.05	0.80	1.86	1.77	0.42

Solving for NPV, and IRR;

NPV = $\sum$Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)

NPV = 2.05

IRR = r ;where $\sum$Cash Flow (T-n)/ $(1+r)^n$-T=0, (n=1-15)

IRR = 20.2%

8. Attachment

Attached are the project location maps, the proposed development plan of Upper Idteg Elementary School as well as captioned photographs highlighting the road and its vicinity.

VICINITY MAP

N

Drawn not to scale:

Legend:

▬▬▬ - Municipal Road

🟨 - Household

🟥 - Proposed School Building

THIS SITE

Municipality
of Paglat

Municipality
Buluan

To Cotabato City

To Gen. Santos City

To Brgy. Tual

Upper Idteg
Elementary
School

**This is the Site of
Proposed 3 Classroom
Building Construction**

Brgy. Lower
Idteg

To Brgy.
Campo

Provincial
Road
(Graveled)

To Cotabato City

**Cotabato – Santos
City National
Highway**

To General Santos City

LOCATION MAP

KEY MAP
OF
MINDANAO

THIS SITE
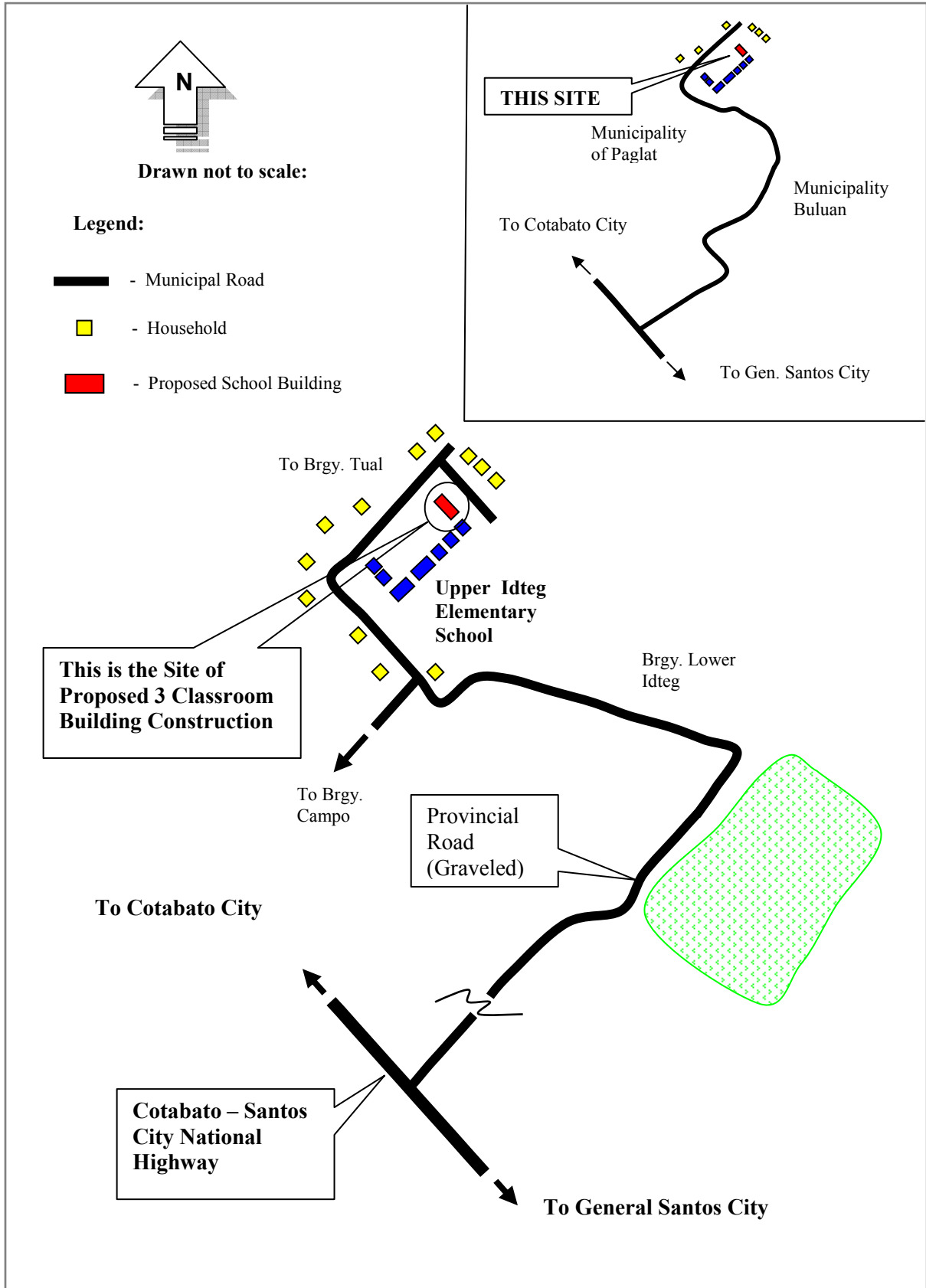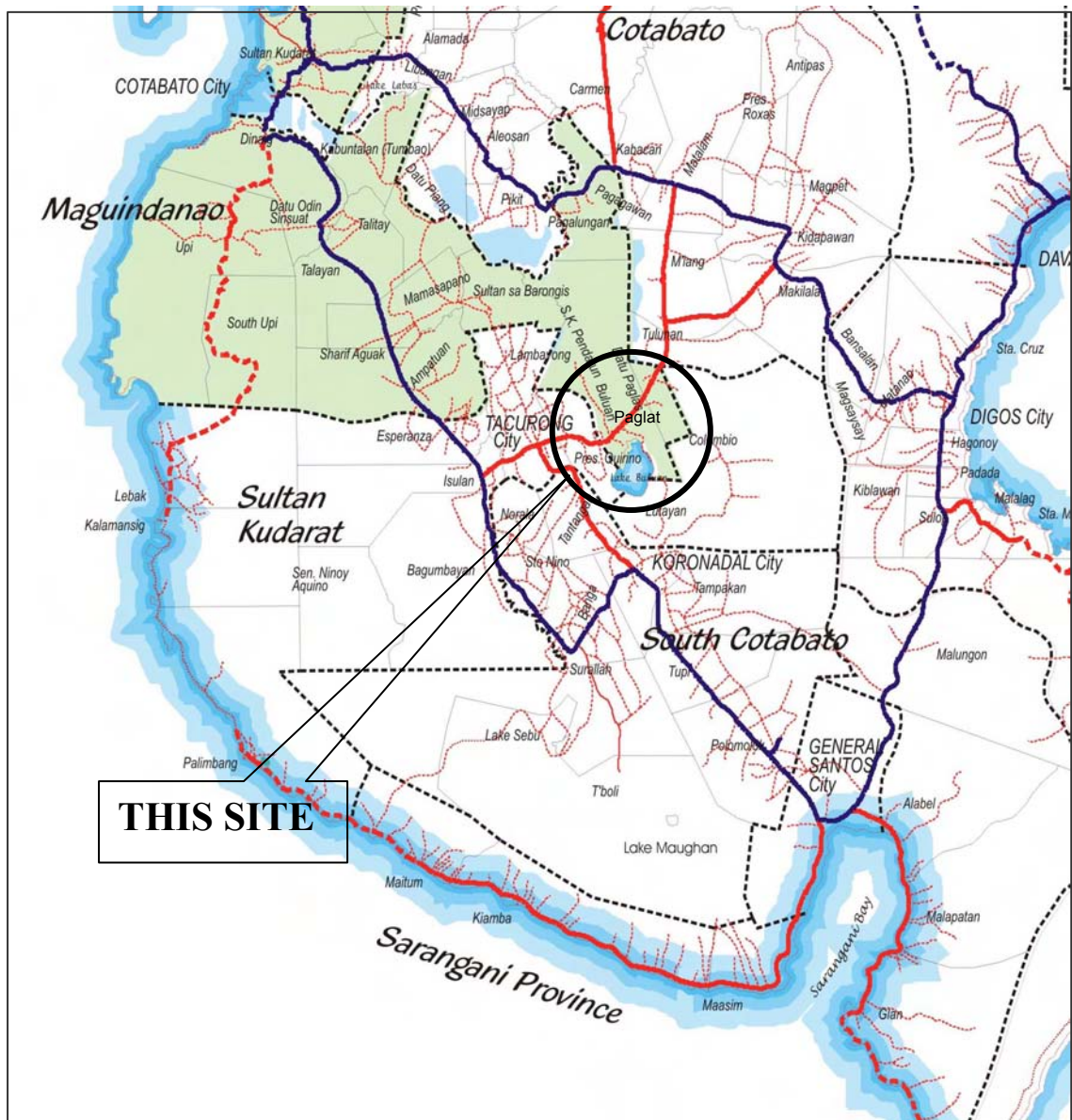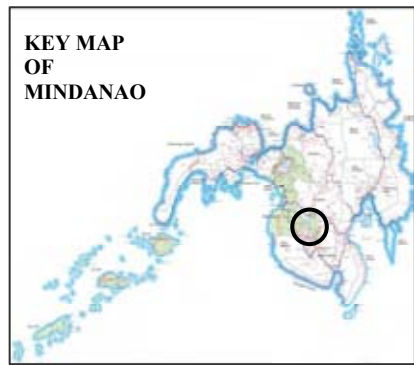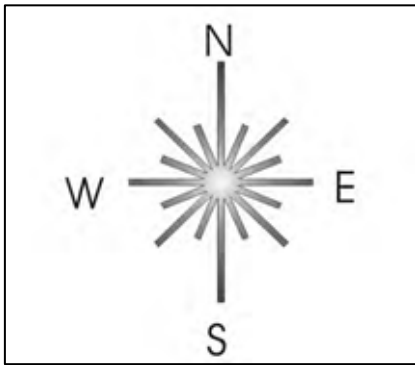
MUNICIPALITY OF PAGLAT, MAGUINDANAO PROVINCE

PHOTOGRAPHS

The school stage used as classroom

Teacher conducting classes at school stage

Classrooms without facilities such as windows, blackboard, and chairs

Classroom buildings made of light materials were students used in their daily regular classes

The location of proposed 3 classroom school building at the vicinity of Upper Idteg Elementary School

APPENDIX M6-1: SAMPAO HEALTH CENTER CONSTRUCTION

IBNA Pre-Feasibility Study

1. Title and Location
Health Center Construction in Barangay Sampao, Municipality of Lutayan, Sultan Kudarat Province

2. Present Situation and Needs
The Municipality of Lutayan is a third class municipality in Sultan Kudarat Province. According to the 2007 National Census, it has a population of 51,640 people. Lutayan Municipality is located on Eastern portion of the province some 50 km from the capital of province, Isulan. The economy of Lutayan is largely based on agriculture due to vast rice field. Aquaculture is the next income earner, with particularly milkfish and tilapia, and other fresh water fishes owning to its proximity of the Lake Buluan.

The Barangay Sampao is located at approximately 5 km and a 15 minutes drive to the Cotabato-General Santos National Highway. It is bounded by the municipality of Buluan at the north, the Lake Buluan at the east, the Barangay Maindang at the south, and the municipality of Tantangan at the west. Its plain area is suited to all kinds of crops such as rice corn, coconut, vegetables, fruit trees and plantation crops. Barangay Sampao can be reached by car along a graveled road. However, there are no regular public jeepneys plying in the area; their means of transportation is single motorcycle and motorcycle with sidecar at 15 peso fare.

Much attention of the community is now focused on the technical quality of health services. Priority is also given to facilitating greater community participation in assessing health needs and evaluating health programs at the community level.

During the IBNA, the residents prioritized the construction of health center. At present, the Barangay Sampao has no public health center. This means that no public health service is available in time of emergency; they have to bring patients to a hospital in Koronadal City which is 15 km away even though this costs them a lot. The common sicknesses among the children are diarrhea, malnutrition, measles, influenza, bronchitis, pneumonia, and skin diseases. There is a regular midwife and barangay health workers assigned in the Barangay Sampao, without a facility for practice.

This project would aim to provide a community health center to Barangay Sampao. The proposed facility would be used for medical consultations and regular health services for people in the area. This project would provide the construction of 6m x 8m (48 m^2) community health center building with office space and a comfort room. The facility would help the residents in the community by improving the accessibility to health and at the same time reducing the cost of transportation.

3. Project Concept
This particular subproject would consist of several components.

1. The construction of a Barangay Health Center of the size of 6m x 8m, with two rooms and a comport room.
2. The installation of water and electrical facilities, and procurement of office supplies such as tables and chairs.

4. Benefits
The project would directly benefit the approximately 2,000 residents of Barangay Sampao. The facility would provide the community a place where to conduct basic health care, regular medical check-up, family planning services, maternal and child health care, nutrition consultation, among other medical health services. The facility would reduce expenditures of the residents since they

would no longer have to travel to the hospital for minor sickness. Transport cost from the barangay to the hospital is 50 peso by motorcycle for one way travel.

5. Potential Risks

The project risk is the possibility that the proposed health center cannot maintained by the local government units (LGU) both the barangay and municipal. Particularly if no regular government workers such as midwife and health workers are assigned, it would underutilized.

6. Costs Estimates

The initial estimated cost of the project is PhP 0.51 million and broken down as follows:

WORK DESCRIPTION	Total Cost
1. The construction of one (1) unit Barangay Health Center measure 6.0m x 8.0m with two (2) rooms and comport room	PhP 0.40 M
2. Supply of office supplies such as tables and chairs	PhP 0.06 M
Total	PhP 0.46 M
10% Contingency	PhP 0.05 M
Total Estimated Cost	**PhP 0.51 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Sultan Kudarat is 2.52%, based on the 2007 National Census. Growth rate (r) is 2.52%.
Number of beneficiaries is 2,000 persons more or less.
Project Life is 15 years.
Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years
Below is the computation of projected annual population:
Table 1

Year	Projected Population = $P*(1+r)^n$
1	2,000
2	2,050
3	2,102
4	2,155
5	2,209
6	2,265
7	2,322
8	2,381
9	2,441
10	2,502
11	2,565
12	2,630
13	2,696
14	2,764
15	2,834

- **Cost**

Initial Cost: PhP 0.51
Operation and Maintenance:
   a) Assume cost of maintaining the building and medicines at PhP 5,000/month*12month= PhP 60,000 per year including labor cost. Assume an increase of 5% per annum.

b) Assume cost of a health workers Php200/day*25 days*12= PhP 60,000 per year. Assume an increase of 5% per annum.

Total cost=maintenance cost+ worker cost=PhP120,000.

Below is the computation of projected operation and maintenance annual cost:

Table 2

Year	Total O&M Cost projected at 5% per year (PhP)
1	120,000
2	126,000
3	132,300
4	138,915
5	145,861
6	153,154
7	160,811
8	168,852
9	177,295
10	186,159
11	195,467
12	205,241
13	215,503
14	226,278
15	237,592

- **Benefits**

Savings in the Cost of Transportation:

Using the data from Table 1, the projected population

a) Assume that PhP 50 is saved for transportation of 25% of the population at thrice a year
b) Assume the transportation cost is PhP 50*3*2 (vice versa)
c) The total cost of transportation save is PhP 300, and increasing at 5% yearly

Below is the computation of product transport cost savings:

Table 4

Year	Projected Population of 25% (Table 1)	Annual Tansport Cost (PhP)	Total Annual Transport Saving Cost (PhP)
1	500	300	150,000
2	525	315	161,469
3	551	331	173,815
4	579	347	187,105
5	608	365	201,411
6	638	383	216,811
7	670	402	233,388
8	704	422	251,233
9	739	443	270,442
10	776	465	291,120
11	814	489	313,379
12	855	513	337,340
13	898	539	363,133
14	943	566	390,898
15	990	594	420,787

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%.

All values are in million pesos.

Table 4

Year	Cost			Benefit		Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Saving Cost of Medicine (Table 3)	Subtotal Benefit (PhP)		
T	0.51		0.51			-0.51	-0.51
T-1		0.12	0.12	0.15	0.15	0.03	0.03
T-2		0.13	0.13	0.16	0.16	0.04	0.03
T-3		0.13	0.13	0.17	0.17	0.04	0.03
T-4		0.14	0.14	0.19	0.19	0.05	0.03
T-5		0.15	0.15	0.20	0.20	0.06	0.03
T-6		0.15	0.15	0.22	0.22	0.06	0.04
T-7		0.16	0.16	0.23	0.23	0.07	0.04
T-8		0.17	0.17	0.25	0.25	0.08	0.04
T-9		0.18	0.18	0.27	0.27	0.09	0.04
T-10		0.19	0.19	0.29	0.29	0.10	0.04
T-11		0.20	0.20	0.31	0.31	0.12	0.04
T-12		0.21	0.21	0.34	0.34	0.13	0.04
T-13		0.22	0.22	0.36	0.36	0.15	0.04
T-14		0.23	0.23	0.39	0.39	0.16	0.04
T-15		0.24	0.24	0.42	0.42	0.18	0.04

Solving for NPV, and IRR;
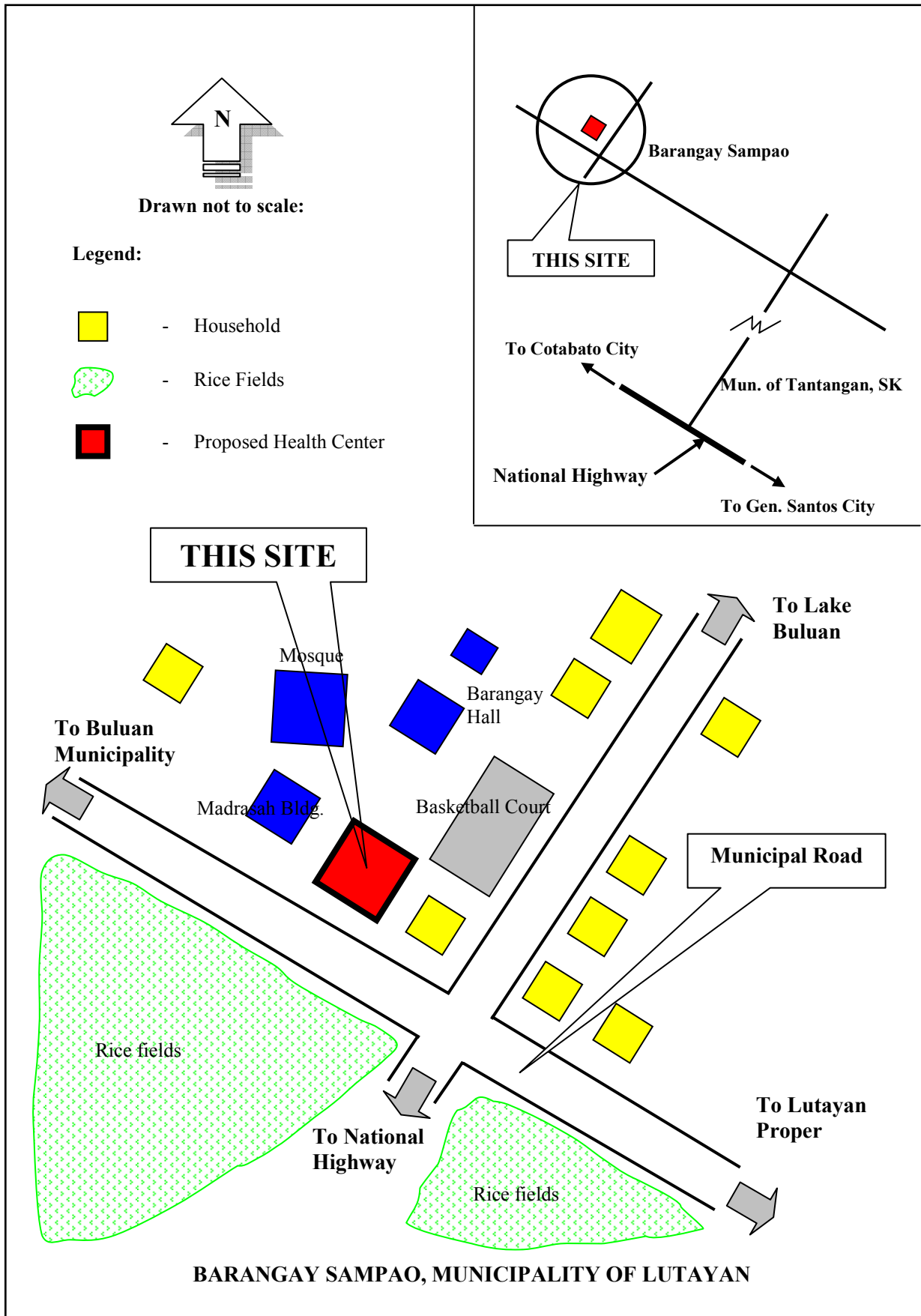
$NPV = \sum Cash\ Flow\ (T-n)/(1+oc)^{n}-T, (n=1-15)$

NPV = 0.05

$IRR = r$;where $\sum Cash\ Flow\ (T-n)/(1+r)^{n}-T=0, (n=1-15)$
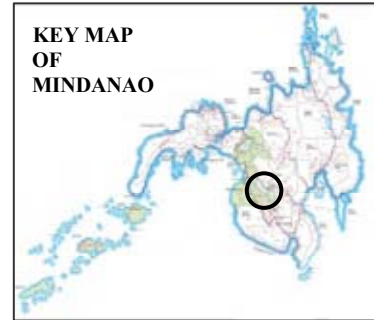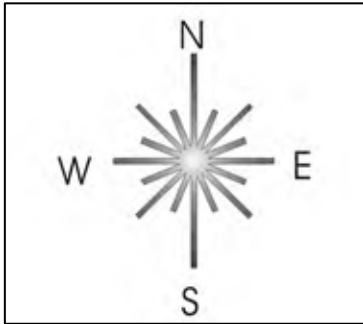
IRR = 11.2%

8. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Sampao Health Center as well as captioned photographs.

VICINITY MAP

N

Drawn not to scale:

Legend:

- Household

- Rice Fields

- Proposed Health Center

THIS SITE

Barangay Sampao

THIS SITE

To Cotabato City

Mun. of Tantangan, SK

National Highway

To Gen. Santos City

THIS SITE

Mosque

Barangay Hall

To Lake Buluan

To Buluan Municipality

Madrasah Bldg.

Basketball Court

Municipal Road

Rice fields

To National Highway

Rice fields

To Lutayan Proper

BARANGAY SAMPAO, MUNICIPALITY OF LUTAYAN

LOCATION MAP

KEY MAP
OF
MINDANAO

MUNICIPALITY OF LUTAYAN, SULTAN KUDARAT PROVINCE

PHOTOGRAPHS

PROPOSED LOCATION OF SAMPAO HEALTH CENTER CONSTRUCTION

APPENDIX M7-1: BUGAWAS IRRIGATION SYSTEM DEVELOPMENT

IBNA Pre-Feasibility Study

1. Title and Location

Irrigation System Development in Barangay Bugawas, Municipality of Datu Odin Sinsuat Shariff Kabunsuan Province

2. Present Situation and Needs

The Municipality of Datu Odin Sinsuat is a second class municipality and the capital town of Shariff Kabunsuan Province. According to the 2007 census, it has a population of 103,765 people and politically subdivided into 34 barangays, and an area of 503.20 km². It is bounded at the north by Cotabato City, at the east by the municipality of Kabuntalan, at the south by the municipality of Upi , and at the west by the Celebes Sea.

Barangay Bugawas is one of the barangays of Datu Odin Sinsuat Municipality; it has an estimated area around 2,500 hectares. Agriculture land comprises the largest part of total 1,000 hectares or 40% of the total land area. It is situated in South part of the municipality, it is bounded by Barangay Pinguiaman on the north, Barangay Sapalan on the east, Barangay Sifaran on the west, and Barangay Kurintem at the Nouth side. It is approximately 5 kilometers away from the Poblacion. Although it is passes the Cotabato – General Santos City National Highway, the barangay has no road connecting each Sitio going to Barangay proper.

Barangay Bugawas has a total population of 2,713 persons based on 2007 National Census Survey. Since the majority is the native settlers in the barangay, almost of them have owned adequate land suit for agriculture. Agriculture is the main livelihoods of the constituents it comprises 60% of the populace are engaged in farming and their main produce is rice. Others are coconut, mangoes, corn, and other root crops. According to the farmers, the area planted with rice constitutes approximately 410 hectares. However, their main problem is the low in production due lack of agriculture facilities, high cost of fertilizer, and no rice field irrigation.

Without irrigation canal on the rice fields, it can harvest rice only at once a year. On areas with irrigation canal it can harvest at three times a year. There is an existing irrigation canal funded by the Mindanao Rural Development Program (MRDP) in the area but only 60% were accomplished. The irrigation line canal started at the Poblacion Sapalan going to Barangays Bugawas and Pinguiaman but it did not completed. The project was undertaken by the National Irrigation Administration (NIA) Maguindanao Province, in the year 2002.

The project was discontinued and stopped at Barangay Bugawas. The project was supposed to be a 5.5 km long with cost amounting to Twelve Million Pesos. According to the plan, the project consists of Phase I, and Phase II project. The exiting line canal is rectangular in shape measured 0.90 meter in width, 0.80 meter in depth, and 0.10 meter in thickness. They are requesting that the project be continued from Barangay Bugawas to Barangay Pinguiaman of more or less 2 kilometers additional irrigation canal. The canal gets the water source from the Buterin creek just approximately 300 meters away from the beginning of the line canal.

3. Project Concept

This particular subproject would consist of several components.

1. Clearing and removal of debris along 2 kilometer new irrigation line canal. The filling (embankment) of base materials intended to meet the design slope of the canal;
2. Excavating and trimming of the proposed line canal;

3. The construction of new reinforce concrete irrigation line canal (U-ditch type) connecting to the existing line canal. The dimension is the same with the existing, 0.90 meter in width, 0.80 meter in depth, and 0.10 meter in thickness, and;
4. Construction of top support on the canal to facilitate buckling at 5 meter on center along the whole stretch of the canal.

4. Benefits

The project will directly benefit at least 3,000 resident farmers of Barangay Bugawas and Barangay Pinguiaman. The project will provide additional 250 hectares of irrigated farm rice fields, in terms of harvesting at three times a year. Also, it generates at least 100 hectares new farmland that has not been developed.

The project will give the farmers additional income of at least 100% or Php 50,000 per hectare, because they can have their harvest at three times a year. Based on the field data gather, the farmers can harvest at an average of 100 sacks per hectare per harvest. This figure shows that for 250 hectares of rice field alone, it can produce additional 3,750 tons of rice per year, or equivalent of Php 37.00 million per annum.

This can greatly improve the living condition of the farmers in the area. Economic benefits will occur as a result of broad economic development that will take place in the area due to improved farming area, leading to greater employment and livelihood opportunities. It will also result in increased opportunities for commerce and employment, many residents will engage in rice farming.

5. Potential Risks

The possible risk in the project is the Operation and Maintenance (O & M) of the project after the turn-over. The farmer in the area which have been benefited the project must form an association in overseeing the operation and maintenance to sustain the project.

6. Costs Estimates

The initial estimated cost of the project is Php 8.58 million and broken down as follows:

DESCRIPTION OF ITEM	TOTAL
1.) Clearing and removal of debris and embankment for 2,000 meter @ PhP 500 per linear meter	P 1.00 M
2.) Excavating and trimming of line canal for the 2,000 meter @ PhP 400 per linear meter	P 0.80 M
3.) Construction of rectangular irrigation line canal (U-ditch type) of 2,000 meters length @ Php 3,000 per linear meter	P 6.00 M
Total	P 7.80 M
10% Contingency	P 0.78 M
Total Estimated Cost	**P 8.58 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Shariff Kabunsuan Province is 6.12%, based on the 2007 National Census
Growth rate (r) is 6.12%
Numbers of beneficiaries are approximately 3,000 farmers more or less
Project Life is 15 years

● **Cost**
Initial Cost: PhP 8.58 Million

Operation and Maintenance

    a)   Assume cost of maintaining the line canal is PhP 200/linear meter/year, including the labor.

    b)   Total Annual Cost = PhP 200/m.*2,000 m = PhP 400,000, assume a yearly increase of 5%

Below is the computation of projected annual O&M cost:

Table 1

Year	Total Annual O&M projected $= P*(1+r)^n$ (PhP)
1	400,000
2	420,000
3	441,000
4	463,050
5	486,203
6	510,513
7	536,038
8	562,840
9	590,982
10	620,531
11	651,558
12	684,136
13	718,343
14	754,260
15	791,973

Cost to develop non-irrigated land

For the development of 250 hectares non irrigated farm land

    a) Assume Development Cost: PhP 20,000/hectare

    b) Total Cost: PhP 250 ha*20,000/ha = PhP 5,000,000

    To be develop within 5 years: PhP 5,000,000/5 years = PhP 1,000,000/year, at 5% increase/year

    Assume maintenance of PhP 5,000/year/hectare for the next years,

    C) beginning on the 6th year O&M Cost: PhP 5,000/year/hectare*250 hectares = PhP 1,250,000, at 5% increase/year

Below is the computation of projected annual O&M cost:

Table 2

Year	Total Annual O&M projected $= P*(1+r)^n$ (PhP)
1	1,000,000
2	1,050,000
3	1,102,500
4	1,157,625
5	1,215,506
6	1,595,352
7	1,675,120
8	1,758,876
9	1,846,819
10	1,939,160
11	2,036,118
12	2,137,924
13	2,244,820
14	2,357,061
15	2,947,435

Operation and Maintenance to develop idle land

For the development of the 100 hectares idle land

Cost to develop for irrigation canal to connect from the main line

    a) Assume Development Cost: = PhP 20,000/hectare

    b) Assume developing of land like clearing, tiling, and others at PhP 5/sq.m
       Cost: PhP 5/sq.m.*10,000 sq.m. = PhP 50,000/hectare

    Total Cost: PhP 20,000+50,000 = PhP 70,000/hectare

    Total Cost to develop: PhP 70,000/hectare*100hectare = PhP 7,000,000

    To be develop within 5 years: PhP 7,000,000/5 years = PhP 1,400,000/year, at 5% increase/year

    Assume maintenance of PhP 5,000/year/hectare for the next years,

    c) Beginning on the 6th year Cost: PhP 5,000/year/hectare*100 hectares = PhP 500,000, at 5% increase/year

Below is the computation of projected annual O&M cost:

Table 3

Year	Total Annual O&M projected $= P*(1+r)^n$ (PhP)
1	1,400,000
2	1,470,000
3	1,102,500
4	1,157,625
5	1,215,506
6	638,141
7	670,048
8	703,550
9	738,728
10	775,664
11	814,447
12	855,170
13	897,928
14	942,825
15	989,966

- **Benefits**

Additional Income for the development of farm and idle lands

Production of farm land before the project

Table 4

Crops	No. of Hectares (Hectare)	Present Production (Sack)	Cycle	Total (Sack)	Market Value Per Sack (PhP)	Total Amount/Year (PhP)
Rice	250 (not irrigated)	100	2	50,000	500	25,000,000
Rice	100 (idle land)	none				
TOTAL						**25,000,000**

Production of farm land after the project
Table 5

Crops	No. of Hectares (Hectare)	Present Production (Sack)	Cycle	Total (Sack)	Market Value Per Sack (PhP)	Total Amount/Year (PhP)
Rice	250 irrigated	100	3	75,000	500	37,500,000
Rice	100 (idle land before)	100	3	30,000	500	15,000,000
TOTAL						**52,500,000**

Production price is PHP 500 per sack and increasing 5% yearly.
Benefits = Production after – Production before.
Benefits = From Table 4 & 5; PhP 52,500,000 – PhP 25,000,000=PhP 27,500,000, assume increasing at 5% yearly.
Amount of production increases at 20% yearly from the 1st year until 5th year.
Prow is the computation of projected annual benefits:
Table 6

Year	Production price/sack	Amount of increased production	Total Benefits
1	500	5,500	2,750,000
2	525	11,000	5,775,000
3	551	16,500	9,095,625
4	579	22,000	12,733,875
5	608	27,500	16,713,211
6	638	27,500	17,548,871
7	670	27,500	18,426,315
8	704	27,500	19,347,631
9	739	27,500	20,315,012
10	776	27,500	21,330,763
11	814	27,500	22,397,301
12	855	27,500	23,517,166
13	898	27,500	24,693,024
14	943	27,500	25,927,676
15	990	27,500	27,224,059

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**
Assume the opportunity cost (oc) of capital cost is 5%
All values are in million pesos.
Table 7

Year	Cost					Benefit		Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O & M (Table 1)	Operating Cost to Develop Land (Table 2)	Operating Cost to Develop Idle Land (Table 3)	Subtotal Cost (PhP)	Total Amount Annually (PhP) (Table 6)	Subtotal Cost (PhP)		
T	8.58				8.58			-8.58	-8.58
T-1		0.40	1.00	1.40	2.80	2.75	2.75	-0.05	-0.05
T-2		0.42	1.05	1.47	2.94	5.78	5.78	2.84	2.34
T-3		0.44	1.10	1.10	2.65	9.10	9.10	6.45	4.85

Year	Cost					Benefit		Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O & M (Table 1)	Operating Cost to Develop Land (Table 2)	Operating Cost to Develop Idle Land (Table 3)	Subtotal Cost (PhP)	Total Amount Annually (PhP) (Table 6)	Subtotal Cost (PhP)		
T-4		0.46	1.16	1.16	2.78	12.73	12.73	9.96	6.80
T-5		0.49	1.22	1.22	2.92	16.71	16.71	13.80	8.57
T-6		0.51	1.60	0.64	2.74	17.55	17.55	14.80	8.36
T-7		0.54	1.68	0.67	2.88	18.43	18.43	15.55	7.98
T-8		0.56	1.76	0.70	3.03	19.35	19.35	16.32	7.61
T-9		0.59	1.85	0.74	3.18	20.32	20.32	17.14	7.27
T-10		0.62	1.94	0.78	3.34	21.33	21.33	18.00	6.94
T-11		0.65	2.04	0.81	3.50	22.40	22.40	18.90	6.62
T-12		0.68	2.14	0.86	3.68	23.52	23.52	19.84	6.32
T-13		0.72	2.24	0.90	3.86	24.69	24.69	20.83	6.03
T-14		0.75	2.36	0.94	4.05	25.93	25.93	21.87	5.76
T-15		0.79	2.47	0.99	4.26	27.22	27.22	22.97	5.50

Solving for NPV, and IRR;
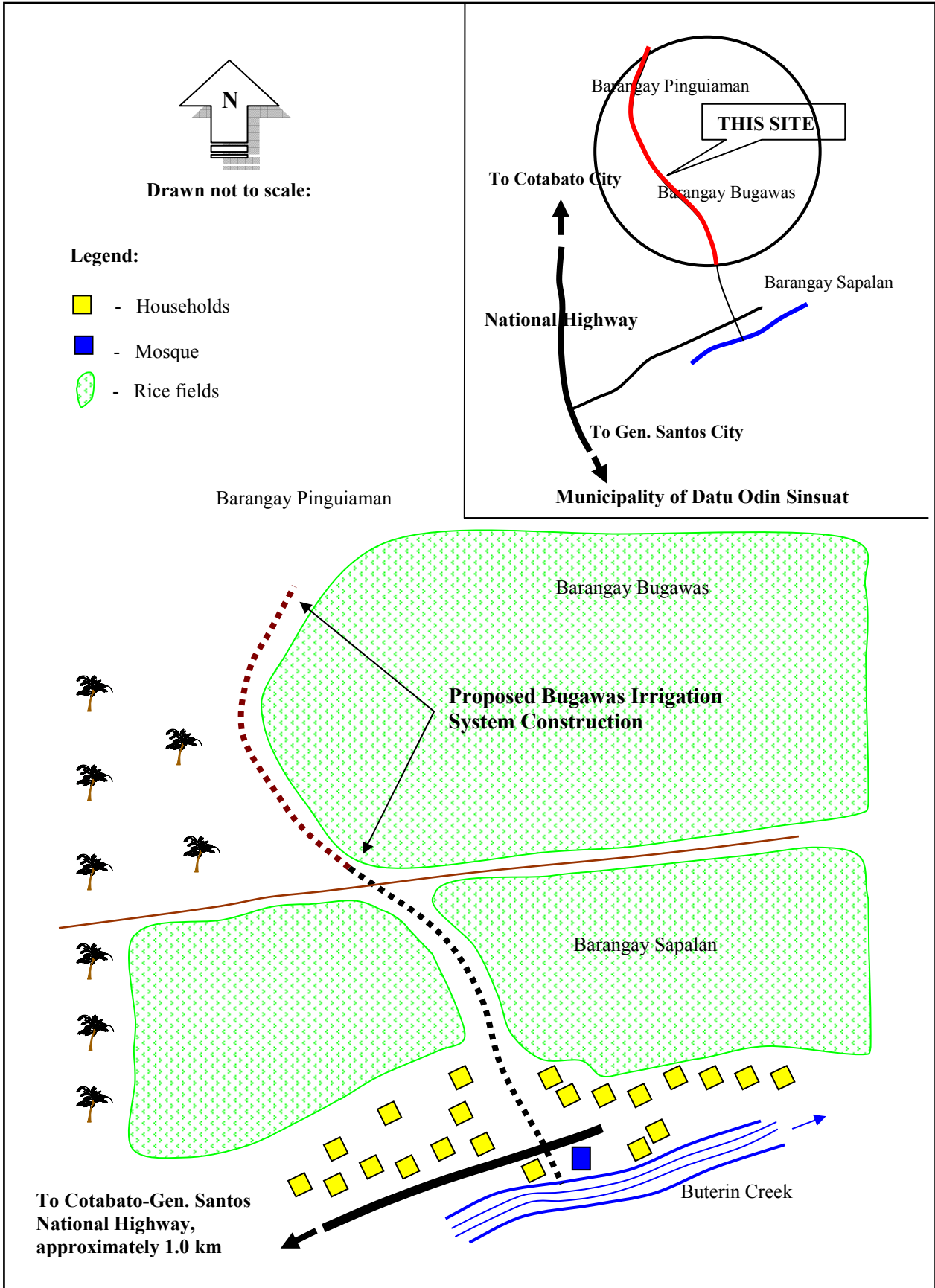NPV = $\sum$Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)
NPV = 82.32

IRR = r ;where $\sum$Cash Flow (T-n)/ $(1+r)^n$-T=0, (n=1-15)
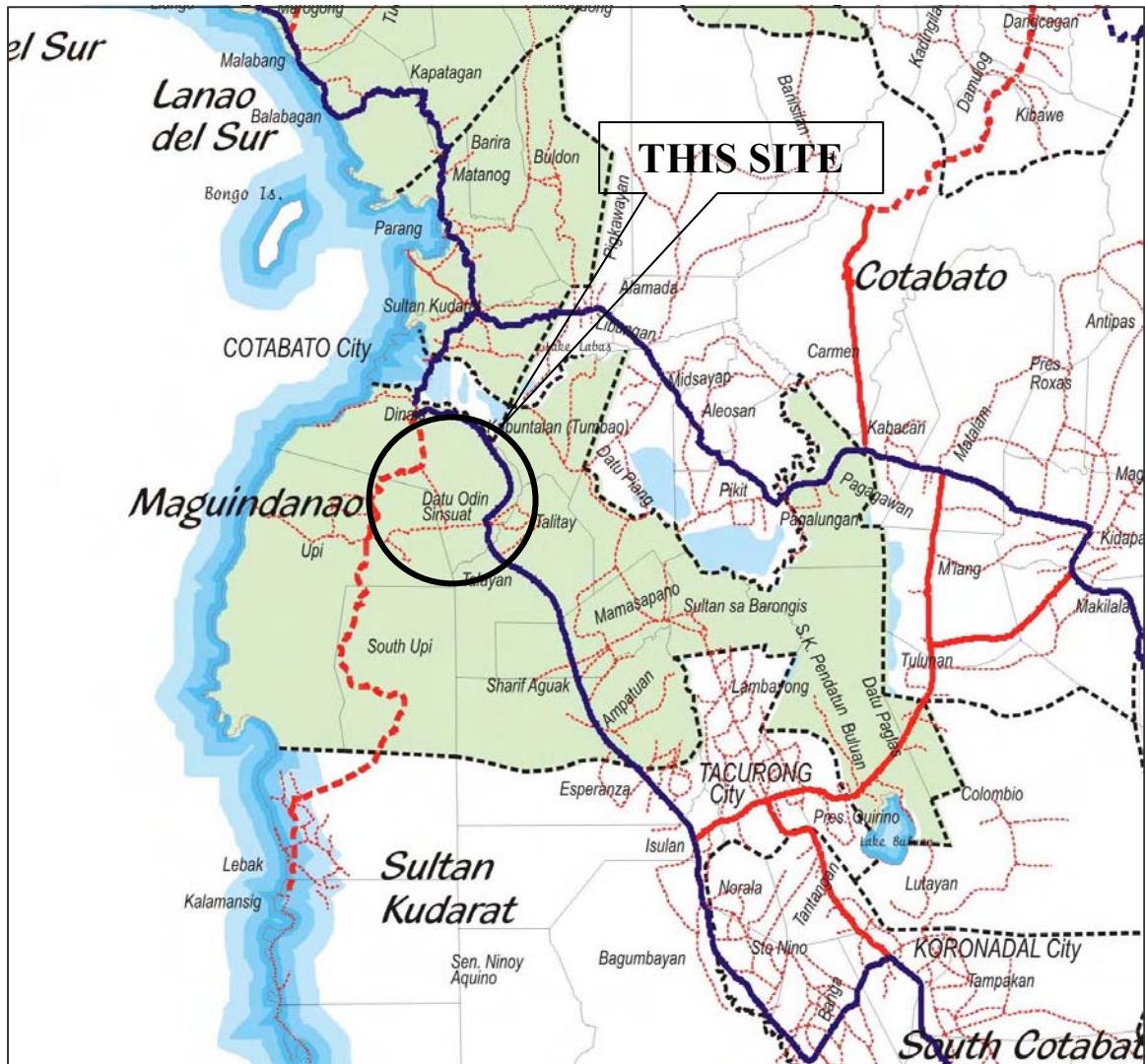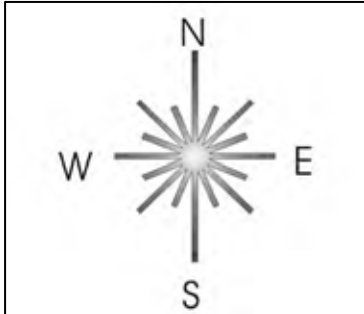**IRR = 57.8%**

8. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Barangay Bugawas Irrigation System as well as captioned photographs.

VICINITY MAP

Drawn not to scale:

Legend:

- **Households**
- **Mosque**
- **Rice fields**

N

Barangay Pinguiaman

THIS SITE

To Cotabato City

Barangay Bugawas

National Highway

Barangay Sapalan

To Gen. Santos City

Municipality of Datu Odin Sinsuat

Barangay Pinguiaman

Barangay Bugawas

Proposed Bugawas Irrigation System Construction

Barangay Sapalan

To Cotabato-Gen. Santos National Highway, approximately 1.0 km

Buterin Creek

LOCATION MAP

THIS SITE

MUNICIPALITY OF DATU ODIN SINSUAT, SHARIFF KABUNSUAN PROVINCE

PHOTOGRAPHS

The existing Irrigation System at Barangay Sapalan

The Proposed Irrigation Lined Canal construction at Barangay Bugawas

The Proposed Irrigation Lined Canal construction of approximately 2,000 linear meters

The source of water at Buterin Creek

Also shown Brgy. Pinguiaman can benefit the project

APPENDIX M8-1: DALADAP RIVER PROTECTION

IBNA Pre-Feasibility Study

1. Title and Location
River Protection Construction in Barangays Salabaca, and Daladap, Municipality of Esperanza, Sultan Kudarat Province

2. Present Situation and Needs
The Municipality of Esperanza is one of the eleven municipalities of the province of Sultan Kudarat in Mindanao. The municipality is bounded at the north by Municipality of Ampatuan, Province of Maguindanao, at the east by Municipality of Lambayong, at the west by Municipality Lebak, and at the south by Municipality of Isulan. It is approximately 13 kilometers from Isulan, the province capital. Esperanza is basically an agricultural municipality. It has vast tracts of irrigated and non-irrigated land for rice production.

Barangay Daladap is one of the barangays of Municipality of Esperanza. It has a total land area of 1,397.15 hectares with a population of 2,570 persons based on the 2007 National Census. Most of the people in the barangay are engaged in agricultural production of which accounts to 80% of populace. It major crops are rice and corn which constitute of 727 hectares and 550 hectares respectively. The average yield per hectare is 5 metric ton and 3.5 metric ton of rice and corn respectively. Also abundant crops are banana, coconut, sugarcane, palm oil, seasonal fruit trees, and other root crops.

Daladap is a flat barangay characterized by fertile soil with plain and low lying elevation. The road to the barangay is a graveled road and connects to different barangay in the municipality, and it is approximately 6.50 kilometers from the Poblacion. However, the soil in the barangay is susceptible to erosion especially in those are located near the banks of the Allah River. The river separating the town of Esperanza from Isulan, and Lambayong is the Allah River considered one of the biggest rivers in the province. The area is occurring occasionally a flash flood especially during raining seasons from July to December.

The barangays of Esperanza that frequent flooding are New Panay, Salabaca, Guiamalia, Sagasa, and Daladap. According to the reports from the Municipal Planning and Development Council (MPDC), approximately 3,562 hectares are considered endanger of eroding. The most affected areas are barangays Salabaca, and Daladap, because these barangays are adjacent to the river. Other areas which are critical of eroding totaled to 1,781 hectares of 5% of the town's total area.

The farmers in those near the bank of the river cannot plant their crops throughout the year because of frequent flooding. According to the local residents the river becomes widen its width every time the flood occurred. Some areas of land are reduced and become part of the river. In Barangay Daladap, the most affected the river widen up to 200 meters. Most of the farmers near the bank of river are discourage in planting their crops. The land becomes idle land, but some are taking their risk by planting corn and sugarcane. Farmers can only utilize their land for two cropping season; others are planting not so value crops.

The project purpose is to protect the river bank from eroding by means of constructing a concrete wall along the side of the river to avoid from further soil erosion and protecting the place from flash blood. The total length of flood protection is approximately 7 kilometers long. In terms of financial resources, the municipality does not have the capability in constructing the river wall protection.

3. Project Concept
This particular subproject would consist of the components as follows.

- Constructing a concrete river flood control. The high is 3 meter (variable) in height, and a width of 0.50 meter, with concrete footing. The total length is approximately 7 kilometers.

4. Benefits

The project will directly benefit the at least 2,000 people living in Barangay Daladap and some part of Barangay Salabaca. The project will provide residents in barangays the opportunity to cultivate and develop approximately 200 hectares idle lands. Farmers can have additional planting area to plant crops to increase their income.

Flash flood can be reduced if not totally control may help residence save their money during the calamities. Soil erosions can be prevented with the construction of flood control. Economic benefits will occur as a result of protection of property which increases farming activities in the area urging the farmers to plant more crops.

5. Potential Risks

The potential risk can be considered is design of the river flood control. Detailed engineering design such as topographic surveys, geotechnical surveys and other engineering parameters should be taken into consideration before the design is considered.

6. Costs Estimates

The initial estimated cost of the project is Php 38.50 million and broken down as follows:

DESCRIPTION OF ITEM	TOTAL
1.) Construction of river flood control of approximately 7 kilometers for the protection of river. (Php 5,000 per linear meter)	P 35.00 M
Total	P 35.00 M
10% Contingency	P 3.50 M
Total Estimated Cost	**P 38.50 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Sultan Kudarat Province is 2.52%, based on the 2007 National Census.
Growth rate (r) is 2.52%.
Numbers of beneficiaries are approximately 2,000 persons.
Approximately 3,562 hectares of agricultural land is considered danger of eroding.
Additional of 200 hectare agricultural land to be developed.
Project Life is 15 years.

- **Cost**

Initial Cost: PhP 38.50 Million
Operation and Maintenance
    a) Assume cost of maintaining the river protection PhP 500,000/km/month including labor cost.
    b) Total Annual Cost = PhP 500,000*12 = PhP 6,000,000/year, and increasing at 5% per year.

Below is the computation of projected annual O&M cost:
Table 1

Year	Total O & M 5% increase yearly (PhP)
1	6,000,000
2	6,300,000
3	6,615,000

Year	Total O & M 5% increase yearly (PhP)
4	6,945,750
5	7,293,038
6	7,657,689
7	8,040,574
8	8,442,603
9	8,864,733
10	9,307,969
11	9,773,368
12	10,262,036
13	10,775,138
14	11,313,895
15	11,879,590

- **Benefits**

Additional Income for the development of idle lands:
   a) Assume the agricultural lands would yield an average of 100 sacks of corn at two cropping per year, and the price is PhP 8/kg, and increasing at 5% per year
   b) Average production per hectare = 100 sacks*50 kg/sack*2 cropping cycle=PhP 10,000kg/year/ha
   c) Idle lands will be developed at the rate of 40 /ha/year until 5th year.

Below is the computation of projected annual income:

Table 2

Year	Price per kg of corn (PhP)	Area of idle land developped (hectares)	Amount of production/ha /year	Annual Projected Income (PhP)
1	8	40	10,000	3,200,000
2	8	80	10,000	6,720,000
3	9	120	10,000	10,584,000
4	9	160	10,000	14,817,600
5	10	200	10,000	19,448,100
6	10	200	10,000	20,420,505
7	11	200	10,000	21,441,530
8	11	200	10,000	22,513,607
9	12	200	10,000	23,639,287
10	12	200	10,000	24,821,251
11	13	200	10,000	26,062,314
12	14	200	10,000	27,365,430
13	14	200	10,000	28,733,701
14	15	200	10,000	30,170,386
15	16	200	10,000	31,678,906

Money Saving due to Floods:
   a) Assume that 30 hectare of agricultural lands are damaged every year due to flash flood
   b) Assume the agricultural lands would yield an average of 100 sacks of corn at two cropping per year, and it cost PhP 8/kg increasing at 5% yearly.
   c) Average production per hectare = 100 sacks*50 kg/sack = PhP 5,000kg/hectare.

Below is the computation of projected annual income:

Table 3

Year	Price per kg of corn (PhP)	Area Damaged Due To Flooding (hectares)	Amount of production per ha (PhP)	Annual Projected Saving (PhP)
1	8	30	5,000	1,200,000
2	8	30	5,000	1,260,000
3	9	30	5,000	1,323,000
4	9	30	5,000	1,389,150
5	10	30	5,000	1,458,608
6	10	30	5,000	1,531,538
7	11	30	5,000	1,608,115
8	11	30	5,000	1,688,521
9	12	30	5,000	1,772,947
10	12	30	5,000	1,861,594
11	13	30	5,000	1,954,674
12	14	30	5,000	2,052,407
13	14	30	5,000	2,155,028
14	15	30	5,000	2,262,779
15	16	30	5,000	2,375,918

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%; All values are in million pesos

Table 4

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O & M (Table 1)	Subtotal Cost	Additional Income for New Land Develop	Saving due to Flood (Table 3)	Subtotal Benefit		
T	38.50		38.50				-38.50	-38.50
T-1		6.00	6.00	3.20	1.20	4.40	-1.60	-1.45
T-2		6.30	6.30	6.72	1.26	7.98	1.68	1.39
T-3		6.62	6.62	10.58	1.32	11.91	5.29	3.98
T-4		6.95	6.95	14.82	1.39	16.21	9.26	6.33
T-5		7.29	7.29	19.45	1.46	20.91	13.61	8.45
T-6		7.66	7.66	20.42	1.53	21.95	14.29	8.07
T-7		8.04	8.04	21.44	1.61	23.05	15.01	7.70
T-8		8.44	8.44	22.51	1.69	24.20	15.76	7.35
T-9		8.86	8.86	23.64	1.77	25.41	16.55	7.02
T-10		9.31	9.31	24.82	1.86	26.68	17.37	6.70
T-11		9.77	9.77	26.06	1.95	28.02	18.24	6.39
T-12		10.26	10.26	27.37	2.05	29.42	19.16	6.10
T-13		10.78	10.78	28.73	2.16	30.89	20.11	5.83
T-14		11.31	11.31	30.17	2.26	32.43	21.12	5.56
T-15		11.88	11.88	31.68	2.38	34.05	22.18	5.31

Solving for NPV, and IRR;

NPV = $\sum$ Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)

NPV = 46.22

IRR = r ;where $\sum$ Cash Flow (T-n)/ $(1+r)^n$-T=0, (n=1-15)

IRR = 21.0%

8. Attachment

Attached are the project location map, the proposed development plan as well as captioned photographs highlighting the road and its vicinity.

VICINITY MAP

N

Drawn not to scale:

Legend:

▬▬▬ - National Highway

──── - Municipal Road

▬▬▬ - Allah River

▬▬▬ - Proposed Project

Ampatuan Municipality

THIS SITE

National Road

Lambayong
Municipality

Municipality Esperanza

Brgy. Guiamalia

Brgy. New Panay

Brgy. Daladap

To Cotabato City

Municipal Road

**Proposed
River
Protection**

Allah River

Brgy. Salabaca

Poblacion

**Cotabato-Gen. Santos
National Highway**

To Gen. Santos City

MUNICIPALITY OF ESPERANZA
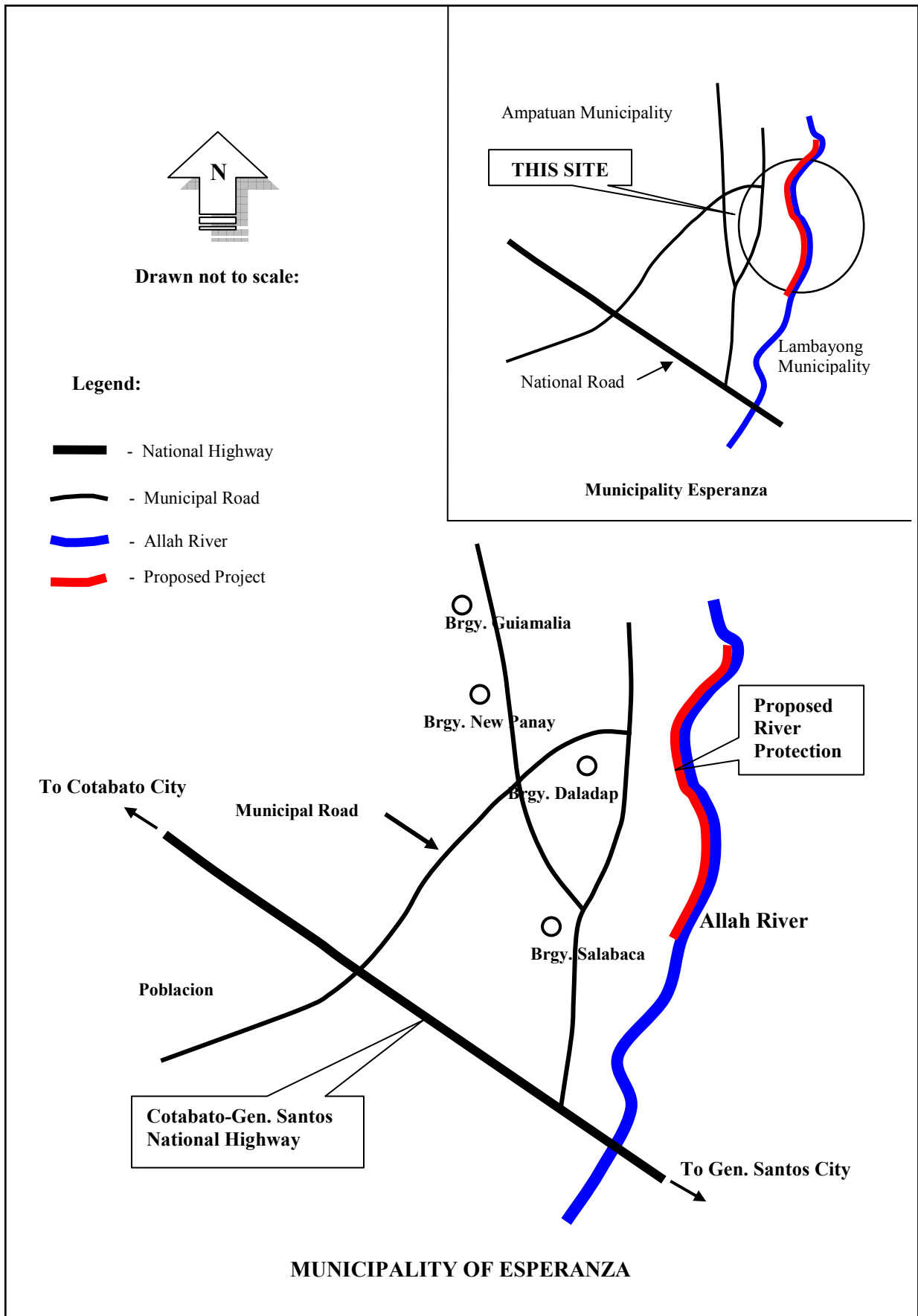
LOCATION MAP
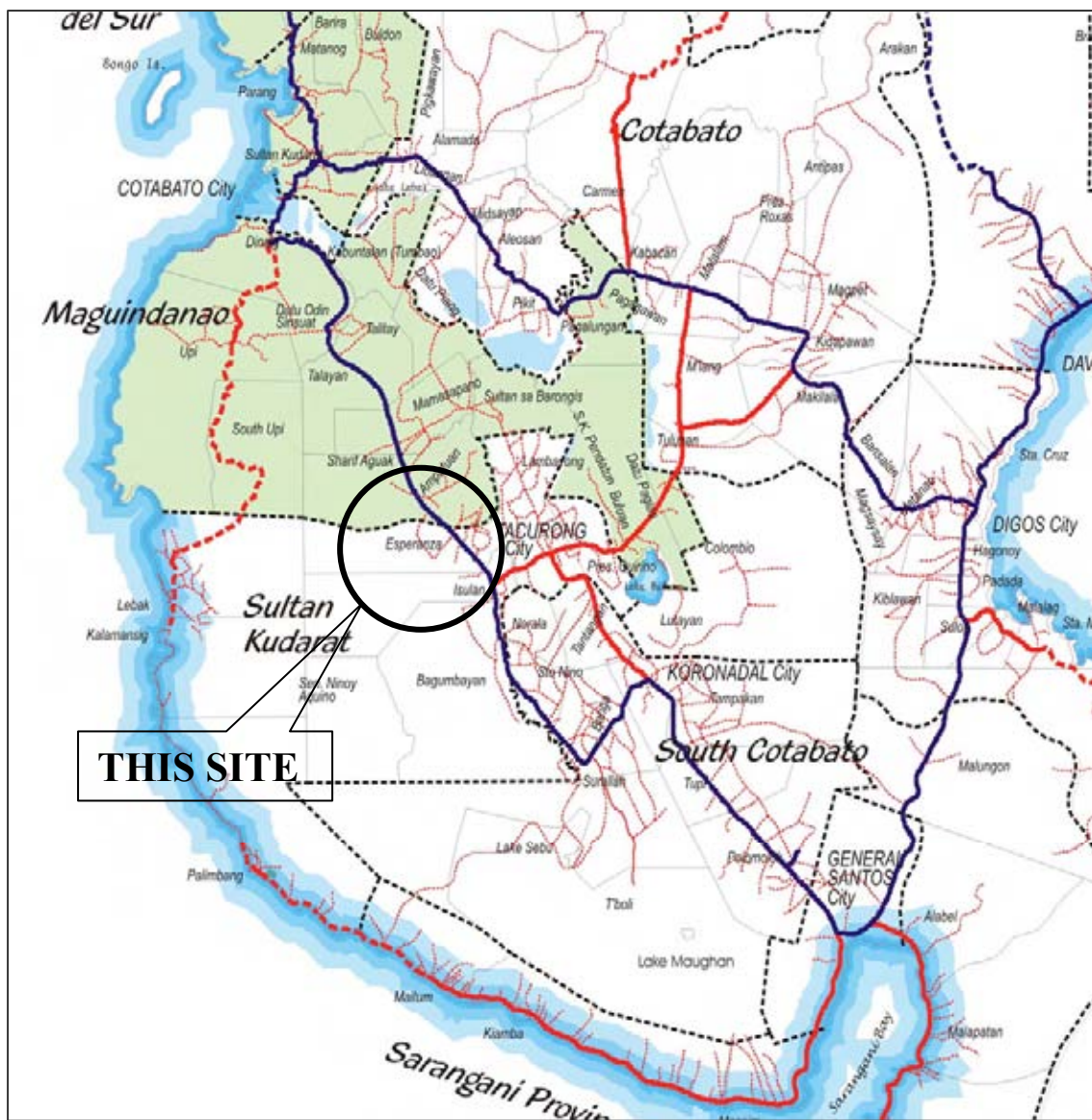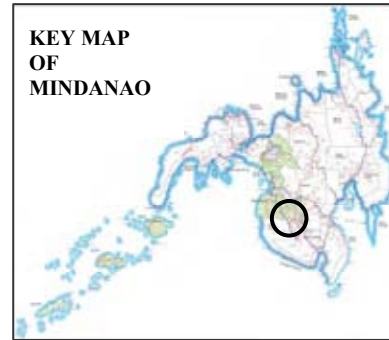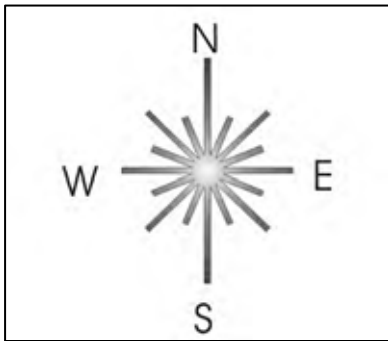
MUNICIPALITY OF ESPERANZA, SULTAN KUDARAT PROVINCE

PHOTOGRAPHS

The Allah River of approximate 200 meters wide needs to be protected to prevent soil from scouring

Lands are not utilized because of nearer to river which very frequent to flash flooding

Agricultural land harrow by farm tractor for planting is only few hundred meters away from the river

APPENDIX M9-1: DUNGO-AN MULTI PURPOSE CENTER

IBNA Pre-Feasibility Study

1. Title and Location
Multi Purpose Center Construction in Barangay Dungo-an, Municipality of M'lang, North Cotabato Province

2. Present Situation and Needs
The Municipality of M'lang is a first class municipality in the province of North Cotabato. According to the 2007 National Census, it has a population of 86,321 people. M'lang is politically subdivided into 37 barangays. It is located on Southern portion of the province. It is bounded by the Municipality of Matalam at the north, Municipality of Makilala, and Kidapawan City, the province capital at the east, the Province of Maguindanao at the west, and Municipality of Tuluyan at the south. The economy of M'lang is largely on agriculture due to vast field lands for rice production.

Barangay Dungo-an is located at approximately 1.5 kilometers and a 5 minutes drive to the Poblacion where the municipal hall is located. It can be reached in all kinds of vehicles. The main source of income of the community is farming. Approximately 1,000 hectares is utilized for rice and corn, other crops are coconut, banana, palm oil, and seasonal fruit trees.

Dungo-an has a population of about 3,937 persons based on the 2007 National Census. It is only the barangay of M'lang Municipality where dominated by Muslims. In 2000, and 2003, the community experienced conflicts that resulted to the displacement of hundreds of residents. The residents had suffered lost of properties and livelihood during the conflicts.

During the In-Depth Barangay Analyses (IBNA), the residents prioritized the construction of a multi purpose center in the area. The barangay has no community facilities for social gathering and community activities such as work shop, meetings and related social activities. They are using the old dilapidated Mosque was built in the 1960's. Sometimes they conducted there seminars at the Poblacion which cost them big amount of money. Frequent visitors conducting seminars are non government organizations (NGO's), government agencies such as Department of Agriculture (DA), Department or Agrarian Reform (DAR) and others.

The multi purpose center project aims to provide its constituents with a good place for meetings and gatherings. The proposed facility will also be used for medical consultations, weddings, and monthly meeting of religious groups. This project will provide the construction of 24m x 8m (192 m²) multi purpose building with office space and a comfort rooms. The project will be located within the compound of M'lang Islamic Institute, a Madrasah school.

The facility would help the residents in the community reduce cost of renting of space in the gathering as the same time cost of transportation to other places. Other community services like public health care, child health care can also be used.

3. Project Concept
This particular subproject would consist of several components.

1. Construction of 1 unit Barangay Multi Purpose Center (measure 8.0m x 24.0m, with two (2) rooms and comport room, and;
2. Installation of water and electrical facilities, and procurement of office supplies such as tables and chairs;

4. Benefits

The project will directly benefit the approximately 1,000 residents of Barangay Dungo-an. The facility will provide the community a place where to conduct community gathering, as well consultations and other various community services.

Aside from community and social gathering, the multi purpose center can be also used to provide public health services, family planning services, maternal and child health care, and nutrition.

5. Potential Risks

The project risk can be attributed if the proposed multi purpose center can not maintain by the local government units (LGU) both the barangay and municipal after the turn-over of the project.

6. Costs Estimates

The initial estimated cost of the project is Php 1.32 million and broken down as follows:

WORK DESCRIPTION	Total Cost
1. The construction of one (1) unit multi purpose center measure 24.0m x 8.0m with two (2) rooms and comport rooms	PhP 1.00 M
2. Supply of office supplies such as tables and chairs (Lump Sump)	PhP 0.20 M
Total	PhP 1.20 M
10% Contingency	PhP 0.12 M
Total Estimated Cost	**PhP 1.32 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of North Cotabato Province is 2.19%, based on the 2007 National Census
Growth rate (r) is 2.19%
Numbers of beneficiaries are approximately 1,000 people
Project Life is 15 years

- **Cost**

Initial Cost: PhP 1.32 Million.
Operation and Maintenance:
   a) Assume cost of maintaining the building at PhP 20,000/year, and labor is 40% of cost
      Material Cost = PhP 20,000; Labor Cost = PhP 20,000*0.40 = Php 8,000
      Total Cost = PhP 20,000 + 8,000 = PhP 28,000, assume increasing at 5% yearly
Below is the computation of projected annual operation and maintenance:
Table 1

Year	Total O&M projected at 5% yearly $= P*(1+r)^n$ (PhP)
1	28,000
2	29,400
3	30,870
4	32,414
5	34,034
6	35,736
7	37,523
8	39,399
9	41,369

Year	Total O&M projected at 5% yearly $= P*(1+r)^n$ (PhP)
10	43,437
11	45,609
12	47,890
13	50,284
14	52,798
15	55,438

- **Benefits**

Savings in the space rental during seminar:
- a) According to resident, there are at least 10 seminars conducted every year.
- b) Assume that an average of 150 persons/ and at 8 seminar, assume PhP 50/person/seminar.

Cost: PhP 50/person*150 person = PhP 7,500.

Transport Cost Saving:
- a) Assume that cost is saved when the seminar is held at Barangay Dungo-an
- b) Cost of the transportation to the Poblacion is PhP 30/person for two ways.
- c) Assume an average of 100 persons attending the seminar.

Cost: PhP 100 person*PhP 30 = PhP 3,000

Total Cost of: PhP7,500+PhP 3,000 = PhP 10,500, and increasing at 5% yearly.

Below is the computation of projected annual transportation cost saving:

Table 2

Year	Cost Saving (Rental/ Transport)	Average of Seminar/ year	Total Annual Rental/Trans- port Savings (PhP)
1	10,500	10	105,000
2	11,025	10	110,250
3	11,576	10	115,760
4	12,155	10	121,550
5	12,763	10	127,630
6	13,410	10	134,010
7	14,071	10	140,710
8	14,775	10	147,750
9	15,513	10	155,130
10	16,289	10	162,890
11	17,103	10	171,030
12	17,959	10	179,590
13	18,856	10	188,560
14	19,799	10	197,990
15	20,789	10	207,890

Transport Cost Saving when use as Public Health Services (Family Planning, Child Care and Nutrition)
- a) Assume that 100 average persons/year especially children will benefit the facilities.
- b) Cost of transport to the Poblacion is PhP 40/person for two ways, assume at 4 times a year.
- c) Total Transport Cost: 100 persons*PhP 40 = PhP 4,000, at increase of 5% yearly

Below is the computation of projected transport saving cost:

Table 3

Year	Transport Cost Saving (PhP)	Times a year	Total Annual Transport Saving Cost (PhP)
1	4,000	4	16,000
2	4,200	4	16,800
3	4,410	4	17,640
4	4,631	4	18,522
5	4,862	4	19,448
6	5,105	4	20,421
7	5,360	4	21,442
8	5,628	4	22,514
9	5,910	4	23,639
10	6,205	4	24,821
11	6,516	4	26,062
12	6,841	4	27,365
13	7,183	4	28,734
14	7,543	4	30,170
15	7,920	4	31,679

Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)

Assume the opportunity cost (oc) of capital cost is 10%

All values are in million pesos

Table 4

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1)	Subtotal Cost	Annual Transport Saving Cost (Table 3)	Transport Saving Cost (Table 4)	Subtotal Benefit (PhP)		
T	1.32		1.32				-1.32	-1.32
T-1		0.03	0.03	0.11	0.02	0.12	0.09	0.09
T-2		0.03	0.03	0.11	0.02	0.13	0.10	0.09
T-3		0.03	0.03	0.12	0.02	0.13	0.10	0.09
T-4		0.03	0.03	0.12	0.02	0.14	0.11	0.09
T-5		0.03	0.03	0.13	0.02	0.15	0.11	0.09
T-6		0.04	0.04	0.13	0.02	0.15	0.12	0.09
T-7		0.04	0.04	0.14	0.02	0.16	0.12	0.09
T-8		0.04	0.04	0.15	0.02	0.17	0.13	0.09
T-9		0.04	0.04	0.16	0.02	0.18	0.14	0.09
T-10		0.04	0.04	0.16	0.02	0.19	0.14	0.09
T-11		0.05	0.05	0.17	0.03	0.20	0.15	0.09
T-12		0.05	0.05	0.18	0.03	0.21	0.16	0.09
T-13		0.05	0.05	0.19	0.03	0.22	0.17	0.09
T-14		0.05	0.05	0.20	0.03	0.23	0.18	0.09
T-15		0.06	0.06	0.21	0.03	0.24	0.18	0.09

Solving for NPV, and IRR;

NPV = $\sum$Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)

NPV = -0.39

IRR = r ;where $\sum$Cash Flow (T-n)/ $(1+r)^n$-T=0, (n=1-15)
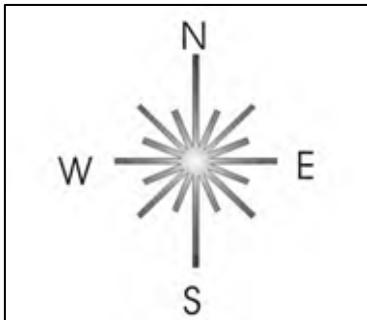
IRR = 5.1%

8. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Dungo-an Multi Purpose Building as well as captioned photographs.

VICINITY MAP

N

Drawn not to scale:

Legend:

- ▢ (yellow) - Household
- ▢ (red) - Proposed Multi-Purpose Building
- ▬ - Barangay Road

THIS SITE

To Cotabato City

National Highway

M'lang Poblacion

Brgy. Dungo-an

To Tacurong City

Municipality of M'lang

To M'lang Poblacion

To General Santos City

Barangay Road

Proposed Multi-Purpose Building

M'lang Islamic Institute

To M'lang Poblacion

LOCATION MAP

KEY MAP OF MINDANAO

THIS SITE
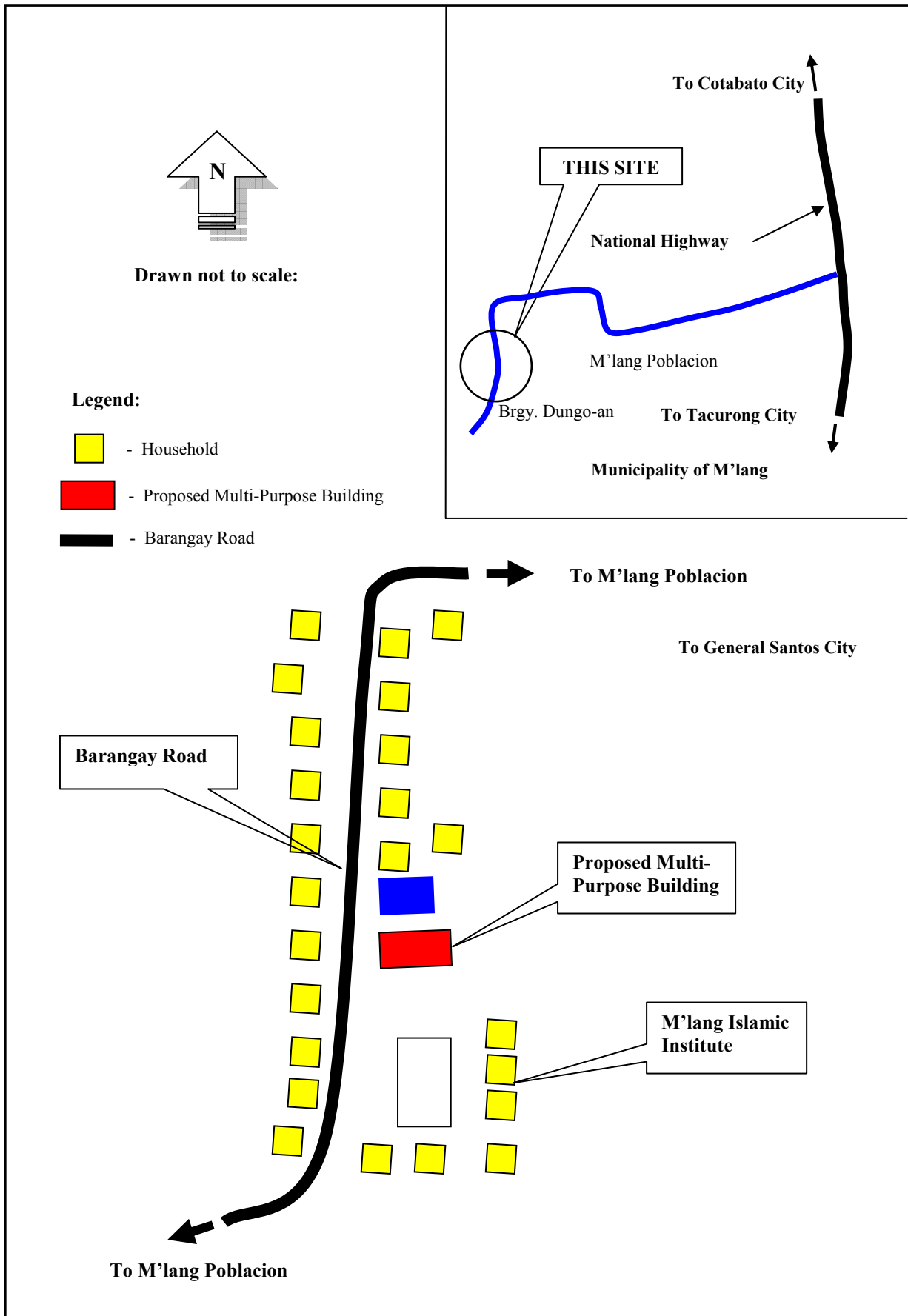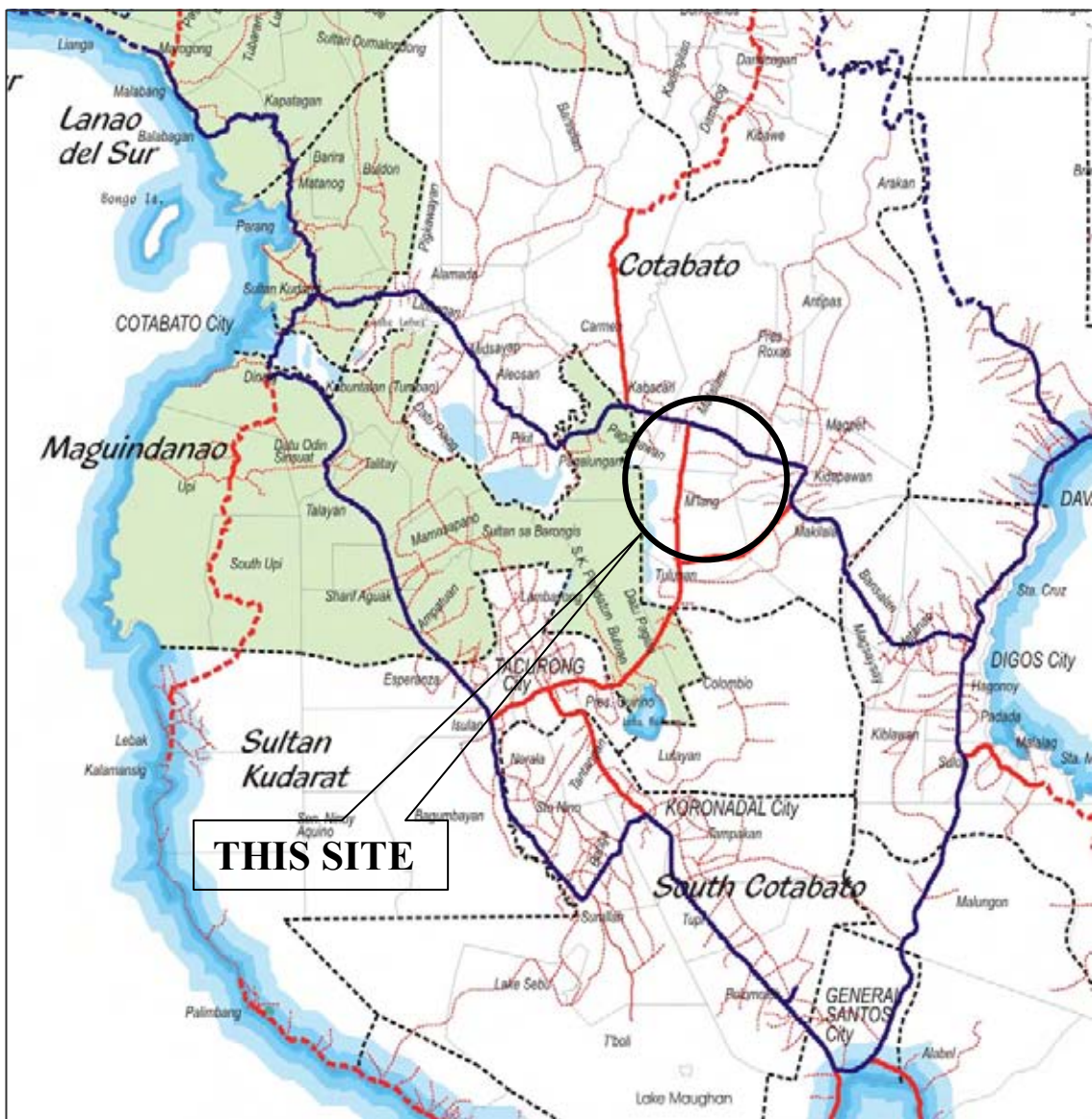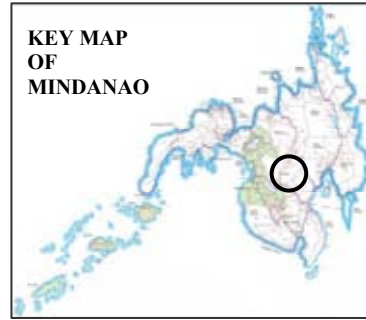
MUNICIPALITY OF M'LANG, NORTH COTABATO PROVINCE

PHOTOGRAPHS

The compound of M'lang Islamic Institute where the multi-purposed building be constructed

The location of proposed multi purpose building is near the old Mosque

The proposed multi-purpose building is located at center of Barangay Dungo-an

APPENDIX M10-1: DUNGUAN MADRASAH BUILDING CONSTRUCTION

IBNA Pre-Feasibility Study

1. **Title and Location**

Madrasah Building Construction in Barangay Dunguan, Municipality of Aleosan, North Cotabato Province

2. **Present Situation and Needs**

The Municipality of Aleosan, classified as 4th class municipality, consists of 19 barangays with a municipal population of 32,874 people based on 2007 National Census. It has a total land area of 24,450 hectares. It is bordered at the west by Municipality of Midsayap, at the east by Municipalities of Carmen and Pikit, at the north by Libungan municipality, and at the south by Municipality of Pikit. The economy of Municipality of Aleosan is intensive on rice and corn production because of its vast land area for agriculture which is composed of 15,450 hectares or 63.19 % of the total land area.

Barangay Dunguan is one of the barangays of Aleosan. It has a total land area of 879.61 hectares, approximately 10 kilometers south of the Cotabato – Davao National Highway, and 12 kilometers from the municipal hall. Dunguan has a total population of 1,983 people based on the 2007 National Census. Agriculture is the main livelihood of the constituents at Barangay Dunguan. The other livelihoods by the residents are livestock such as cow, goat, and chicken.

It can be reached in all kinds of land vehicles like public utility vehicle (PUJ) such as jeepneys and through motorcycle popularly known as "habal-habal, passing through a graveled provincial road. They are selling their produce at Municipality of Pikit, and Poblacion of Aleosan at approximately 17km and 12km respectively. There are regular passenger jeepneys and motorcycle plying the route daily which chargers a fare of Php 30 per persons. The fare for their produce is at Php 0.50 per kilograms of produce, or Php 50 per sack.

During the In-Depth Barangay Analyses (IBNA), the residents in the area prioritized the construction of a Madrasah School located near the barangay hall of Dunguan. There is an existing Madrasah School in the area but the problem is the lack of facilities like tables, chairs, blackboards, and the buildings are not furnish well. The building do not have walls, windows, and doors, also the flooring is not concreted. According to the teacher in charge of the Madrasah School, there are existing 128 totaled of pupils were enrolled. The numbers of pupils are the following; 45, 30, 28, 20, 15, and 10, for grade I, grade II, grade III, grade IV, grade V, and grade VI respectively. Presently, there are 6 teachers teaching Madrasah at Dunguan Madrasah School, and a teacher in-charged.

The grade I pupils are using one of the buildings without walls and very uncomfortable to study. The grade II, III, and IV pupils are occupying 2 buildings together, likewise without good facilities. While the grade V and VI pupils are using the waiting shed along the road as their classroom. The classes are held on weekends during Saturday and Sunday each week for the duration of 10 months.

A Madrasah is any school for the advance study of Islamic Law or "shari'a. The word madrasah relates to learning, therefore literally means "a place where learning/teaching is done". In common English language usage, the word madrasah has been taken to refer to an Islamic religious school. Madrasah is so essential to the Bangsamoro and in the absence of which, the masjid (mosque) is used as a substitute.

Madrasah's core curriculums are Qur'an *(Islam's holy book),* Seerah *(study of the life of the Prophet Mohammed)*, Hadith, Aqeedah *(Muslim history and theology)*, Fiqh *(Islamic Law),* and Arabic Language. In addition to this core curriculum subjects, there also other subjects such as Filipino (Lugatul Filibbiniyah), English (Lugatul Inglisiiyah), Science (Uloom), Mathematics (Hisab) and Makabayan (Ijtimaiyah).

According to the teacher, there are many problems in administering the school like the maintaining of the Madrasah, purchasing of school supplies, and salary of the teachers. With no other income aside from the enrollment in which the parents are paying amounting to Php 50 per pupil per enrollment. Aside from the enrollment, the parents are also paying additional of PhP 100 for the tuition and purchase of school supplies and the operation and maintenance of the madrasah. The total amount paid for one school year is Php 150 per pupil. The school is operating only for 10 months. The barangay kagawads (barangay councilor) and barangay chairman, including the barangay treasurer and secretary are also contributing a monthly of PhP 500 per month for the school. These amounts will be paid for 6 teachers, and a teacher in-charge with a monthly salary of Php 500 each, and the remaining for the operation and maintenance.

3. Project Concept
This particular subproject would consist of several components.

1. Construction of one (1) unit building, of six (6) unit's classroom measure 5 m x 6 m;
2. Provision of tables, chairs, blackboard, and other school paraphernalia;
3. Construction of one (1) unit latrine, for boys, and girls; and
4. Construction of water hand pump intended for the latrine and for sanitary purposes.

4. Benefits
The numbers of persons who will directly benefit from the construction of Madrasah are all Muslim in Barangay Dunguan. The realization of the project will bring together the best of public school and the Madrasah system prepare for Muslim children which makes them spiritually strong, making them productive Filipino Muslims. The education department, local government, and other agencies to work to generate the support of these secondary stakeholders require efforts with the national policy.

5. Potential Risks
The possible risk in the project is the operation and maintenance (O & M) of the project after the turn-over to the local authority or school administration concern.

6. Costs Estimates
The initial estimated cost of the project is Php 1.77 million and broken down as follows:

WORK DESCRIPTION	Total Cost
1. Construction of one (1) unit Madrasah Building	PhP 1.40 M
2. Construction of one (1) unit Rest Room for boys and girls	PhP 0.10 M
3. Construction of one (1) unit hand pump	PhP 0.05 M
4. Provision of amenities (chair, table, blackboard, text book, etc.)	PhP 0.06 M
Total	PhP 1.61 M
10% Contingency	PhP 0.16 M
Total Estimated Cost	**PhP 1.77 M**

7. Cost-benefit Analysis
The Annual Population Growth Rate of North Cotabato Province is 2.19%, based on the 2007 Census
Growth rate (r) is 2.19%
Numbers of beneficiaries are 128 pupils and increasing yearly
Project Life is 15 years
Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years
Below is the computation of projected annual student population

Table 1

Year	Projected Student, at rate of 2.19% $= P*(1+r)^n$
1	128
2	131
3	134
4	137
5	140
6	143
7	146
8	149
9	152
10	156
11	159
12	162
13	166
14	170
15	173

- **Cost**

Initial Cost: PhP 1.77 Million

Operation and Maintenance

  a) Assume cost of maintaining the building at PhP 30,000 per year, and cost of labor is 40%:
     Material Cost = PhP 30,000; Labor Cost = PhP 30,000*0.40 = PhP 12,000
     Total Cost = PhP 42,000; Assume increasing at the rate of 5% yearly

Below is the computation of projected annual operation and maintenance cost

Table 2

Year	Total O&M projected at 5% per annum $= P*(1+r)^n$ (PhP)
1	42,000
2	44,100
3	46,305
4	48,620
5	51,051
6	53,604
7	56,284
8	59,098
9	62,053
10	65,156
11	68,414
12	71,834
13	75,426
14	79,197
15	83,157

- **Benefits**

Savings in the Transportation Cost:

Using the data from Table 1, projected student population

a) Assume 20% of students can reduce their transportation fee.
b) Assume that PhP 20 is saved for transportation of pupils in 10 months at average of 20 days/month.
c) Annual transportation cost is PhP 20*10 months*20 days/month = PhP 4,000, and increase at the rate of 5% yearly:

Below is the computation of projected annual transportation cost savings:

Table 3

Year	20% of Projected Population Pupil, (Table 1)	Annual Transport Cost per Pupil	Total Annual Transport Cost Saving (PhP)
1	26	4,000	102,400
2	26	4,200	109,875
3	27	4,410	117,895
4	27	4,631	126,501
5	28	4,862	135,735
6	29	5,105	145,643
7	29	5,360	156,274
8	30	5,628	167,681
9	30	5,910	179,921
10	31	6,205	193,054
11	32	6,516	207,146
12	32	6,841	222,267
13	33	7,183	238,491
14	34	7,543	255,900
15	35	7,920	274,579

Increases Productivity and Earnings:

Research has established that every year of schooling increases individual wages for both men and women by a world average of about 10 percent. In poor countries, In poor countries, the gains are even greater. (Source: web.worldbank.org)

Using the data, from Table 1, projected student population
a) Assume that the minimum wage of ARMM is PhP 200/day; working day is 25days/month.
b) Annual Wage is PhP 200*25 days*12month = PhP 60,000, and increase at the rate of 5% yearly.
c) Assume that 10% of student can increase their wage in the future.
d) Children start working the 11th year of the project.

Below is the computation of projected productivity and earnings:

Table 4

Year	10% of Projected Population (Table 1)	10% of Annual Wage Projected, at 5% yearly	Annual Wage Projected
1	0	6,000.00	0
2	0	6,300.00	0
3	0	6,615.00	0
4	0	6,945.75	0
5	0	7,293.04	0
6	0	7,657.69	0
7	0	8,040.57	0
8	0	8,442.60	0

Year	10% of Projected Population (Table 1)	10% of Annual Wage Projected, at 5% yearly	Annual Wage Projected
9	0	8,864.73	0
10	0	9,307.97	0
11	13	9,773.37	125,099
12	13	10,262.04	134,231
13	13	10,775.14	144,029
14	14	11,313.89	154,542
15	14	11,879.59	165,823

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%.

All values are in million pesos.

Table 5

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Annual Transport Saving Cost (Table 3)	Increases Productivity and Earning (Table 4)	Subtotal Benefit (PhP)		
T	1.77		1.77				-1.77	-1.77
T-1		0.04	0.04	0.10	0.00	0.10	0.06	0.05
T-2		0.04	0.04	0.11	0.00	0.11	0.07	0.05
T-3		0.05	0.05	0.12	0.00	0.12	0.07	0.05
T-4		0.05	0.05	0.13	0.00	0.13	0.08	0.05
T-5		0.05	0.05	0.14	0.00	0.14	0.08	0.05
T-6		0.05	0.05	0.15	0.00	0.15	0.09	0.05
T-7		0.06	0.06	0.16	0.00	0.16	0.10	0.05
T-8		0.06	0.06	0.17	0.00	0.17	0.11	0.05
T-9		0.06	0.06	0.18	0.00	0.18	0.12	0.05
T-10		0.07	0.07	0.19	0.00	0.19	0.13	0.05
T-11		0.07	0.07	0.21	0.13	0.33	0.26	0.09
T-12		0.07	0.07	0.22	0.13	0.36	0.28	0.09
T-13		0.08	0.08	0.24	0.14	0.38	0.31	0.09
T-14		0.08	0.08	0.26	0.15	0.41	0.33	0.09
T-15		0.08	0.08	0.27	0.17	0.44	0.36	0.09

Solving for NPV, and IRR;

NPV = $\sum$ Cash Flow $(T-n)/(1+oc)^n$-T, (n=1-15)

NPV = -0.76

IRR = r ;where $\sum$ Cash Flow $(T-n)/(1+r)^n$-T=0, (n=1-15)
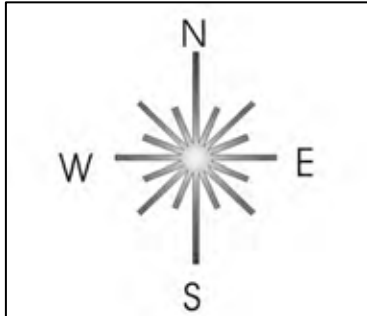
IRR = 3.4%

8. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Dunguan Madrasah Construction as well as captioned photographs.

VICINITY MAP

N

Drawn not to scale:

Legend:

🟨 - Household

🟥 - Proposed Madrasah

To Cotabato City

National Highway

To Davao City

THIS SITE

Brgy. Dunguan

Municipality of Aleosan

To Aleosan Proper
approximately 12 km

PROPOSED
MADRASAH
BUILDING

Mosque

Barangay
Hall

Basketball Court

Provincial Road
(Graveled)

To Municipality of Pikit
approximately 17 km

BARANGAY DUNGUAN, MUNICIPALITY OF ALEOSAN
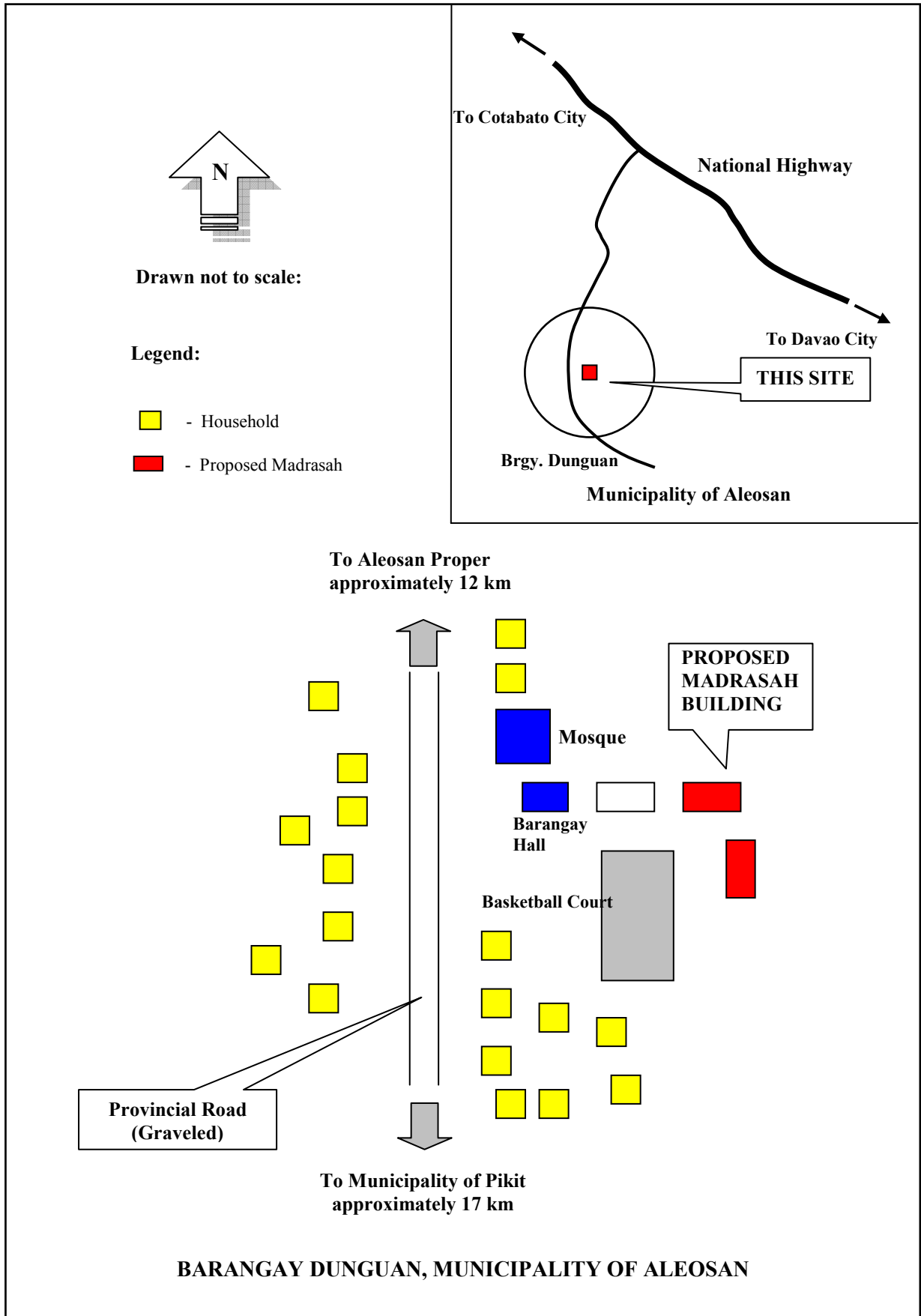
LOCATION MAP
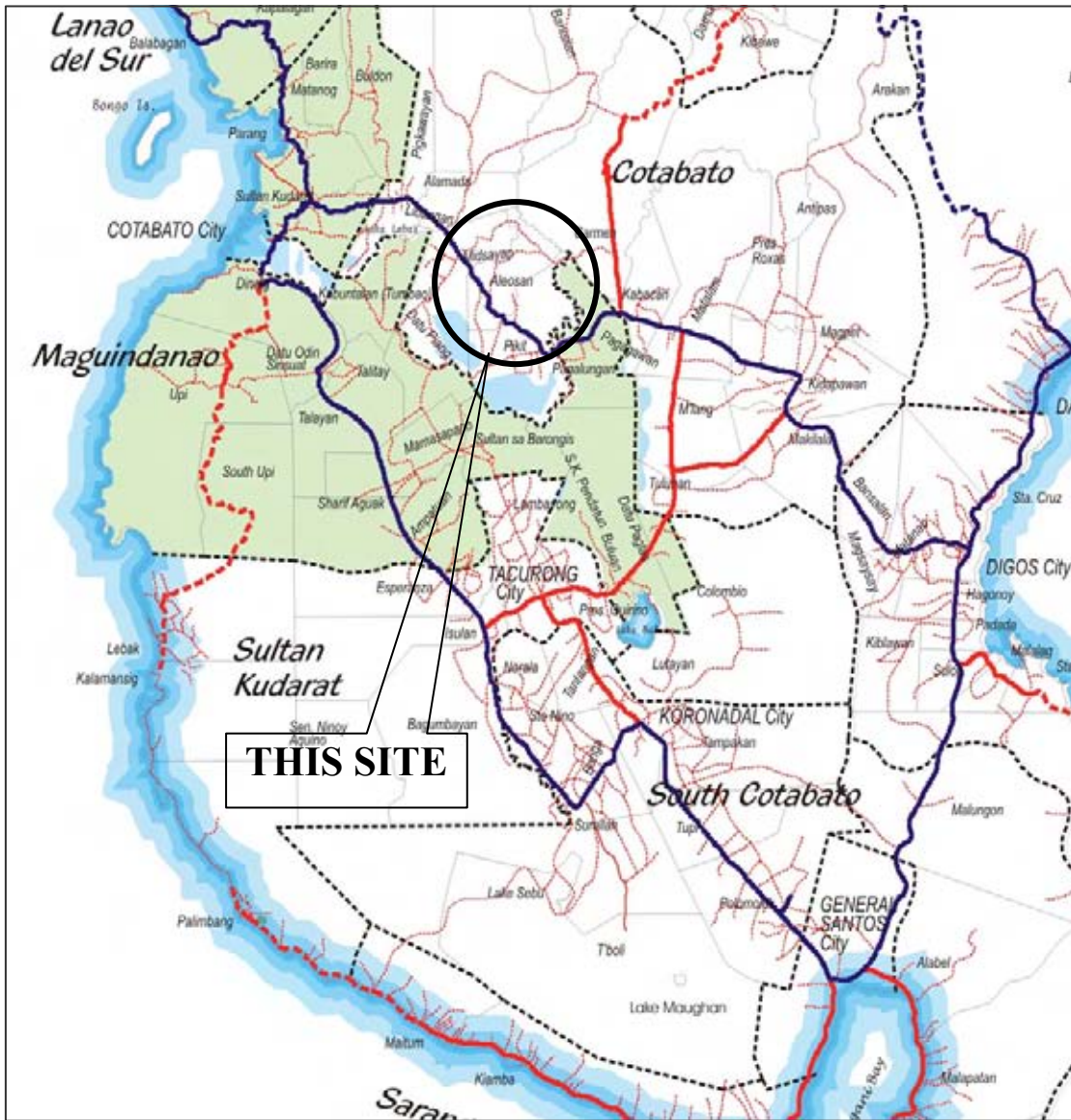
MUNICIPALITY OF ALEOSAN, COTABATO PROVINCE

PHOTOGRAPHS

Building without facilities and walls are used by the Grade I pupils

This building with 2 classrooms without complete facilities are used by Grade I, II, & IV

This waiting shed is used by Grade V, & VI pupils for their Madrasah classes

The view of Madrasah School of Dunguan Islamic School

APPENDIX M11-1: KALIAN SCHOOL BUILDING CONSTRUCTION

IBNA Pre-Feasibility Study

1. Title and Location
School Building Construction in Barangay Kalian, Municipality of Mangudadatu, Maguindanao Province

2. Present Situation and Needs
The Municipality of Mangudadatu is a new municipality created out of 8 barangay of Buluan, Maguindanao, by virtue of Muslim Mindanao Autonomy Act No. 204 which was subsequently ratified in a plebiscite held on December 30, 2006. According to the 2,000 census, it has a population of 24,300 people and politically subdivided into 8 barangays. Mangudadatu is characterized as relatively flat terrain along the Buluan Lake and rolling to hilly on the south eastern part. All of the 8 barangays are situated near the Buluan Lake. It is accessible by land transportation traversing the Tacurong-Matalam National Highway.

Barangay Kalian is one of the barangays of Mangudadatu Municipality of the province of Maguindanao. Barangay Kalian has a total population of 1,776 persons based on 2007 National Census. Fishing is the main livelihood of the residents because of its proximity to Lake Buluan. The people rely on the resources of Buluan Lake which comprises 70% of the populace are fishermen.

Farming is the second major livelihood of the constituents and their main produce is rice and corn. Barangay Kalian can be accessed of any kind of vehicles passing to a provincial unpaved road. Its main transportation is the motorcycle with a sidecar, and a single motorcycle popularly known as "habal-habal", which charges of PhP 20 per passenger. It is approximately 5 kilometers from the Tacurong-Matalam National Highway.

During the In-depth Barangay Needs Analysis (IBNA), majority of the residents especially the youth and the leader's group prioritized the construction of 2 units School Building with 2 classrooms as their basic needs in the community. According to the community elders, they have an elementary school which was established in 1962. However, during the martial law period in the 70's, it was burn, up to the present they do not have a school building. Barangay Kalian was also affected in 2000, when the government declared an "all-out war" on the MILF. Majority of the residents were fleeing their homes for fear of being caught in the crossfire.

Presently, the school is only a primary which accommodates grade I, II, and III pupils. The Kalian Primary School has two regular teachers and one one voluntary teacher. There are 165 pupils enrolled at the school from grade one to grade three, each has one section. The grade I and grade II pupils composed of 62, and 50 pupils respectively were using the madrasah building as their classrooms.

The madrasah building measured 5 meters by 8.50 meters are divided by two for grade I, and II pupils. Only the blackboard serves as partition of the rooms which makes pupils overcrowding. The grade III numbered of 53 pupils are occupying the other building in a makeshift made of wooden post, without walls and exposed to weather. The grade III pupils are very uncomfortable in learning their lessons. After completing their grade III curriculum, the pupils will be transferring to the next adjacent barangay to continue their schooling for grade IV to grade VI.

The school is located at Barangay Daladagan approximately 2.50 kilometers from the Kalian Primary School. There are approximately 200 pupils from Barangay Kalian are presently enrolled at Daladagan Elementary School. The pupils are walking every day in going to school to attend their classes, which is approximately 5 kilometer on both ways. The construction of 2 units' school building with 2 units each of standard size classroom measure 8m x 7m at Kalian Primary School will help a better learning for the children in their class lessons. In addition, the school needs the

construction of new toilet (rest rooms) as hygiene of children, and construction/installation of deep well for the cleanliness and sanitation of the school, and provision of chair for the classroom and tables for the teachers.

The project will help address the unavailability of classroom by the pupils in the area. This project will provide the pupils 4 new classrooms of 57 square meters per classroom or a total of 224 square meters.

3. Project Concept
This particular subproject would consist of several components.

1. The construction of new two (2) units buildings, with two (2) classroom, measure 8 meters by 7 meters (56 square meter), with complete facilities such as blackboard, and tables;
2. The construction of two (2) units latrine (restroom) intended for boys and girls at the vicinity of the school premises;
3. The construction of deep well, and installation of water pump be used for the sanitation of the latrine; and
4. The provision of 200 units of monoblock chairs for the children to use during classes.

4. Benefits
The project will directly benefit all the children at Kalian Primary School and the nearby barangays in the area. The number of children who will directly benefit from the new school building is approximately 500 pupils, and the figure will increase in the coming years. It will greatly help the children to meet the standard of quality education and encourage them to study more.

With the construction of school building project it will extend the curriculum up to grade VI level. In this case, the children will no longer walk every day to the nearby Barangay Daladagan to attend their classes. It will save their time and energy and concentrate more in their school lessons. Moreover, it will improve the health of the children because it will lessen over crowding in classroom with the construction of new building.

5. Potential Risks
The possible project risk is very lightly since the school building will be turn-over to the administration of Kalian Primary School and to the Department of Education of the Autonomous Region in Muslim Mindanao (ARMM) after the project completion. This government agency will be the responsible in the operation and maintenance of the school.

6. Costs Estimates
The initial estimated cost of the project is PhP 2.34 million, and broken down as follows:

Work Description	Total Cost
1. Construction of two (2) units School Building, with two (2) Classroom (total of four (4) classrooms	1.75 M
2. Provision of 200 units chairs (monoblock), and tables	0.20 M
3. Construction of latrine (rest room)	0.15 M
4. Construction of well and water hand pump	0.03 M
Total	PhP 2.13 M
10% Contingency	0.21 M
Total Estimated Cost	**PhP 2.34 M**

7. Cost-benefit Analysis

The Annual Population Growth Rate of Maguindanao Province is 6.99%, based on the 2007 Census
Growth rate (r) is 6.99%
Number of beneficiaries is 165 pupils and increasing yearly
Project Life is 15 years
Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years
Below is the computation of projected annual student population:

Table 1

Year	Projected Student, at rate of 6.99% $= P*(1+r)^n$
1	165
2	177
3	189
4	202
5	216
6	231
7	247
8	265
9	283
10	303
11	324
12	347
13	371
14	397
15	425

● **Cost**

Initial Cost: PhP 2.34 Million.
Operation and Maintenance
   a) Assume cost of maintaining the building at PhP 30,000 per year, and cost of labor is 40%:
      Material Cost = PhP 30,000; Labor Cost = PhP 30,000*0.40 = PhP 12,000
      Total Cost = PhP 42,000; Assume increasing at the rate of 5% yearly
Below is the computation of projected annual operation and maintenance cost:

Table 2

Year	Total O&M projected at 5% per annum $= P*(1+r)^n$ (PhP)
1	42,000
2	44,100
3	46,305
4	48,620
5	51,051
6	53,604
7	56,284
8	59,098
9	62,053
10	65,156
11	68,414
12	71,834
13	75,426
14	79,197
15	83,157

- **Benefits**

Savings in the Transportation Cost:

Using the data from Table 1, projected student population.

   a) Assume 10% of students can reduce their transportation fee.
   b) Assume that PhP 20 is saved for transportation of pupils in 10 months at average of 20 days/month.
   c) Annual transportation cost is PhP 20*10 months*20 days/month = PhP 4,000, and increase at the rate of 5% yearly:

Below is the computation of projected annual transportation cost savings:

Table 3

Year	10% of Projected Population Pupil (Table 1)	Annual Transport Cost per Pupil	Total Annual Transport Cost Saving (PhP)
1	17	4,000	66,000
2	18	4,200	74,144
3	19	4,410	83,293
4	20	4,631	93,571
5	22	4,862	105,117
6	23	5,105	118,088
7	25	5,360	132,660
8	26	5,628	149,029
9	28	5,910	167,419
10	30	6,205	188,077
11	32	6,516	211,285
12	35	6,841	237,357
13	37	7,183	266,645
14	40	7,543	299,548
15	42	7,920	336,511

Increases Productivity and Earnings:

Research has established that every year of schooling increases individual wages for both men and women by a world average of about 10 percent. In poor countries, In poor countries, the gains are even greater. (Source: web.worldbank.org)

Using the data, from Table 1, projected student population;

   a) Assume that the minimum wage of ARMM is PhP 200/day; working day is 25days/month.
   b) Annual Wage is PhP 200*25 days*12month = PhP 60,000, and increase at the rate of 5% yearly.
   c) Assume that 10% of student can increase their wage in the future.
   d) Children start working from the 11th year of the project.

Below is the computation of projected productivity and earnings:

Table 4

Year	10% of Projected Population (Table 1)	10% of Annual Wage Projected, at 5% yearly	Annual Wage Projected
1	0	6,000.00	0
2	0	6,300.00	0
3	0	6,615.00	0
4	0	6,945.75	0
5	0	7,293.04	0
6	0	7,657.69	0

Year	10% of Projected Population (Table 1)	10% of Annual Wage Projected, at 5% yearly	Annual Wage Projected
7	0	8,040.57	0
8	0	8,442.60	0
9	0	8,864.73	0
10	0	9,307.97	0
11	17	9,773.37	161,261
12	18	10,262.04	181,159
13	19	10,775.14	203,513
14	20	11,313.89	228,626
15	22	11,879.59	256,837

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%.

All values are in million pesos.

Table 5

Year	Cost			Benefit			Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Annual Transport Saving Cost (Table 3)	Increases Productivity and Earning (Table 4)	Subtotal Benefit (PhP)		
T	2.34		2.34				-2.34	-2.34
T-1		0.04	0.04	0.07	0.00	0.07	0.02	0.02
T-2		0.04	0.04	0.07	0.00	0.07	0.03	0.02
T-3		0.05	0.05	0.08	0.00	0.08	0.04	0.03
T-4		0.05	0.05	0.09	0.00	0.09	0.04	0.03
T-5		0.05	0.05	0.11	0.00	0.11	0.05	0.03
T-6		0.05	0.05	0.12	0.00	0.12	0.06	0.04
T-7		0.06	0.06	0.13	0.00	0.13	0.08	0.04
T-8		0.06	0.06	0.15	0.00	0.15	0.09	0.04
T-9		0.06	0.06	0.17	0.00	0.17	0.11	0.04
T-10		0.07	0.07	0.19	0.00	0.19	0.12	0.05
T-11		0.07	0.07	0.21	0.16	0.37	0.30	0.11
T-12		0.07	0.07	0.24	0.18	0.42	0.35	0.11
T-13		0.08	0.08	0.27	0.20	0.47	0.39	0.11
T-14		0.08	0.08	0.30	0.23	0.53	0.45	0.12
T-15		0.08	0.08	0.34	0.26	0.59	0.51	0.12

Solving for NPV, and IRR;

NPV = $\sum$ Cash Flow (T-n)/ $(1+oc)^n$ -T, (n=1-15)

NPV = -1.42

IRR = r ;where $\sum$ Cash Flow (T-n)/ $(1+r)^n$ -T=0, (n=1-15)
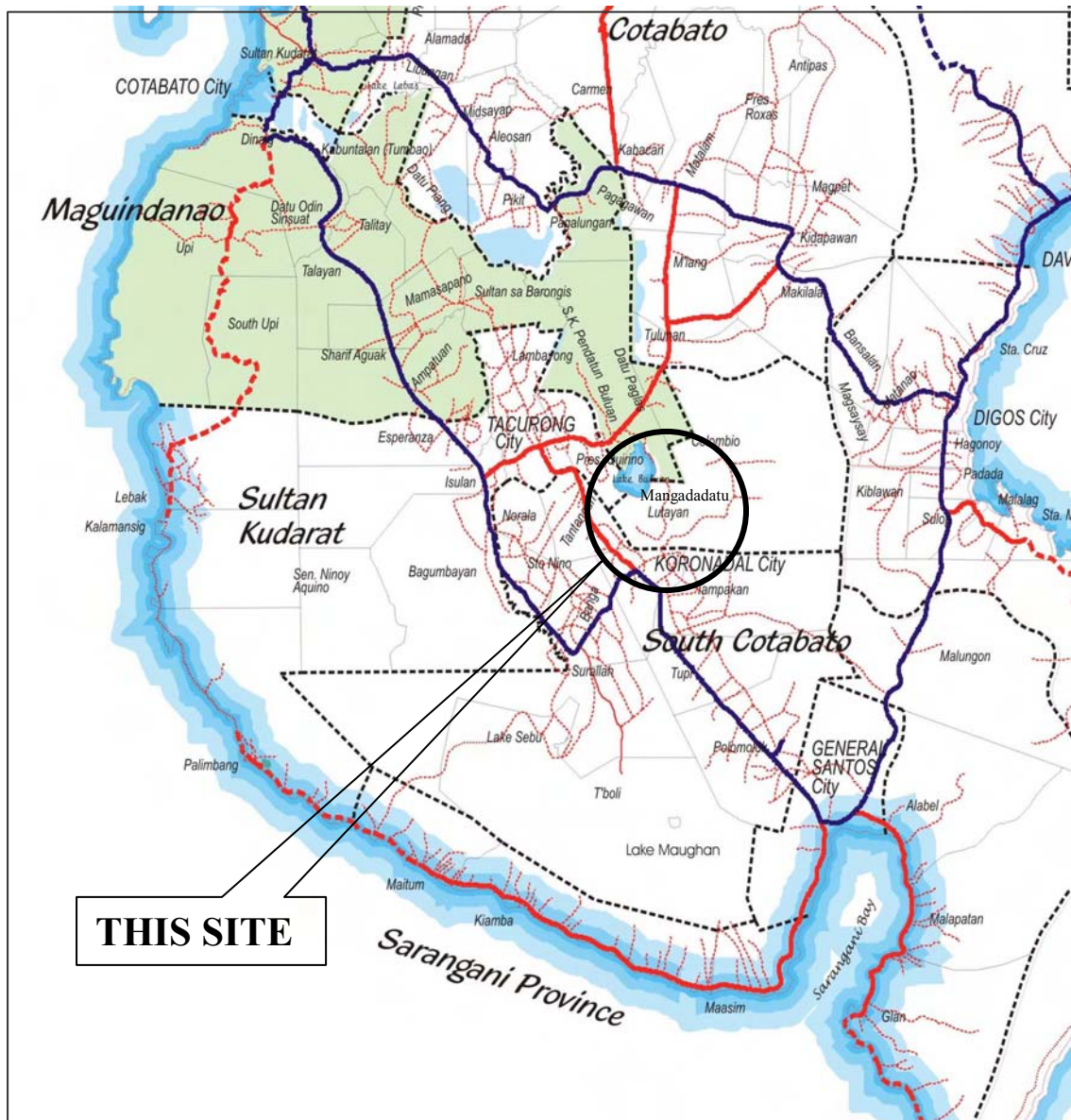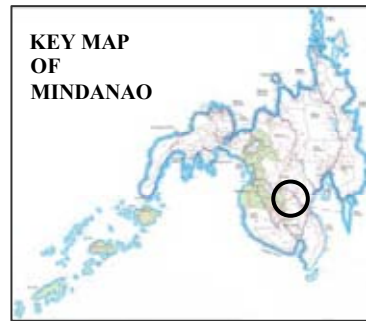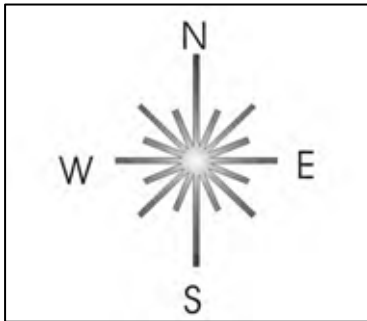
IRR = 1.1%

8. Attachment

Attached are the project location maps, the proposed development plan of Kalian Primary School as well as captioned photographs highlighting the road and its vicinity.

VICINITY MAP

N

Drawn not to scale:

Legend:

■ (yellow) - Household

━━ - Provincial Road

■ (red) - Proposed Project

To Davao

To Tacurong

Tacurong – Matalam National Highway

THIS SITE

Buluan Lake

Municipality of Mangudadatu

Buluan Lake

To Lutayan Municipality

talam

Proposed 2 units School Building

Brgy. Kalian

Madrasah Building

Kalian Primary School

Wooden Building

LOCATION MAP

N
W — E
S

KEY MAP
OF
MINDANAO

THIS SITE
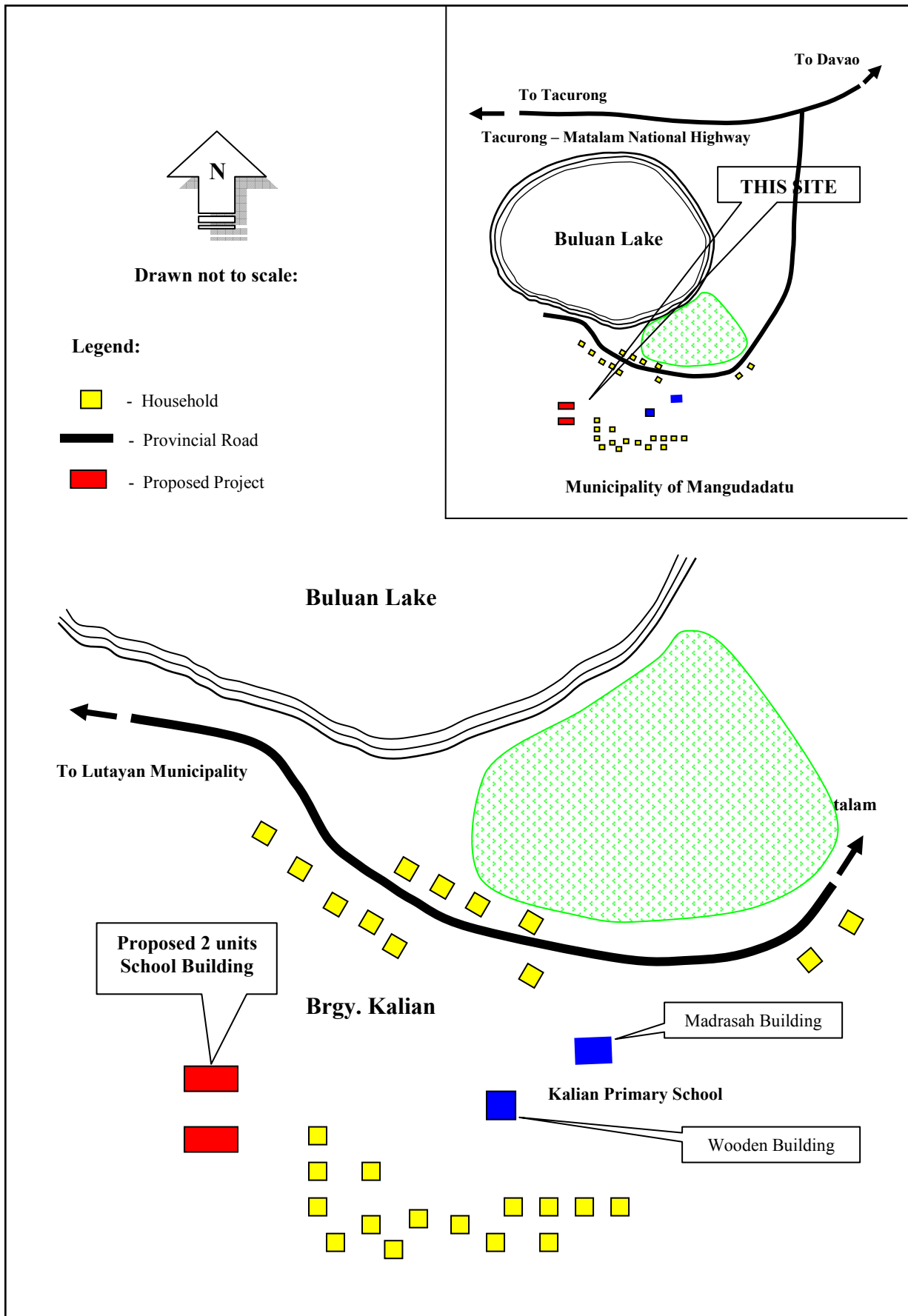
MUNICIPALITY OF MANGUDADATU, MAGUINDANAO PROVINCE

PHOTOGRAPHS

The Grade III pupils are occupying this building which is uncomfortable for learning

The Grade I & II pupils are occupying this Madrasah building measure 5 m x 8.5 m

The proposed location of school building

Children are walking daily to school of approximately 2.5 kilometers at Brgy. Daladagan

APPENDIX M12-1: KAYAGA FARM EQUIPMENT

IBNA Pre-Feasibility Study

1. Title and Location
Farm Equipment in Barangay Kayaga, Municipality of Kabacan, North Cotabato Province

2. Present Situation and Needs
The Municipality of Kabacan is a 2nd class municipality in the province of North Cotabato, Philippines. According to the 2007 census, it has a population 73,991 people consisting of 24 barangays, and a land area of 44,809 hectares. The town is predominantly composed of rice farms made by the influx of people from Luzon. It has a state university that specializes mainly in agricultural courses. The municipality of Kabacan can be reached in all kinds of vehicles traversing the Davao-Cotabato route.

Barangay Kayaga is one of the barangays of Kabacan. It is approximately 2 kilometers away from the Poblacion, and can be accessed in all kinds of land vehicles such as bus, passenger jeepneys, trucks, and motorcycles. The economy of Kabacan is largely based on agricultural farming due to its high level production of rice. According to 2007 National Census, it has a population of 8,451 persons. Barangay Kayaga is approximately 2 kilometers to Kabacan Poblacion, a few minutes drive. It can be reached to all kinds of land vehicles through the Cotabato-Davao National Road.

The barangay is relatively plain and entirely an agricultural economy, produce agricultural products like rice, corn, coconut, banana, beans, and vegetables. It biggest produce is rice with constitutes of approximately 2,000 hectares of rice, and the other are distributed to other agricultural products. Barangay Kayaga has 7 sitios namely, Malabuaya, Lumayong, Abpah, Proper Kayaga, Kabalis, Liton, and Kabuling. Majority of the residents are mostly farmers which accounts for 90% of the population.

However, growth in agricultural production is hindered by lack of farms facilities to cultivate the rice fields. To prepare the land for planting, farmers have to rent tractors. Farmers are renting the farm equipment such as turtle, popularly known as "kuliglig" in local name and rice thresher. These equipments are responsible for the harrowing the rice fields and threshing of rice during the harvest. The turtle (kuliglig) is the replacement of using an animal like carabao in plowing the rice fields. A kuliglig is a vehicle composed of a two-wheeled trailer pulled by a hand-tractor. It is a multi-purpose diesel or gasoline engine, commonly used in the southern province in Mindanao. Plowing using the carabao will take 3 days, whereas using the machine takes only 1 day for one hectare of rice fields.

The carabao is one of the most important animals in the country, especially in agriculture. The old method of farming is still used in the locality. The soil of the rice paddy is first softened with rainwater or irrigated farms. The farmer guides the carabaos in trampling the planting area until it is soggy enough to receive the rice seedlings. This time consuming task produces lower yields and lower income when compared with the farming equipment.The charge of renting a kuliglig (power tiller machine) is Php 1,500.00. After the planting of rice which takes around 3 months to harvest.

The rice grains should be threshed immediately after harvesting to prevent from grain losses. To do this the farmers must separate the grains from the panicle by rubbing, impact, or stripping using either by manually or mechanically operated threshers. There are also threshers for hire which with the same chargers of kuliglig at Php 1,500 per hectare. The farmers can generate an average yield of 4.0 tons per hectare per cropping cycle and plant two to three cropping in a year.

During the In-depth Barangay Needs Analysis (IBNA), majority of the resident prioritized the farming equipment of each 7 sitios. These equipments are the kuliglig, rice thresher, rice sheller, trailer, and the machine. The trailer with mounted machine is the responsible of the hauling of grain

rice from the rice field to the warehouse. Likewise, it is use in the delivery of agricultural products to the market, and any other hauling of agricultural products activities.

3. Project Concept
This particular subproject would consist of several components.

1. Purchasing of 1 complete sets of 7 units each of farm equipments, namely, turtle (aqua tiller), kuliglig (power tiller), transmission, trailer, rice sheller, and rice thresher; and
2. Purchasing of 7 units machine at least 12 horsepower.

4. Benefits
The project will directly benefit the 30% of the farmers, or 2,500 people. The farm equipment will provide the farmers the best opportunity for higher incomes and improve their yields and lower the cost of farm production by means of more efficient technologies.

The lack of appropriate technology, technical and management skills resulting to poor rice output and time consuming results to economic losses. The equipment can help the farmer's valuable time and since the manual harvesting with an animal (carabao) tilling is caused delay and losses will be incurred. The project will improved farmers income and save time energy which maximize the three cropping per year.

5. Potential Risks
The potential risk of the project is when the project is being turnover to the farmer beneficiaries. The local government units (LGU) or any concern agencies must choose the right farmers to manage these machines. They must check the equipment regularly if it is properly use only for farming purposes. The lack of technical and good financial systems and procedure to preserve against conflicting interests of the farmers has been the cause of failure of the project.

6. Costs Estimates
The initial estimated cost of the project is PhP 1.54 million and broken down as follows:

DESCRIPTION OF ITEM	TOTAL COST
1.) Purchasing of seven (7) units each set of aqua tiller, power tiller, transmission, rice sheller, and rice thresher at PhP 60,000 per machine	P 0.98 M
2.) Purchasing of seven (7) units machine at Php 60,000 per machine	P 0.42 M
Total	P 1.40 M
10% Contingency	P 0.14 M
Total Estimated Cost	**P 1.54 M**

7. Cost-benefit Analysis
The Annual Population Growth Rate of North Cotabato Province is 2.19%, based on the 2007 Census
Numbers of beneficiaries are 2,500 farmers more or less
Assume that only 25% of 2,000 hectares will benefit the project: 500 hectares
Cost of renting the equipment such as aqua tiller, power tiller, and rich thresher at PhP1,500/hectare
Project Life is 10 years

● **Cost**
Initial Cost: PhP 1.54 Million
Operation and Maintenance

a) Assume cost of maintaining the farm equipment at PhP 1,000/equipment/month.
b) Cost of maintenance: PhP 1,000*14 units = PhP 14,000/month including the labor cost.
   Total Annual Cost: PhP 14,000*12 = PhP 168,000, and increasing at 5% yearly

Below is the computation of projected annual operation and maintenance cost:

Table 1

Year	Total O&M projected at 5% per annum $= P*(1+r)^n$ (PhP)
1	168,000
2	176,400
3	185,220
4	194,481
5	204,205
6	214,415
7	225,136
8	236,393
9	248,213
10	260,623

● **Benefits**

Savings in the Rental of Equipment
a) Assume the area benefitted by the equipment is 500ha, or 25% of the total firm land.
b) The cost of renting the equipment is PhP 1,500 and increasing at 5% yearly.
c) 2 cropping cycle per year.

Below is the computation of projected annual rental of equipment:

Table 2

Year	Area Benefited (500 has)	Cropping per year	Rental of Equipment (PhP)	Annual Equipment Cost Saving
1	500	2	1,500	1,050,000
2	500	2	1,575	1,102,500
3	500	2	1,654	1,157,625
4	500	2	1,736	1,215,506
5	500	2	1,823	1,276,282
6	500	2	1,914	1,340,096
7	500	2	2,010	1,407,100
8	500	2	2,111	1,477,455
9	500	2	2,216	1,551,328
10	500	2	2,327	1,628,895

● **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%
All values are in million pesos

Table 3

Year	Cost			Benefit		Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 1) (PhP)	Subtotal Cost (PhP)	Annual Equip-ment Saving Cost (Table 2)	Subtotal Benefit (PhP)		
T	1.54		1.54			-1.54	-1.54
T-1		0.17	0.17	1.05	1.05	0.88	0.80
T-2		0.18	0.18	1.10	1.10	0.93	0.77
T-3		0.19	0.19	1.16	1.16	0.97	0.73
T-4		0.19	0.19	1.22	1.22	1.02	0.70
T-5		0.20	0.20	1.28	1.28	1.07	0.67
T-6		0.21	0.21	1.34	1.34	1.13	0.64
T-7		0.23	0.23	1.41	1.41	1.18	0.61
T-8		0.24	0.24	1.48	1.48	1.24	0.58
T-9		0.25	0.25	1.55	1.55	1.30	0.55
T-10		0.26	0.26	1.63	1.63	1.37	0.53

Solving for NPV, and IRR;
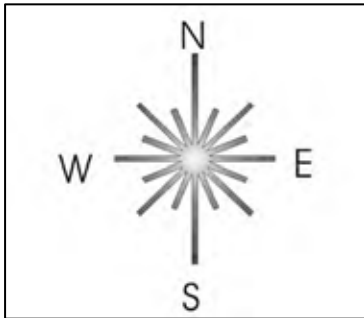NPV = $\sum$ Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)
NPV = 5.02

IRR = r ;where $\sum$ Cash Flow (T-n)/ $(1+r)^n$-T=0, (n=1-15)
IRR = 61.5%

8. Attachment
Attached is the project location map, the proposed Kayaga Farm Equipment as well as captioned photographs.

LOCATION MAP
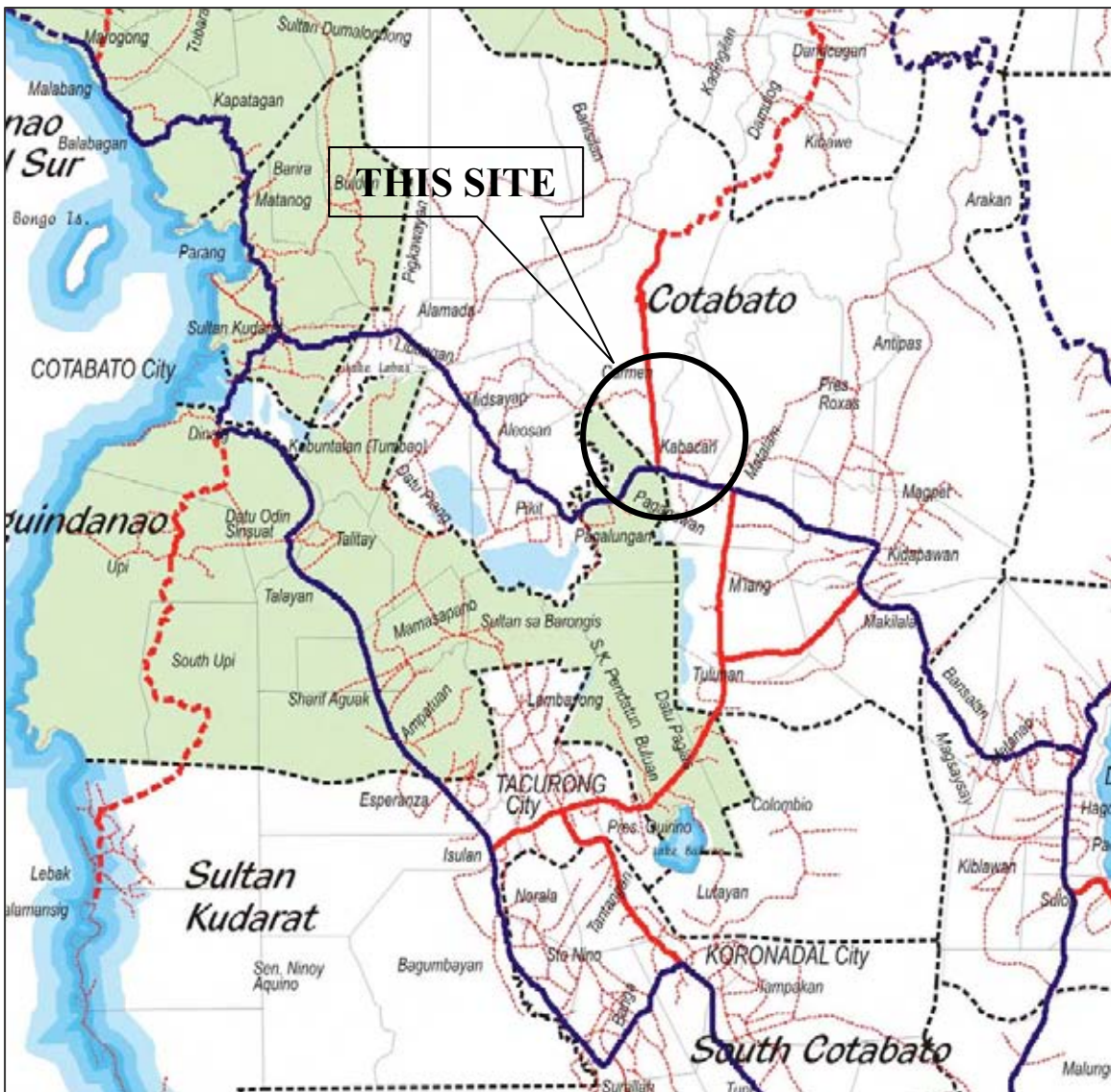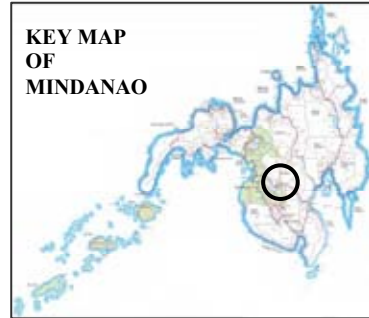
MUNICIPALITY OF KABACAN, NORTH COTABATO PROVINCE

PHOTOGRAPHS

The above pictures are the rice thresher and aqua tiller

The above pictures are the power tiller, and engine with transmission

Rice is abundant at Barangay Kayaga   Rice fields with newly planted rice

APPENDIX M13-1: KURENTEM MULTI PURPOSE CENTER

IBNA Pre-Feasibility Study

1. Title and Location

Multi Purpose Center Construction in Barangay Kurentem, Municipality of Datu Odin Sinsuat, Shariff Kabunsuan.

2. Present Situation and Needs

The Municipality of Datu Odin Sinsuat is a second class municipality and the capital town of Shariff Kabunsuan Province. According to the 2007 National Census, it has a population of 103,765 people and politically subdivided into 34 barangays. It has an area of 503.20 km². It is bounded at the north by Cotabato City, at the east by the municipality of Kabuntalan, at the south by the municipality of Upi, and at the west by the Celebes Sea. It is approximately 36 kilometers from Cotabato City the regional center.

Barangay Kurentem is one of the barangays of Datu Odin Sinsuat Municipality; it has an area of 1,150 hectares, with a population of 2,739 person based on the 2007 National Survey. It is generally plain area, and situated just along the Cotabato-General Santos National Highway, and can be access in all types of vehicles. Majority of the residents are engage in farming as their source of livelihood. Rice and corn is their main produce, others are in small enterprise such as store business as their daily income activities. The barangay has no adequate infrastructure and basic social services like health centers, and water supply facility.

During the In-Depth Barangay Analyses (IBNA), the residents prioritized the construction of a multi purpose center in the area. The building can also be utilized as Madrasah for the children during the week ends. The proposed building is an open type with division at each room composed of 6 rooms of standard madrasah. On regular days it is used for community related activities such as health centers, community meetings, and social functions.

At present, there are two rooms for Madrasah class, and can only accommodate 2 classes for Grade I, and II, it has a population of 50 pupils. For other higher classes approximately 40 pupils, they are using the Mosque for their classes. There are teachers for the madrasah class, the only problem is the lack of classroom.

This project would aim to provide a multi purpose building, community health center, as the same time a madrasah for the children of Barangay Kurentem. The proposed facility would also be used for community services such as medical consultations in the area. This project will provide the construction of 30m x 8m (240m²) multi purpose building with office space and a comfort rooms. The project will be located at Sitio Penolin, near the Mosque and approximately 500 meters to the national highway.

The facility would help the resident's multi purpose in the community such as madrasah school, community meetings especially for government institutions, non government organization (NGO) that regularly visited the area for seminars which relates to livelihood program opportunity.

3. Project Concept

This particular subproject would consist of several components.

1. Construction of 1 unit Barangay Multi Purpose Center (measure 30.0m x 8.0m, detachable division with comport room, and;
2. Installation of water and electrical facilities, and procurement of office supplies such as tables and chairs;

4. Benefits

The project will directly benefit the approximately 1,000 residents of Barangay Kurentem. The facility will provide the community a place where to conduct community gathering, Madrasah School for children and other various community services.

5. Potential Risks

The project risk can be attributed if the proposed multi purpose center can not maintain by the local government units (LGU) both the barangay and municipal after the turn-over of the project.

Costs Estimates

The initial estimated cost of the project is Php 1.76 million and broken down as follows:

WORK DESCRIPTION	Total Cost
1. The construction of one (1) unit multi purpose center measure 30.0m x 8.0m with two (2) comport rooms. The building is detachable division for other use.	PhP 1.40 M
2. Supply of office supplies such as tables and chairs (Lump Sump)	PhP 0.20 M
Total	PhP 1.60 M
10% Contingency	PhP 0.16 M
Total Estimated Cost	**PhP 1.76 M**

6. Cost-benefit Analysis

The Annual Population Growth Rate of Shariff Kabunsuan is 6.12%, based on the 2007 National Census.
Growth rate (r) is 6.12%.
Numbers of beneficiaries are approximately 1,000 people, when use as public health care.
Assume that 150 students will benefit on the first year when use as madrasah.
Project Life is 15 years.

- **Cost**

Initial Cost: PhP 1.76 Million.
Operation and Maintenance:
    a) Assume cost of maintaining the building at PhP 20,000/year, and labor is 40% of cost
        Material Cost = PhP 20,000; Labor Cost = PhP 20,000*0.40 = Php 8,000
        Total Cost = PhP 20,000 + 8,000 = PhP 28,000, assume increasing at 5% yearly

Below is the computation of projected annual operation and maintenance:

Table 1

Year	Total O&M projected at 5% yearly $= P*(1+r)^n$ (PhP)
1	28,000
2	29,400
3	30,870
4	32,414
5	34,034
6	35,736
7	37,523
8	39,399
9	41,369
10	43,437

Year	Total O&M projected at 5% yearly $= P*(1+r)^n$ (PhP)
11	45,609
12	47,890
13	50,284
14	52,798
15	55,438

- **Benefits**

Savings in the space rental during seminar:
  a) According to resident, there are at least 10 seminars conducted every year.
  b) Assume that an average of 150 persons/ and at 8 seminar, assume PhP 50/person/seminar.
  Cost: PhP 50/person*150 person = PhP 7,500.

Transport Cost Saving:
  a) Assume that cost is saved when the seminar is held at Barangay Dungo-an
  b) Cost of the transportation to the Poblacion is PhP 30/person for two ways.
  c) Assume an average of 100 persons attending the seminar.
  Cost: PhP 100 person*PhP 30 = PhP 3,000
  Total Cost of: PhP7,500+PhP 3,000 = PhP 10,500, and increasing at 5% yearly.

Below is the computation of projected annual transportation cost saving:
Table 2

Year	Cost Saving (Rental/ Transport)	Average of Seminar/ year	Total Annual Rental/Trans- port Savings (PhP)
1	10,500	10	105,000
2	11,025	10	110,250
3	11,576	10	115,760
4	12,155	10	121,550
5	12,763	10	127,630
6	13,410	10	134,010
7	14,071	10	140,710
8	14,775	10	147,750
9	15,513	10	155,130
10	16,289	10	162,890
11	17,103	10	171,030
12	17,959	10	179,590
13	18,856	10	188,560
14	19,799	10	197,990
15	20,789	10	207,890

Transport Cost Saving when use as Public Health Services (Family Planning, Child Care and Nutrition)
  a) Assume that 100 average persons/year especially children will benefit the facilities.
  b) Cost of transport to the Poblacion is PhP 30/person for two ways, assume at 4 times a year.
  c) Total Transport Cost: 100 persons*PhP 30 = PhP 3,000, at increase of 5% yearly
Below is the computation of projected transport saving cost:

Table 3

Year	Transport Cost Saving (PhP)	Times a year	Total Annual Transport Saving Cost (PhP)
1	3,000	4	12,000
2	3,150	4	12,600
3	3,308	4	13,230
4	3,473	4	13,892
5	3,647	4	14,586
6	3,829	4	15,315
7	4,020	4	16,081
8	4,221	4	16,885
9	4,432	4	17,729
10	4,654	4	18,616
11	4,887	4	19,547
12	5,131	4	20,524
13	5,388	4	21,550
14	5,657	4	22,628
15	5,940	4	23,759

Increases Productivity and Earnings:

Research has established that every year of schooling increases individual wages for both men and women by a world average of about 10 percent. In poor countries, In poor countries, the gains are even greater. (Source: web.worldbank.org)

Using the data, from Table 1, projected student population;

a) Assume that the minimum wage of ARMM is PhP 200/day; working day is 25days/month.
b) Annual Wage is PhP 200*25 days*12month = PhP 60,000, and increase at the rate of 5% yearly.
c) Assume that 10% of student can increase their wage in the future.
d) Children start working from the 11th year of the project.

Solving the projected population using formula $P_j = P*(1+r)^n$; where: r = growth rate; n = no. of years

Below is the computation of projected annual student population

Table 4

Year	Projected Student, at rate of 6.12% $= P*(1+r)^n$
1	150
2	159
3	169
4	179
5	190
6	202
7	214
8	227
9	241
10	256
11	272
12	288
13	306
14	325
15	345

Below is the computation of projected productivity and earnings:
Table 5

Year	10% of Projected Population (Table 1)	10% of Annual Wage Projected, at 5% yearly	Annual Wage Projected
1	0	6,000.00	0
2	0	12,600.00	0
3	0	13,230.00	0
4	0	13,891.50	0
5	0	14,586.08	0
6	0	15,315.38	0
7	0	16,081.15	0
8	0	16,885.21	0
9	0	17,729.47	0
10	0	18,615.94	0
11	15	19,546.74	293,201
12	16	20,524.07	326,702
13	17	21,550.28	364,031
14	18	22,627.79	405,625
15	19	23,759.18	451,972

Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)
Assume the opportunity cost (oc) of capital cost is 10%
All values are in million pesos
Table 6

Year	Cost			Benefit				Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O & M (Table 1)	Sub-total Cost	Rental Saving and (Table 2)	Transport Cost as Health Service (Table 3)	Producti-vity and Earning (Table 5)	Sub-total Cost		
T	1.76		1.76					-1.76	-1.76
T-1		0.03	0.03	0.11	0.01	0.00	0.12	0.09	0.08
T-2		0.03	0.03	0.11	0.01	0.00	0.12	0.09	0.08
T-3		0.03	0.03	0.12	0.01	0.00	0.13	0.10	0.07
T-4		0.03	0.03	0.12	0.01	0.00	0.14	0.10	0.07
T-5		0.03	0.03	0.13	0.01	0.00	0.14	0.11	0.07
T-6		0.04	0.04	0.13	0.02	0.00	0.15	0.11	0.06
T-7		0.04	0.04	0.14	0.02	0.00	0.16	0.12	0.06
T-8		0.04	0.04	0.15	0.02	0.00	0.16	0.13	0.06
T-9		0.04	0.04	0.16	0.02	0.00	0.17	0.13	0.06
T-10		0.04	0.04	0.16	0.02	0.00	0.18	0.14	0.05
T-11		0.05	0.05	0.17	0.02	0.29	0.48	0.44	0.15
T-12		0.05	0.05	0.18	0.02	0.33	0.53	0.48	0.15
T-13		0.05	0.05	0.19	0.02	0.36	0.57	0.52	0.15
T-14		0.05	0.05	0.20	0.02	0.41	0.63	0.57	0.15
T-15		0.06	0.06	0.21	0.02	0.45	0.68	0.63	0.15

Solving for NPV, and IRR;
NPV = $\sum$Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)

NPV = 0.10
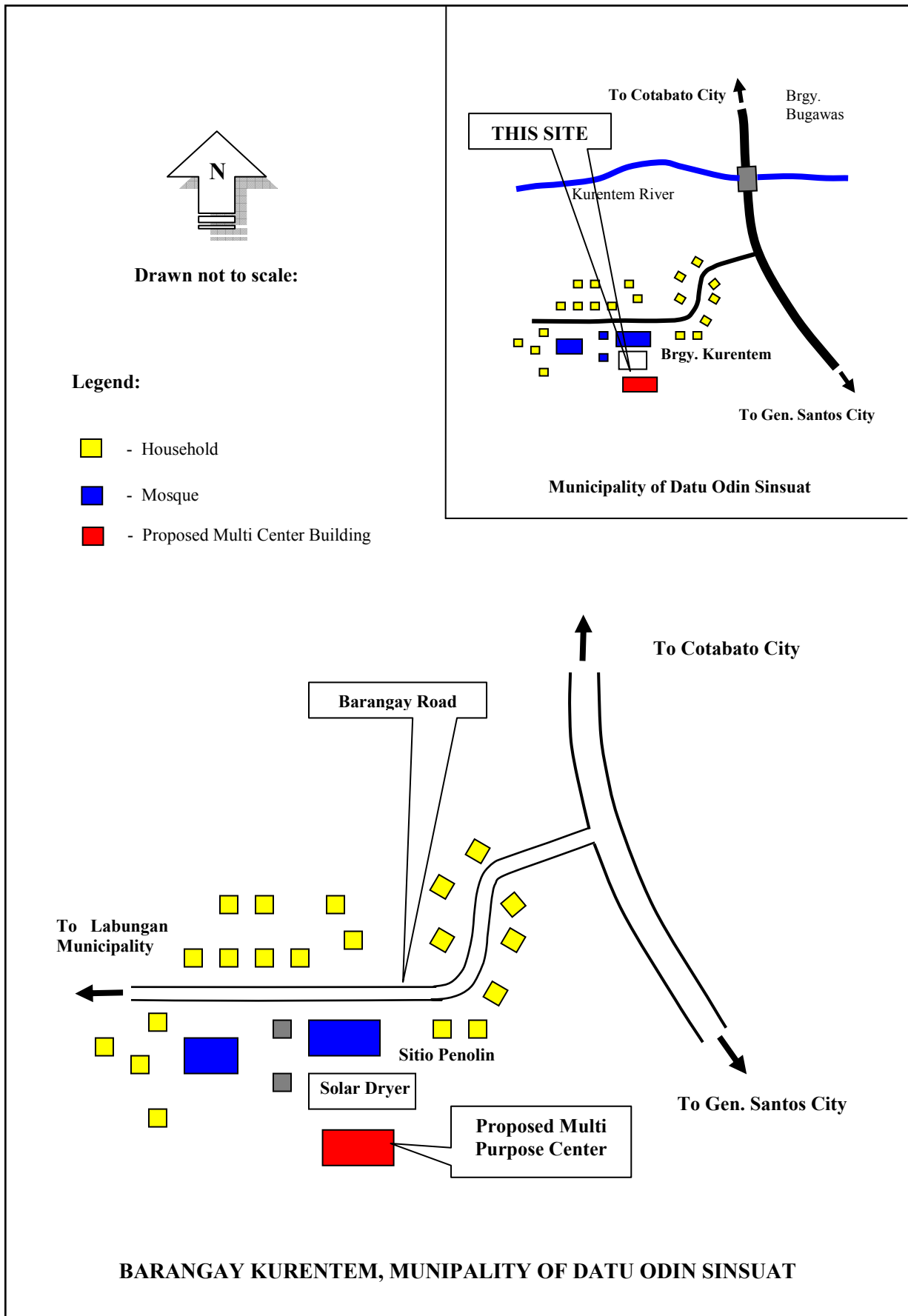
IRR = r ;where $\sum$Cash Flow $(T-n)/ (1+r)^n$-T=0, (n=1-15)
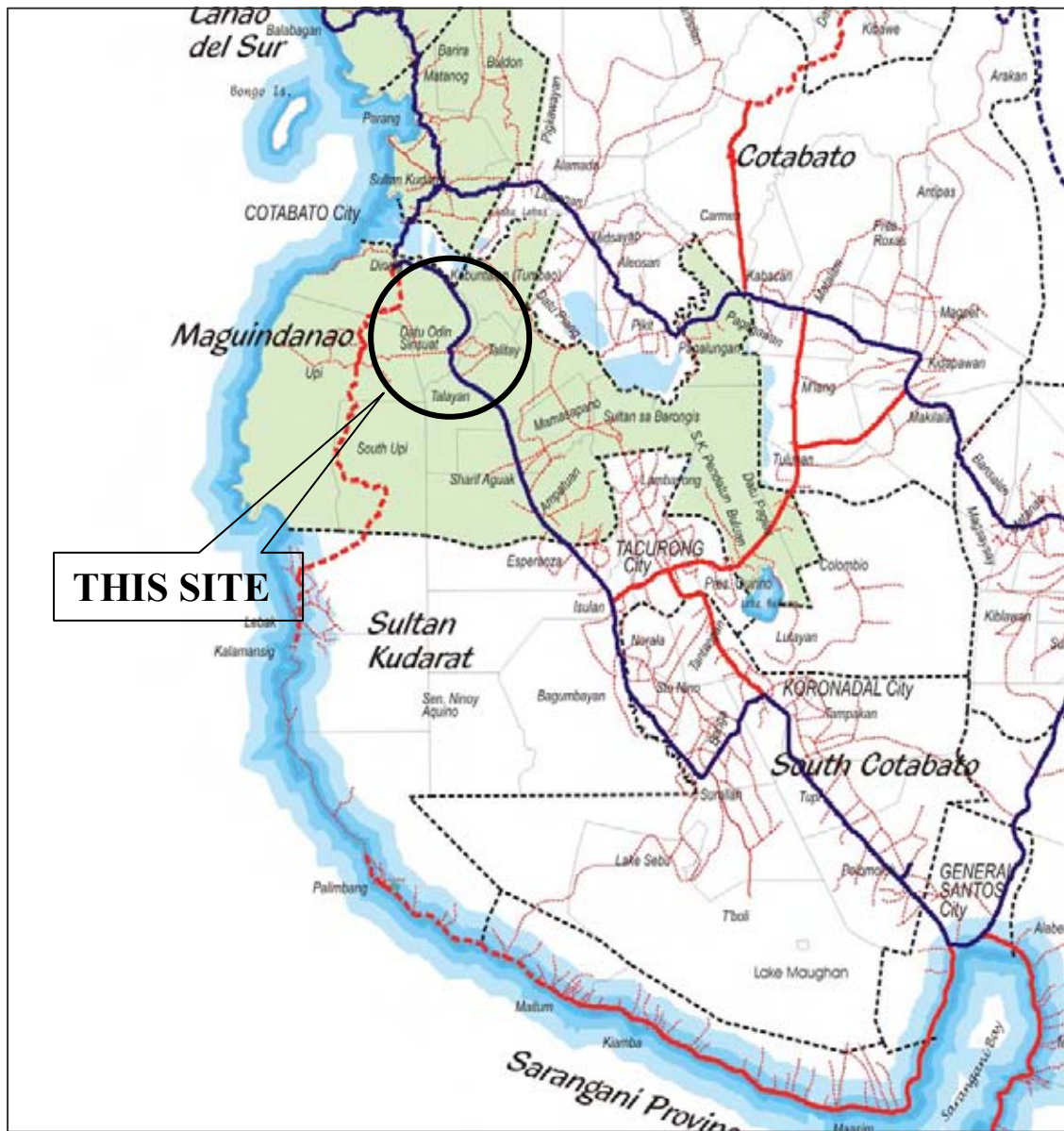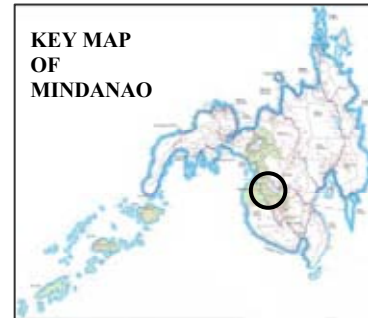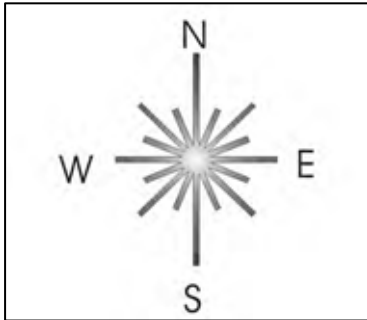**IRR = 10.9%**

7. Attachment

Attached is the project location map, the proposed schematic layout of the proposed Kurentem Multi Purpose Building as well as captioned photographs.

VICINITY MAP

N

Drawn not to scale:

Legend:

🟨 - Household

🟦 - Mosque

🟥 - Proposed Multi Center Building

THIS SITE

To Cotabato City

Brgy. Bugawas

Kurentem River

Brgy. Kurentem

To Gen. Santos City

Municipality of Datu Odin Sinsuat

Barangay Road

To Cotabato City

To Labungan Municipality

Sitio Penolin

Solar Dryer

To Gen. Santos City

Proposed Multi Purpose Center

BARANGAY KURENTEM, MUNIPALITY OF DATU ODIN SINSUAT

LOCATION MAP

THIS SITE

MUNICIPALITY O DATU ODIN SINSUAT, SHARIFF KABUNSUAN PROVINCE

PHOTOGRAPHS

The Mosque where the children are using as the classroom during their Madrasah classes

Proposed location of Multi Purpose Building near concrete solar dryer at Sitio Penolin

APPENDIX M14-1: LOWER TAVIRAN WAREHOUSE & SOLAR DRYER CONSTRUCTION

IBNA Pre-Feasibility Study

1. Title and Location
Warehouse and Solar Dryer Construction in Barangay Lower Taviran, Municipality of Kabuntalan, Shariff Kabunsuan Province

2. Present Situation and Needs
Kabuntalan is a 5th class municipality of Shariff Kabunsuan. According to 2007 census, it has a population of 22,363 people and politically divided into 17 barangays. The municipality is relatively plain area with almost of the land are marshy part of the Ligawasan Marsh. It is a vast of freshwater lakes, ponds, and arable land suited for agriculture and aqua culture.

Lower Taviran is one of the barangays of the municipality of Kabuntalan, which agriculture is the main source of income mainly because their areas are arable land. It has an area of 589 hectares with a total population of 1,509 persons based on 2007 National Census. It is approximately 2.5 kilometers northwest of the Cotabato – General Santos National Highway. It is bounded by the municipality of North Kabuntalan at the north, Upper Taviran at the south, and Pulangi River at the west side.

The farmer of Barangay Lower Taviran uses the marsh land for their farming and fishing. During rainy seasons between August to November, they utilized it as fishing ground for fish such as tilapia, haloan, and milkfish. During summer between January and April, and September to December, they utilized the marsh land as for planting of rice corn and other vegetables crops.

The production area cultivated by the covers a total more or less of 300 hectares of rice and corn. Farmers have an average yield of 4 tons per hectare for rice and corn and can generate 2 cropping cycles in year. Presently, the farmers do not have warehouse for storage, and solar dryer for drying of produce.

During harvest season, farmers are forced to sell undried or poorly dried grains at a low price due of the absence of storage facility and solar dryer in the area. A good quality well dried rice and corn can save the farmer of Php 3.0 three pesos per kilogram. Majority of the farmers use part of their houses as storage for their harvest predisposing the grains to infestation and growth of mold for poorly dried grains. And on drying their harvest, they are using the road as the dryer facility. Due to the poor post-harvest handling, the grains deteriorate in quality, which lowers the market value of the produce.

In the In-depth Barangay Needs Analysis (IBNA), majority of the residents prioritized the construction of Warehouse and Solar Dryer as their needs in the community. The proposed project will help the need of a post-handling facility by the farmer. This project will provide the farmers with a 1-unit 64-m² warehouse, and 12m x 24m, or 288 m² of solar dryer.

3. Project Concept
This particular subproject would consist of several components.

1. The backfilling of the site of the warehouse and solar dryer of approximately 500 m² . This is to elevate the warehouse and solar dryer;
2. The construction of 8m x 8m warehouse with steel trusses, including electrical facilities, and the construction of 12m x 24m concrete solar dryer; and
3. The construction of approximate 50m lined canals along the warehouse to control water during rains and to prevent the warehouse from flooding.

4. Benefits
The subproject will directly benefit at least 75% of farmers and members and their families. It will address the need for a post-harvest facility and solar dryer that will be used in storing, and drying grains produced in the area. The grains warehouse will allow farmers to store their grains in a dedicated storage facility that will prevent wastage and exposure in open environment.

Grains exposed to rains could reduce the value of grains by as much as PhP 3 per kilograms. Fully dried rice and corn sells at a higher price than undried or inadequately dried rice and corn. The selling price of a good quality well-dried is PhP 11 per kilogram and PhP 10 per kilogram for rice and corn respectively.

5. Potential Risks
The possible potential risk of the project is after the completion and turn-over to the communities or any line agencies concern such as, barangay government and/or farmers association, but if would be very lightly. This is only the Operation and Maintenance (O & M), and management of the building facilities including its amenities.

6. Costs Estimates
The initial estimated cost of the project is PhP 1.65 million, the cost be increased depending on the Detailed Engineering Survey, and broken down as follows:

Work Description	Total Cost
1. Earthworks	0.35 M
2. Warehouse (8m x 8m)	0.75 M
3. Solar Dryer (12m x 24m)	0.20 M
4. Line Canal or Slope protection construction	0.20 M
Total	PhP 1.50 M
10% Contingency	0.15 M
Total Estimated Cost	**PhP 1.65 M**

7. Cost-benefit Analysis
The Annual Population Growth Rate of Shariff Kabunsuan Province is 6.12%, based on the 2007 National Census
Number of beneficiaries is 600 farmers more or less
Project Life is 15 years

a) The dryer can produce dried rice at 8 tons a week or 8,000 kilograms
b) Total yield for 9 months period (2-3crop cycle) = 9 months/year*4 week/month*8,000 kgs/week
c) Total Annual Dried Products = 288,000 kg/year, assume no increase of production
Below is the computation of projected annual population:
Table 1

Year	Total Annual Dried Product (Kg)
1	288,000
2	288,000
3	288,000
4	288,000
5	288,000
6	288,000
7	288,000
8	288,000
9	288,000
10	288,000

Year	Total Annual Dried Product (Kg)
11	288,000
12	288,000
13	288,000
14	288,000
15	288,000

- **Cost**

Initial Cost: PhP 1.65 Million

Operation and Maintenance

a) Assume cost of maintaining the building at PhP 30,000 per year, and cost of labor is 40%:
   Material Cost = PhP 30,000; Labor Cost = PhP 30,000*0.40 = PhP 12,000

b) Total Annual Cost = PhP 42,000; Assume an increase of 5% yearly

Below is the computation of projected annual O&M cost:

Table 2

Year	Total Annual O&M projected $= P*(1+r)^n$ (PhP)
1	42,000
2	44,100
3	46,305
4	48,620
5	51,051
6	53,604
7	56,284
8	59,098
9	62,053
10	65,156
11	68,414
12	71,834
13	75,426
14	79,197
15	83,157

- **Benefit**

Additional Income

a) An increase of income at PhP 3/kg for well dried rice.

b) Assume an increase of price/kg at 5% per year.

Using the data from Table 1

Below is the computation of projected annual income:

Table 3

Year	Annual Dried Product, in kg (Table 1)	Increase of Cost per Kg (PhP)	Annual Farmers Additional Income (PhP)
1	288,000	3.00	604,800
2	288,000	3.15	635,040
3	288,000	3.31	666,792
4	288,000	3.47	700,132
5	288,000	3.65	735,138
6	288,000	3.83	771,895

Year	Annual Dried Product, in kg (Table 1)	Increase of Cost per Kg (PhP)	Annual Farmers Additional Income (PhP)
7	288,000	4.02	810,490
8	288,000	4.22	851,014
9	288,000	4.43	893,565
10	288,000	4.65	938,243
11	288,000	4.89	985,155
12	288,000	5.13	1,034,413
13	288,000	5.39	1,086,134
14	288,000	5.66	1,140,441
15	288,000	5.94	1,197,463

- **Computation of Net Present Value, (NPV), and Internal Rate of Return (IRR)**

Assume the opportunity cost (oc) of capital cost is 10%

All values are in million pesos

Table 4

Year	Cost			Benefit		Total Cash Flow	NPV TCF/ $(1+oc)^n$
	Initial Invest-ment	O&M (Table 2) (PhP)	Subtotal Cost (PhP)	Farmers Additional Income (Table 3)	Subtotal Benefit (PhP)		
T	1.65		1.65			-1.65	-1.65
T-1		0.04	0.04	0.60	0.60	0.56	0.51
T-2		0.04	0.04	0.64	0.64	0.59	0.49
T-3		0.05	0.05	0.67	0.67	0.62	0.47
T-4		0.05	0.05	0.70	0.70	0.65	0.44
T-5		0.05	0.05	0.74	0.74	0.68	0.42
T-6		0.05	0.05	0.77	0.77	0.72	0.41
T-7		0.06	0.06	0.81	0.81	0.75	0.39
T-8		0.06	0.06	0.85	0.85	0.79	0.37
T-9		0.06	0.06	0.89	0.89	0.83	0.35
T-10		0.07	0.07	0.94	0.94	0.87	0.34
T-11		0.07	0.07	0.99	0.99	0.92	0.32
T-12		0.07	0.07	1.03	1.03	0.96	0.31
T-13		0.08	0.08	1.09	1.09	1.01	0.29
T-14		0.08	0.08	1.14	1.14	1.06	0.28
T-15		0.08	0.08	1.20	1.20	1.11	0.27

Solving for NPV, and IRR;

NPV = $\sum$ Cash Flow (T-n)/ $(1+oc)^n$-T, (n=1-15)

NPV = 4.00

IRR = r ;where $\sum$ Cash Flow (T-n)/ $(1+r)^n$-T=0, (n=1-15)
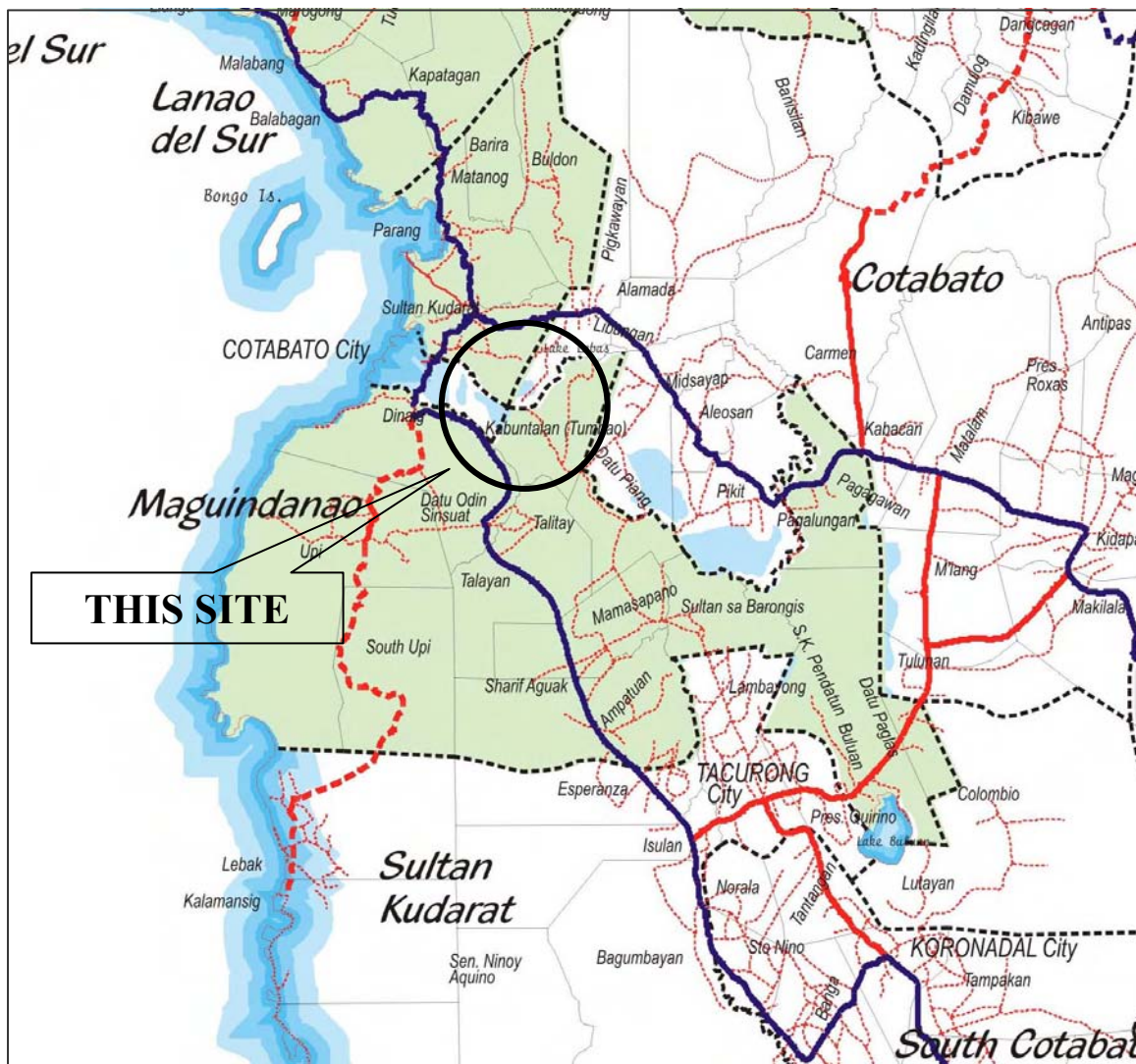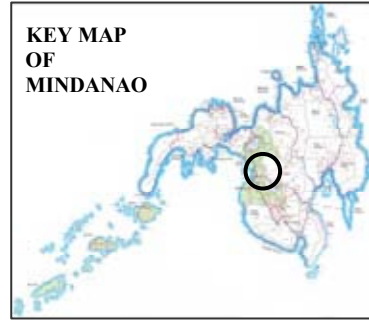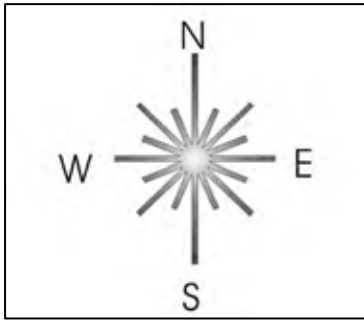
IRR = 38.6%

8. Attachment

Attached are the project location map, the proposed development plan as well as captioned photographs highlighting the road and its vicinity.

VICINITY MAP

THIS SITE

To Cotabato City

To Kabuntalan

Pulangi River

National Highway

To Gen. Santos City

Drawn not to scale:

Legend:

▢ - Household

■ - Mosque, School

⬭ - Rice fields

Provincial Road (Graveled road)

To Cotabato City

Creek

Rice fields

Box Culvert

Lower Taviran Elem School

Mosque

The Proposed Site of Warehouse & Solar Dryer Construction

MUNICIPALITY OF KABUNTALAN, PROVINCE OF SHARIFF KABUNSUAN

LOCATION MAP

THIS SITE

KEY MAP
OF
MINDANAO
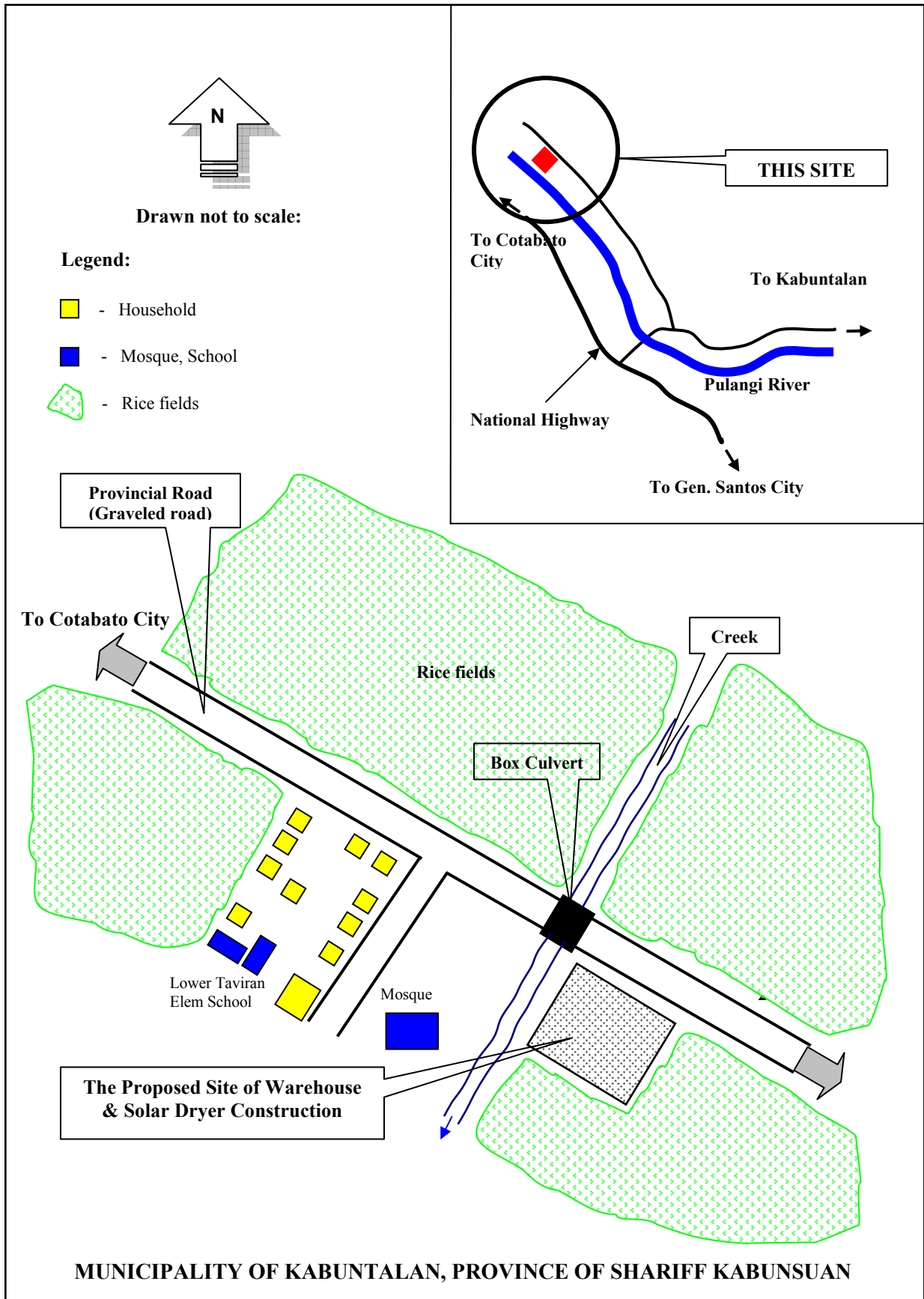
MUNICIPALITY OF KABUNTALAN, PROVINCE OF SHARIFF KABUNSUAN

PHOTOGRAPHS

Farmers using the road as dryer in drying of grain rice

Construction of lined canal along this creek

The field utilized as planting of veggies during off-seasons

Rice fields during planting seasons

Rice fields during harvesting

The location of the Proposed Warehouse and Solar Dryer where embankment is needed to level into the road