

## C - 5 BENEFIT COST ANALYSIS



SCHEME ID NO: 2-006-00-03-0  
 SCHEME NAME: BULU

R.D.Coef. ;(%):	70.00			
Q-firm ;(m3/s):	139.80			
Q-max ;(m3/s):	279.60	419.40	559.20	838.79
F.S.L. ;(El.-m):	218.00			
A.O.L. ;(El.-m):	199.20			
M.O.L. ;(El.-m):	161.50			
Inst.Cap. ;(MW):	272.05	408.08	544.11	816.17
Firm Engy ;(GWh):	1191.60	1191.60	1191.60	1191.60
Scnd Engy ;(GWh):	130.40	173.87	195.61	217.34
Plnt Fctr:	0.55	0.38	0.29	0.19
Ann Bnft ;(Mil.US\$):	114.17	176.30	187.30	206.99
Pjct Cost ;(Mil.US\$):	434.90	517.70	615.80	788.30
Acc.Bnft ;(Mil.US\$):	713.16	979.19	1040.32	1292.97
Acc.Cost ;(Mil.US\$):	695.33	861.53	1024.79	1260.37
B/C Ratio:	1.02	1.13	1.01	1.02
B-C :	17.82	117.65	15.53	32.60
D.Rate :	0.16	0.18	0.18	0.16

SCHEME ID NO: 2-006-00-02-0  
 SCHEME NAME: BUBULAYAN

R.D.Coef. ;(%):	80.00			
Q-firm ;(m3/s):	150.10			
Q-max ;(m3/s):	300.20	450.30	600.40	900.59
F.S.L. ;(El.-m):	206.00			
A.O.L. ;(El.-m):	182.30			
M.O.L. ;(El.-m):	134.80			
Inst.Cap. ;(MW):	384.27	576.41	768.55	1152.83
Firm Engy ;(GWh):	1683.14	1683.14	1683.14	1683.14
Scnd Engy ;(GWh):	138.27	184.36	207.40	230.45
Plnt Fctr:	0.54	0.36	0.28	0.18
Ann Bnft ;(Mil.US\$):	158.84	242.48	257.21	284.21
Pjct Cost ;(Mil.US\$):	622.10	742.90	861.20	1117.40
Acc.Bnft ;(Mil.US\$):	1057.99	1346.78	1512.42	1892.98
Acc.Cost ;(Mil.US\$):	975.66	1236.30	1404.46	1752.46
B/C Ratio:	1.08	1.08	1.07	1.08
B-C :	82.33	110.47	107.95	140.52
D.Rate :	0.15	0.18	0.17	0.15

SCHEME ID NO: 2-006-01-05-0  
 SCHEME NAME: DIBAGAT

R.D.Coef. ; (%) :	80.00			
Q-firm ; (m3/s) :	78.10			
Q-max ; (m3/s) :	156.20	234.30	312.40	468.59
F.S.L. ; (El.-m) :	341.00			
A.O.L. ; (El.-m) :	314.60			
M.O.L. ; (El.-m) :	261.80			
Inst.Cap. ; (MW) :	201.10	301.65	402.21	603.31
Firm Engy ; (GWh) :	880.84	880.84	880.84	880.84
Scnd Engy ; (GWh) :	73.16	97.54	109.74	121.93
Plnt Fctr :	0.54	0.37	0.28	0.18
Ann Bnft ; (Mil.US\$) :	83.17	127.01	134.73	148.87
Pjct Cost ; (Mil.US\$) :	391.90	451.80	502.70	622.60
Acc.Bnft ; (Mil.US\$) :	638.36	746.84	841.59	991.60
Acc.Cost ; (Mil.US\$) :	592.67	736.80	803.74	976.44
B/C Ratio :	1.07	1.01	1.04	1.01
B-C :	45.68	10.03	37.85	15.15
D.Rate :	0.13	0.17	0.16	0.15

SCHEME ID NO: 2-006-01-06-0  
 SCHEME NAME: AGBULU

R.D.Coef. ; (%) :	75.00			
Q-firm ; (m3/s) :	64.60			
Q-max ; (m3/s) :	129.20	193.80	258.40	387.59
F.S.L. ; (El.-m) :	346.00			
A.O.L. ; (El.-m) :	323.40			
M.O.L. ; (El.-m) :	278.10			
Inst.Cap. ; (MW) :	144.22	216.33	288.44	432.66
Firm Engy ; (GWh) :	631.68	631.68	631.68	631.68
Scnd Engy ; (GWh) :	60.46	80.61	90.69	100.77
Plnt Fctr :	0.54	0.37	0.28	0.19
Ann Bnft ; (Mil.US\$) :	60.06	92.22	97.90	108.19
Pjct Cost ; (Mil.US\$) :	282.60	315.50	366.60	441.40
Acc.Bnft ; (Mil.US\$) :	461.03	542.28	611.54	720.60
Acc.Cost ; (Mil.US\$) :	427.38	514.52	586.13	692.26
B/C Ratio :	1.07	1.05	1.04	1.04
B-C :	33.65	27.76	25.40	28.33
D.Rate :	0.13	0.17	0.16	0.15

SCHEME ID NO: 2-008-28-52-0  
 SCHEME NAME: CABINGATAN

R.D.Coeff. ; (%):	70.00			
Q-firm ; (m3/s):	67.70			
Q-max ; (m3/s):	135.40	203.10	270.80	406.19
F.S.L. ; (El.-m):	303.00			
A.O.L. ; (El.-m):	284.60			
M.O.L. ; (El.-m):	247.70			
Inst.Cap. ; (MW):	132.52	198.79	265.05	397.58
Firm Engy ; (GWh):	580.47	580.47	580.47	580.47
Scnd Engy ; (GWh):	158.41	211.22	237.62	264.02
Plnt Fctr:	0.63	0.45	0.35	0.24
Ann Bnft ; (Mil.US\$):	60.62	72.68	106.44	117.72
Pjct Cost ; (Mil.US\$):	280.90	317.50	359.20	436.80
Acc.Bnft ; (Mil.US\$):	432.44	518.44	625.90	735.35
Acc.Cost ; (Mil.US\$):	432.42	488.77	585.79	698.37
B/C Ratio:	1.00	1.06	1.06	1.05
B-C :	0.01	29.67	40.10	36.97
D.Rate :	0.14	0.14	0.17	0.16

SCHEME ID NO: 2-006-00-01-0  
 SCHEME NAME: SISIRITAN

R.D.Coeff. ; (%):	30.00			
Q-firm ; (m3/s):	111.40			
Q-max ; (m3/s):	222.80	334.20	445.60	668.39
F.S.L. ; (El.-m):	100.00			
A.O.L. ; (El.-m):	88.40			
M.O.L. ; (El.-m):	65.20			
Inst.Cap. ; (MW):	139.20	208.81	278.41	417.62
Firm Engy ; (GWh):	609.72	609.72	609.72	609.72
Scnd Engy ; (GWh):	282.36	376.48	423.54	470.60
Plnt Fctr:	0.73	0.53	0.42	0.29
Ann Bnft ; (Mil.US\$):	49.14	84.51	96.73	144.30
Pjct Cost ; (Mil.US\$):	318.20	369.60	428.40	536.80
Acc.Bnft ; (Mil.US\$):	487.27	602.80	689.97	901.34
Acc.Cost ; (Mil.US\$):	459.60	568.97	659.49	858.26
B/C Ratio:	1.06	1.05	1.04	1.05
B-C :	27.66	33.82	30.47	43.08
D.Rate :	0.10	0.14	0.14	0.16

SCHEME ID NO: 1-022-00-01-0  
 SCHEME NAME: BANAQANG

R.D.Coef.;(%):	70.00			
Q-firm;(m3/s):	183.80			
Q-max;(m3/s):	367.60	551.40	735.20	1102.80
F.S.L. ;(El.-m):	77.00			
A.O.L. ;(El.-m):	68.00			
M.O.L. ;(El.-m):	50.10			
Inst.Cap.;(MW):	176.42	264.63	352.84	529.26
Firm Engy;(GWh):	772.72	772.72	772.72	772.72
Scnd Engy;(GWh):	114.77	153.03	172.16	191.29
Plnt Fctr:	0.57	0.39	0.30	0.20
Ann Bnft ;(Mil.US\$):	75.63	118.62	126.30	139.61
Pjct Cost;(Mil.US\$):	367.30	447.10	526.60	701.20
Acc.Bnft ;(Mil.US\$):	580.50	740.97	841.24	1071.54
Acc.Cost ;(Mil.US\$):	555.47	714.84	825.88	1060.43
B/C Ratio:	1.04	1.03	1.01	1.01
B-C :	25.03	26.13	15.35	11.10
D.Rate :	0.13	0.16	0.15	0.13

SCHEME ID NO: 2-006-01-04-0  
 SCHEME NAME: NABABARAYAN

R.D.Coef.;(%):	45.00			
Q-firm;(m3/s):	77.90			
Q-max;(m3/s):	155.80	233.70	311.60	467.39
F.S.L. ;(El.-m):	240.00			
A.O.L. ;(El.-m):	222.30			
M.O.L. ;(El.-m):	186.80			
Inst.Cap.;(MW):	152.10	228.16	304.21	456.32
Firm Engy;(GWh):	666.24	666.24	666.24	666.24
Scnd Engy;(GWh):	160.70	214.27	241.05	267.83
Plnt Fctr:	0.62	0.44	0.34	0.23
Ann Bnft ;(Mil.US\$):	68.47	81.93	118.78	131.36
Pjct Cost;(Mil.US\$):	357.80	401.10	456.30	540.90
Acc.Bnft ;(Mil.US\$):	568.62	628.90	741.98	874.94
Acc.Cost ;(Mil.US\$):	532.12	606.59	729.55	848.31
B/C Ratio:	1.06	1.03	1.01	1.03
B-C :	36.49	22.31	12.43	26.62
D.Rate :	0.12	0.13	0.16	0.15

SCHEME ID NO: 4-007-00-05-0  
 SCHEME NAME: UPPER AGOS-2

R.D.Coef. ; (%) :	75.00			
Q-firm ; (m3/s) :	41.80			
Q-max ; (m3/s) :	83.60	125.40	167.20	250.79
F.S.L. ; (El.-m) :	316.00			
A.O.L. ; (El.-m) :	299.80			
M.O.L. ; (El.-m) :	267.30			
Inst.Cap. ; (MW) :	90.08	135.12	180.16	270.25
Firm Engy ; (GWh) :	394.57	394.57	394.57	394.57
Scnd Engy ; (GWh) :	33.41	44.55	50.12	55.69
Plnt Fctr :	0.54	0.37	0.28	0.19
Ann Bnft ; (Mil.US\$) :	37.29	56.98	60.45	66.80
Pjct Cost ; (Mil.US\$) :	235.30	261.40	282.20	332.00
Acc.Bnft ; (Mil.US\$) :	369.72	406.46	464.02	512.73
Acc.Cost ; (Mil.US\$) :	339.86	402.40	426.77	502.08
B/C Ratio :	1.08	1.01	1.08	1.02
B-C :	29.86	4.05	37.24	10.64
D.Rate :	0.10	0.14	0.13	0.13

SCHEME ID NO: 1-022-00-05-0  
 SCHEME NAME: SUPO

R.D.Coef. ; (%) :	43.00			
Q-firm ; (m3/s) :	43.30			
Q-max ; (m3/s) :	86.60	129.90	173.20	259.79
F.S.L. ; (El.-m) :	320.00			
A.O.L. ; (El.-m) :	306.30			
M.O.L. ; (El.-m) :	278.80			
Inst.Cap. ; (MW) :	71.14	106.71	142.29	213.43
Firm Engy ; (GWh) :	311.62	311.62	311.62	311.62
Scnd Engy ; (GWh) :	84.71	112.94	127.06	141.18
Plnt Fctr :	0.63	0.45	0.35	0.24
Ann Bnft ; (Mil.US\$) :	32.53	38.99	57.09	63.14
Pjct Cost ; (Mil.US\$) :	205.30	229.70	249.90	294.50
Acc.Bnft ; (Mil.US\$) :	322.53	352.60	407.20	484.62
Acc.Cost ; (Mil.US\$) :	296.53	336.38	384.70	445.37
B/C Ratio :	1.08	1.04	1.05	1.08
B-C :	26.00	16.22	22.50	39.24
D.Rate :	0.10	0.11	0.14	0.13

SCHEME ID NO: 4-007-00-01-0

SCHEME NAME: KANAN

R.D.Coeff. ; (%):	75.00			
Q-firm ; (m <sup>3</sup> /s):	51.30			
Q-max ; (m <sup>3</sup> /s):	102.60	153.90	205.20	307.79
F.S.L. ; (El.-m):	294.00			
A.O.L. ; (El.-m):	273.00			
M.O.L. ; (El.-m):	231.00			
Inst.Cap. ; (MW):	142.31	213.47	284.63	426.94
Firm Engy ; (GWh):	623.34	623.34	623.34	623.34
Scnd Engy ; (GWh):	49.19	65.59	73.79	81.99
Plnt Fctr:	0.53	0.36	0.27	0.18
Ann Bnft ; (Mil.US\$):	58.72	89.51	94.93	104.89
Pjct Cost ; (Mil.US\$):	445.20	475.80	515.90	585.90
Acc.Bnft ; (Mil.US\$):	643.68	743.38	788.38	948.44
Acc.Cost ; (Mil.US\$):	635.57	707.61	767.25	858.01
B/C Ratio:	1.01	1.05	1.02	1.10
B-C :	8.10	35.76	21.13	90.43
D.Rate :	0.09	0.12	0.12	0.11

SCHEME ID NO: 2-008-07-24-0

SCHEME NAME: BANTAY

R.D.Coeff. ; (%):	80.00			
Q-firm ; (m <sup>3</sup> /s):	34.60			
Q-max ; (m <sup>3</sup> /s):	69.20	103.80	138.40	207.60
F.S.L. ; (El.-m):	62.00			
A.O.L. ; (El.-m):	56.20			
M.O.L. ; (El.-m):	44.50			
Inst.Cap. ; (MW):	19.88	29.82	39.76	59.64
Firm Engy ; (GWh):	87.07	87.07	87.07	87.07
Scnd Engy ; (GWh):	23.62	31.50	35.43	39.37
Plnt Fctr:	0.63	0.45	0.35	0.24
Ann Bnft ; (Mil.US\$):	9.08	10.89	15.94	17.63
Pjct Cost ; (Mil.US\$):	70.10	79.00	94.30	118.70
Acc.Bnft ; (Mil.US\$):	99.61	108.01	132.42	174.85
Acc.Cost ; (Mil.US\$):	95.13	107.79	130.83	171.44
B/C Ratio:	1.04	1.00	1.01	1.01
B-C :	4.48	0.21	1.58	3.40
D.Rate :	0.09	0.10	0.12	0.10



SCHEME ID NO: 4-007-00-02-0  
 SCHEME NAME: DARAITAN

R.D.Coef.;(%):	40.00			
Q-firm;(m3/s):	24.00			
Q-max;(m3/s):	48.00	72.00	96.00	144.00
F.S.L. ;(El.-m):	234.00			
A.O.L. ;(El.-m):	221.80			
M.O.L. ;(El.-m):	197.40			
Inst.Cap.;(MW):	30.50	45.75	61.00	91.51
Firm Engy;(GWh):	133.60	133.60	133.60	133.60
Scnd Engy;(GWh):	28.04	37.39	42.06	46.73
Plnt Fctr:	0.60	0.42	0.32	0.22
Ann Bnft ;(Mil.US\$):	13.51	16.13	23.15	25.59
Pjct Cost;(Mil.US\$):	105.80	116.40	125.90	150.60
Acc.Bnft ;(Mil.US\$):	165.28	176.89	192.26	231.45
Acc.Cost ;(Mil.US\$):	149.69	166.17	187.24	220.54
B/C Ratio:	1.10	1.06	1.02	1.04
B-C :	15.58	10.72	5.02	10.91
D.Rate :	0.08	0.09	0.12	0.11

SCHEME ID NO: 5-014-01-01-0  
 SCHEME NAME: BOSIGON

R.D.Coef.;(%):	38.00			
Q-firm;(m3/s):	19.00			
Q-max;(m3/s):	38.00	57.00	76.00	114.00
F.S.L. ;(El.-m):	80.00			
A.O.L. ;(El.-m):	72.30			
M.O.L. ;(El.-m):	56.80			
Inst.Cap.;(MW):	14.89	22.33	29.78	44.67
Firm Engy;(GWh):	65.21	65.21	65.21	65.21
Scnd Engy;(GWh):	34.49	45.99	51.74	57.49
Plnt Fctr:	0.76	0.56	0.44	0.31
Ann Bnft ;(Mil.US\$):	5.35	9.34	10.68	16.19
Pjct Cost;(Mil.US\$):	60.30	67.10	73.60	91.70
Acc.Bnft ;(Mil.US\$):	84.37	92.62	105.95	134.52
Acc.Cost ;(Mil.US\$):	82.13	91.55	100.42	127.22
B/C Ratio:	1.02	1.01	1.05	1.05
B-C :	2.24	1.06	5.53	7.29
D.Rate :	0.06	0.10	0.10	0.12

SCHEME ID NO: 2-008-03-05-0

SCHEME NAME: SADANGA

R.D.Coef.;(%):	65.00			
Q-firm;(m3/s):	38.90			
Q-max;(m3/s):	77.80	116.70	155.60	233.40
F.S.L.;(El.-m):	890.00			
A.O.L.;(El.-m):	866.70			
M.O.L.;(El.-m):	820.20			
Inst.Cap.;(MW):	119.18	178.78	238.37	357.56
Firm Engy;(GWh):	522.04	522.04	522.04	522.04
Scnd Engy;(GWh):	59.64	79.52	89.46	99.41
Plnt Fctr:	0.55	0.38	0.29	0.19
Ann Bnft;(Mil.US\$):	50.15	77.59	82.46	91.13
Pjct Cost;(Mil.US\$):	403.00	434.10	463.00	521.00
Acc.Bnft;(Mil.US\$):	613.54	701.58	745.59	824.00
Acc.Cost;(Mil.US\$):	570.20	635.71	678.03	762.96
B/C Ratio:	1.07	1.10	1.09	1.07
B-C:	43.33	65.87	67.55	61.03
D.Rate:	0.08	0.11	0.11	0.11

SCHEME ID NO: 1-022-00-06-0

SCHEME NAME: ETEB

R.D.Coef.;(%):	60.00			
Q-firm;(m3/s):	39.40			
Q-max;(m3/s):	78.80	118.20	157.60	236.40
F.S.L.;(El.-m):	371.00			
A.O.L.;(El.-m):	357.80			
M.O.L.;(El.-m):	331.40			
Inst.Cap.;(MW):	53.51	80.27	107.03	160.54
Firm Engy;(GWh):	234.40	234.40	234.40	234.40
Scnd Engy;(GWh):	41.40	55.20	62.11	69.01
Plnt Fctr:	0.58	0.41	0.31	0.21
Ann Bnft;(Mil.US\$):	23.29	27.76	39.36	43.52
Pjct Cost;(Mil.US\$):	199.10	222.40	239.40	277.90
Acc.Bnft;(Mil.US\$):	284.93	339.63	355.96	431.52
Acc.Cost;(Mil.US\$):	281.70	314.67	350.58	401.39
B/C Ratio:	1.01	1.07	1.01	1.07
B-C:	3.22	24.96	5.37	30.12
D.Rate:	0.08	0.08	0.11	0.10

SCHEME ID NO: 2-008-14-34-0

SCHEME NAME: MALIANO

R.D.Coeff. ; (%) :	70.00			
Q-firm ; (m3/s) :	43.00			
Q-max ; (m3/s) :	86.00	129.00	172.00	257.99
F.S.L. ; (El.-m) :	292.00			
A.O.L. ; (El.-m) :	272.20			
M.O.L. ; (El.-m) :	232.70			
Inst.Cap. ; (MW) :	87.71	131.57	175.43	263.14
Firm Engy ; (GWh) :	384.19	384.19	384.19	384.19
Scnd Engy ; (GWh) :	104.14	138.85	156.21	173.57
Plnt Fctr :	0.63	0.45	0.35	0.24
Ann Bnft ; (Mil.US\$) :	40.09	48.05	70.33	77.79
Pjct Cost ; (Mil.US\$) :	344.50	371.20	392.90	452.70
Acc.Bnft ; (Mil.US\$) :	490.44	587.92	635.97	703.37
Acc.Cost ; (Mil.US\$) :	487.43	525.21	575.37	662.94
B/C Ratio :	1.00	1.11	1.10	1.06
B-C :	3.00	62.70	60.60	40.43
D.Rate :	0.08	0.08	0.11	0.11

SCHEME ID NO: 2-008-08-25-0

SCHEME NAME: DABBA

R.D.Coeff. ; (%) :	62.00			
Q-firm ; (m3/s) :	27.80			
Q-max ; (m3/s) :	55.60	83.40	111.20	166.80
F.S.L. ; (El.-m) :	117.00			
A.O.L. ; (El.-m) :	105.50			
M.O.L. ; (El.-m) :	82.50			
Inst.Cap. ; (MW) :	30.11	45.17	60.23	90.34
Firm Engy ; (GWh) :	131.91	131.91	131.91	131.91
Scnd Engy ; (GWh) :	36.23	48.31	54.34	60.38
Plnt Fctr :	0.63	0.45	0.35	0.24
Ann Bnft ; (Mil.US\$) :	13.78	16.53	24.22	26.79
Pjct Cost ; (Mil.US\$) :	122.80	134.00	147.40	170.00
Acc.Bnft ; (Mil.US\$) :	190.31	202.26	219.04	265.66
Acc.Cost ; (Mil.US\$) :	172.81	189.59	215.85	245.54
B/C Ratio :	1.10	1.06	1.01	1.08
B-C :	17.49	12.67	3.19	20.11
D.Rate :	0.07	0.08	0.11	0.10

SCHEME ID NO: 4-115-01-01-0  
 SCHEME NAME: WAWA

R.D.Coeff.;(%):	67.00			
Q-firm;(m3/s):	22.40			
Q-max;(m3/s):	44.80	67.20	89.60	134.40
F.S.L. ;(El.-m):	151.00			
A.O.L. ;(El.-m):	136.90			
M.O.L. ;(El.-m):	108.80			
Inst.Cap. ;(MW):	40.60	60.90	81.20	121.81
Firm Engy;(GWh):	177.84	177.84	177.84	177.84
Scnd Engy;(GWh):	17.91	23.88	26.86	29.85
Plnt Fctr:	0.55	0.37	0.28	0.19
Ann Bnft ;(Mil.US\$):	16.95	26.09	27.70	30.61
Pjct Cost;(Mil.US\$):	153.60	164.40	176.50	202.20
Acc.Bnft ;(Mil.US\$):	234.04	258.69	274.70	303.57
Acc.Cost ;(Mil.US\$):	216.15	237.45	254.93	292.05
B/C Ratio:	1.08	1.08	1.07	1.03
B-C :	17.88	21.23	19.77	11.52
D.Rate :	0.07	0.10	0.10	0.10

SCHEME ID NO: 1-022-01-12-0  
 SCHEME NAME: TINEG-1

R.D.Coeff.;(%):	75.00			
Q-firm;(m3/s):	46.70			
Q-max;(m3/s):	93.40	140.10	186.80	280.19
F.S.L. ;(El.-m):	324.00			
A.O.L. ;(El.-m):	299.10			
M.O.L. ;(El.-m):	249.40			
Inst.Cap. ;(MW):	122.55	183.83	245.11	367.67
Firm Engy;(GWh):	536.80	536.80	536.80	536.80
Scnd Engy;(GWh):	61.79	82.39	92.69	102.99
Plnt Fctr:	0.55	0.38	0.29	0.19
Ann Bnft ;(Mil.US\$):	51.59	79.85	84.86	93.79
Pjct Cost;(Mil.US\$):	508.60	540.60	568.60	628.70
Acc.Bnft ;(Mil.US\$):	813.23	791.75	841.45	929.94
Acc.Cost ;(Mil.US\$):	715.20	780.83	821.27	908.08
B/C Ratio:	1.13	1.01	1.02	1.02
B-C :	98.03	10.91	20.17	21.86
D.Rate :	0.06	0.10	0.10	0.10

SCHEME ID NO: 2-008-14-37-0

SCHEME NAME: DINAPIQUI

R.D.Coef. ; (%):	94.00			
Q-firm; (m3/s):	4.30			
Q-max ; (m3/s):	8.60	12.90	17.20	25.79
F.S.L. ; (El.-m):	546.00			
A.O.L. ; (El.-m):	525.80			
M.O.L. ; (El.-m):	485.30			
Inst.Cap. ; (MW):	30.00	45.00	60.00	90.00
Firm Enrgy; (GWh):	131.41	131.41	131.41	131.41
Scnd Enrgy; (GWh):	22.41	29.88	33.61	37.35
Plnt Fctr:	0.58	0.40	0.31	0.21
Ann Bnft ; (Mil.US\$):	13.01	15.50	21.94	24.25
Pjct Cost; (Mil.US\$):	130.80	138.50	146.40	169.00
Acc.Bnft ; (Mil.US\$):	205.14	214.02	217.56	265.90
Acc.Cost ; (Mil.US\$):	183.93	194.90	211.45	241.26
B/C Ratio:	1.11	1.09	1.02	1.10
B-C :	21.21	19.11	6.10	24.63
D.Rate :	0.06	0.07	0.10	0.09

SCHEME ID NO: 2-008-29-61-0

SCHEME NAME: UP.CASECNAN-3

R.D.Coef. ; (%):	91.00			
Q-firm; (m3/s):	6.80			
Q-max ; (m3/s):	13.60	20.40	27.20	40.79
F.S.L. ; (El.-m):	796.00			
A.O.L. ; (El.-m):	782.90			
M.O.L. ; (El.-m):	756.60			
Inst.Cap. ; (MW):	34.72	52.09	69.45	104.18
Firm Enrgy; (GWh):	152.11	152.11	152.11	152.11
Scnd Enrgy; (GWh):	27.97	37.30	41.96	46.62
Plnt Fctr:	0.59	0.41	0.31	0.21
Ann Bnft ; (Mil.US\$):	15.17	18.09	26.83	30.10
Pjct Cost; (Mil.US\$):	149.20	163.70	179.90	205.00
Acc.Bnft ; (Mil.US\$):	239.15	249.71	266.05	298.47
Acc.Cost ; (Mil.US\$):	209.80	230.37	259.84	296.09
B/C Ratio:	1.13	1.08	1.02	1.00
B-C :	29.34	19.34	6.20	2.37
D.Rate :	0.06	0.07	0.10	0.10

SCHEME ID NO: 2-008-29-54-0  
 SCHEME NAME: DAKGAN

R.D.Coef. ;(%):	72.00			
Q-firm ;(m3/s):	28.50			
Q-max ;(m3/s):	57.00	85.50	114.00	171.00
F.S.L. ;(El.-m):	433.00			
A.O.L. ;(El.-m):	413.20			
M.O.L. ;(El.-m):	373.50			
Inst.Cap. ;(MW):	56.21	84.31	112.42	168.63
Firm Engy ;(GWh):	246.21	246.21	246.21	246.21
Scnd Engy ;(GWh):	62.41	83.21	93.62	104.02
Plnt Fctr:	0.62	0.44	0.34	0.23
Ann Bnft ;(Mil.US\$):	25.46	30.49	44.38	49.08
Pjct Cost ;(Mil.US\$):	270.80	287.40	304.30	330.40
Acc.Bnft ;(Mil.US\$):	401.35	420.84	440.05	486.66
Acc.Cost ;(Mil.US\$):	380.80	404.45	439.52	477.22
B/C Ratio:	1.05	1.04	1.00	1.01
B-C :	20.55	16.38	0.53	9.43
D.Rate :	0.06	0.07	0.10	0.10

SCHEME ID NO: 2-005-00-02-0  
 SCHEME NAME: ZIMIGUI

R.D.Coef. ;(%):	57.00			
Q-firm ;(m3/s):	34.90			
Q-max ;(m3/s):	69.80	104.70	139.60	209.40
F.S.L. ;(El.-m):	74.00			
A.O.L. ;(El.-m):	64.30			
M.O.L. ;(El.-m):	44.90			
Inst.Cap. ;(MW):	32.34	48.52	64.69	97.04
Firm Engy ;(GWh):	141.69	141.69	141.69	141.69
Scnd Engy ;(GWh):	23.79	31.72	35.69	39.66
Plnt Fctr:	0.58	0.40	0.31	0.21
Ann Bnft ;(Mil.US\$):	14.01	16.69	23.60	26.08
Pjct Cost ;(Mil.US\$):	141.10	158.10	171.30	203.00
Acc.Bnft ;(Mil.US\$):	220.88	230.40	258.69	319.16
Acc.Cost ;(Mil.US\$):	198.41	222.49	244.55	287.22
B/C Ratio:	1.11	1.03	1.05	1.11
B-C :	22.46	7.91	14.14	31.93
D.Rate :	0.06	0.07	0.09	0.08

SCHEME ID NO: 2-008-03-03-0  
 SCHEME NAME: BASAO

R.D.Coeff. ; (%):	70.00			
Q-firm ; (m3/s):	47.20			
Q-max ; (m3/s):	94.40	141.60	188.80	283.19
F.S.L. ; (El.-m):	768.00			
A.O.L. ; (El.-m):	740.40			
M.O.L. ; (El.-m):	685.20			
Inst.Cap. ; (MW):	174.14	261.22	348.29	522.44
Firm Engy ; (GWh):	762.76	762.76	762.76	762.76
Scnd Engy ; (GWh):	78.95	105.27	118.43	131.59
Plnt Fctr:	0.55	0.37	0.28	0.19
Ann Bnft ; (Mil.US\$):	72.84	112.20	119.17	131.69
Pjct Cost ; (Mil.US\$):	746.70	791.10	825.90	909.50
Acc.Bnft ; (Mil.US\$):	1148.19	1229.99	1306.34	1443.64
Acc.Cost ; (Mil.US\$):	1050.02	1129.39	1179.07	1298.42
B/C Ratio:	1.09	1.08	1.10	1.11
B-C :	98.16	100.60	127.27	145.22
D.Rate :	0.06	0.09	0.09	0.09

SCHEME ID NO: 3-077-00-04-0  
 SCHEME NAME: TABU

R.D.Coeff. ; (%):	6.00			
Q-firm ; (m3/s):	12.50			
Q-max ; (m3/s):	25.00	37.50	50.00	74.99
F.S.L. ; (El.-m):	414.00			
A.O.L. ; (El.-m):	404.40			
M.O.L. ; (El.-m):	385.10			
Inst.Cap. ; (MW):	22.43	33.64	44.86	67.29
Firm Engy ; (GWh):	94.90	97.30	97.30	98.30
Scnd Engy ; (GWh):	94.90	194.50	244.20	361.90
Plnt Fctr:	0.96	0.98	0.86	0.78
Ann Bnft ; (Mil.US\$):	8.93	13.33	16.54	23.40
Pjct Cost ; (Mil.US\$):	125.40	136.00	145.30	161.80
Acc.Bnft ; (Mil.US\$):	192.01	210.22	228.37	256.58
Acc.Cost ; (Mil.US\$):	179.69	191.24	204.47	230.98
B/C Ratio:	1.06	1.09	1.11	1.11
B-C :	12.32	18.97	23.89	25.59
D.Rate :	0.04	0.06	0.07	0.09

SCHEME ID NO: 2-008-14-35-0  
 SCHEME NAME: ILAGAN-1

R.D.Coeff.;(%):	90.00			
Q-firm;(m3/s):	22.50			
Q-max;(m3/s):	45.00	67.50	90.00	135.00
F.S.L. ;(El.-m):	474.00			
A.O.L. ;(El.-m):	441.30			
M.O.L. ;(El.-m):	375.90			
Inst.Cap.;(MW):	69.34	104.01	138.69	208.03
Firm Engy;(GWh):	303.73	303.73	303.73	303.73
Scnd Engy;(GWh):	57.87	77.17	86.81	96.46
Plnt Fctr:	0.59	0.41	0.32	0.21
Ann Bnft ;(Mil.US\$):	30.40	36.27	51.69	57.14
Pjct Cost;(Mil.US\$):	329.40	348.00	361.90	396.60
Acc.Bnft ;(Mil.US\$):	479.21	500.58	566.62	626.45
Acc.Cost ;(Mil.US\$):	463.20	489.73	516.65	566.19
B/C Ratio:	1.03	1.02	1.09	1.10
B-C :	16.00	10.85	49.96	60.25
D.Rate :	0.06	0.07	0.09	0.09

SCHEME ID NO: 2-008-04-10-0  
 SCHEME NAME: MATALAG

R.D.Coeff.%;(%):	67.00			
Q-firm;(m3/s):	21.40			
Q-max;(m3/s):	42.80	64.20	85.60	128.40
F.S.L. ;(El.-m):	81.00			
A.O.L. ;(El.-m):	73.50			
M.O.L. ;(El.-m):	58.60			
Inst.Cap.;(MW):	15.57	23.35	31.14	46.71
Firm Engy;(GWh):	68.20	68.20	68.20	68.20
Scnd Engy;(GWh):	9.32	12.42	13.98	15.53
Plnt Fctr:	0.56	0.39	0.30	0.20
Ann Bnft ;(Mil.US\$):	6.63	10.35	11.01	12.17
Pjct Cost;(Mil.US\$):	72.60	79.80	88.10	105.70
Acc.Bnft ;(Mil.US\$):	104.55	113.51	120.78	168.08
Acc.Cost ;(Mil.US\$):	98.88	108.30	119.56	148.75
B/C Ratio:	1.05	1.04	1.01	1.12
B-C :	5.67	5.21	1.22	19.33
D.Rate :	0.06	0.09	0.09	0.07



SCHEME ID NO: 3-023-00-02-0

SCHEME NAME: UP.UMIRAY

R.D.Coeff. ;(%):	75.00			
Q-firm;(m3/s):	27.30			
Q-max ;(m3/s):	54.60	81.90	109.20	163.80
F.S.L. ;(El.-m):	322.00			
A.O.L. ;(El.-m):	300.40			
M.O.L. ;(El.-m):	257.20			
Inst.Cap. ;(MW):	71.82	107.73	143.64	215.47
Firm Envy;(GWh):	314.59	314.59	314.59	314.59
Scnd Envy;(GWh):	25.50	34.01	38.26	42.51
Plnt Fctr:	0.54	0.36	0.28	0.18
Ann Bnft ;(Mil.US\$):	29.67	45.27	48.02	53.06
Pjct Cost;(Mil.US\$):	336.90	351.80	371.70	401.80
Acc.Bnft ;(Mil.US\$):	541.68	553.86	587.46	581.64
Acc.Cost ;(Mil.US\$):	476.30	497.76	525.92	573.61
B/C Ratio:	1.13	1.11	1.11	1.01
B-C :	65.38	56.09	61.54	8.02
D.Rate :	0.05	0.08	0.08	0.09

SCHEME ID NO: 2-032-00-01-0

SCHEME NAME: TABOAN

R.D.Coeff. ;(%):	67.00			
Q-firm;(m3/s):	19.00			
Q-max ;(m3/s):	38.00	57.00	76.00	114.00
F.S.L. ;(El.-m):	103.00			
A.O.L. ;(El.-m):	91.20			
M.O.L. ;(El.-m):	67.70			
Inst.Cap. ;(MW):	25.15	37.72	50.30	75.45
Firm Envy;(GWh):	110.15	110.15	110.15	110.15
Scnd Envy;(GWh):	28.25	37.67	42.38	47.09
Plnt Fctr:	0.62	0.44	0.34	0.23
Ann Bnft ;(Mil.US\$):	11.41	13.66	19.91	22.02
Pjct Cost;(Mil.US\$):	125.90	136.30	146.10	169.10
Acc.Bnft ;(Mil.US\$):	179.84	215.41	218.25	269.38
Acc.Cost ;(Mil.US\$):	177.04	191.66	208.57	239.26
B/C Ratio:	1.01	1.12	1.04	1.12
B-C :	2.80	23.74	9.68	30.12
D.Rate :	0.06	0.06	0.09	0.08

SCHEME ID NO: 2-008-15-39-0

SCHEME NAME: ABUAN-1

R.D.Coef. ; (%):	80.00			
Q-firm ; (m3/s):	24.40			
Q-max ; (m3/s):	48.80	73.20	97.60	146.40
F.S.L. ; (El.-m):	284.00			
A.O.L. ; (El.-m):	261.60			
M.O.L. ; (El.-m):	216.70			
Inst.Cap. ; (MW):	61.78	92.67	123.56	185.35
Firm Envy ; (GWh):	270.61	270.61	270.61	270.61
Scnd Envy ; (GWh):	61.62	82.16	92.43	102.70
Plnt Fctr:	0.61	0.43	0.33	0.22
Ann Bnft ; (Mil.US\$):	27.61	33.02	47.66	52.70
Pjct Cost ; (Mil.US\$):	313.60	330.70	345.30	382.40
Acc.Bnft ; (Mil.US\$):	504.21	520.54	522.49	577.76
Acc.Cost ; (Mil.US\$):	443.36	465.03	492.95	545.92
B/C Ratio:	1.13	1.11	1.05	1.05
B-C :	60.85	55.50	29.53	31.84
D.Rate :	0.05	0.06	0.09	0.09

SCHEME ID NO: 2-008-29-56-0

SCHEME NAME: KAGIPSIPAN

R.D.Coef. ; (%):	75.00			
Q-firm ; (m3/s):	22.90			
Q-max ; (m3/s):	45.80	68.70	91.60	137.40
F.S.L. ; (El.-m):	525.00			
A.O.L. ; (El.-m):	503.60			
M.O.L. ; (El.-m):	460.70			
Inst.Cap. ; (MW):	52.59	78.89	105.19	157.78
Firm Envy ; (GWh):	230.36	230.36	230.36	230.36
Scnd Envy ; (GWh):	57.43	76.57	86.15	95.72
Plnt Fctr:	0.62	0.44	0.34	0.23
Ann Bnft ; (Mil.US\$):	23.77	28.46	41.37	45.75
Pjct Cost ; (Mil.US\$):	286.10	303.10	315.30	345.60
Acc.Bnft ; (Mil.US\$):	434.01	448.63	453.51	501.53
Acc.Cost ; (Mil.US\$):	404.48	426.22	450.12	493.38
B/C Ratio:	1.07	1.05	1.00	1.01
B-C :	29.53	22.41	3.38	8.15
D.Rate :	0.05	0.06	0.09	0.09

SCHEME ID NO: 2-008-26-50-0  
 SCHEME NAME: PINARIPAD

R.D.Coef.;(%):	41.00			
Q-firm;(m3/s):	23.80			
Q-max;(m3/s):	47.60	71.40	95.20	142.80
F.S.L. ;(El.-m):	194.00			
A.O.L. ;(El.-m):	182.90			
M.O.L. ;(El.-m):	160.60			
Inst.Cap. ;(MW):	26.17	39.26	52.35	78.52
Firm Engy;(GWh):	114.64	114.64	114.64	114.64
Scnd Engy;(GWh):	60.38	80.51	90.58	100.64
Plnt Fctr:	0.76	0.56	0.44	0.31
Ann Bnft ;(Mil.US\$):	9.40	16.40	18.76	28.43
Pjct Cost;(Mil.US\$):	160.10	171.40	182.10	208.10
Acc.Bnft ;(Mil.US\$):	241.98	258.56	258.99	311.65
Acc.Cost ;(Mil.US\$):	235.04	241.02	256.26	297.08
B/C Ratio:	1.02	1.07	1.01	1.04
B-C :	6.94	17.54	2.72	14.57
D.Rate :	0.03	0.06	0.07	0.09

SCHEME ID NO: 2-008-15-38-0  
 SCHEME NAME: BALLASANG

R.D.Coef.;(%):	49.00			
Q-firm;(m3/s):	24.90			
Q-max;(m3/s):	49.80	74.70	99.60	149.40
F.S.L. ;(El.-m):	194.00			
A.O.L. ;(El.-m):	175.60			
M.O.L. ;(El.-m):	138.80			
Inst.Cap. ;(MW):	46.36	69.54	92.73	139.09
Firm Engy;(GWh):	203.08	203.08	203.08	203.08
Scnd Engy;(GWh):	82.50	110.00	123.75	137.50
Plnt Fctr:	0.70	0.51	0.40	0.27
Ann Bnft ;(Mil.US\$):	16.10	27.33	31.30	46.00
Pjct Cost;(Mil.US\$):	282.10	294.40	309.90	339.30
Acc.Bnft ;(Mil.US\$):	414.48	430.86	493.42	504.31
Acc.Cost ;(Mil.US\$):	414.15	413.99	435.78	484.39
B/C Ratio:	1.00	1.04	1.13	1.04
B-C :	0.33	16.87	57.63	19.92
D.Rate :	0.03	0.06	0.06	0.09

SCHEME ID NO: 4-007-00-03-0  
 SCHEME NAME: UPPER AGOS-1M

R.D.Coeff. ; (%) :	70.00			
Q-firm ; (m3/s) :	12.00			
Q-max ; (m3/s) :	24.00	36.00	48.00	71.99
F.S.L. ; (El.-m) :	252.00			
A.O.L. ; (El.-m) :	242.90			
M.O.L. ; (El.-m) :	224.70			
Inst.Cap. ; (MW) :	14.85	22.28	29.71	44.57
Firm Engy ; (GWh) :	65.07	65.07	65.07	65.07
Secd Engy ; (GWh) :	6.68	8.91	10.03	11.14
Plnt Fctr :	0.55	0.37	0.28	0.19
Ann Bnft ; (Mil.US\$) :	6.21	9.56	10.15	11.22
Pjct Cost ; (Mil.US\$) :	69.20	75.30	81.10	93.80
Acc.Bnft ; (Mil.US\$) :	97.91	117.02	124.28	137.34
Acc.Cost ; (Mil.US\$) :	94.25	101.92	109.77	126.96
B/C Ratio :	1.03	1.14	1.13	1.08
B-C :	3.66	15.10	14.51	10.38
D.Rate :	0.06	0.08	0.08	0.08

SCHEME ID NO: 3-023-00-01-0  
 SCHEME NAME: UMIRAY-3

R.D.Coeff. ; (%) :	62.00			
Q-firm ; (m3/s) :	39.70			
Q-max ; (m3/s) :	79.40	119.10	158.80	238.20
F.S.L. ; (El.-m) :	201.00			
A.O.L. ; (El.-m) :	182.50			
M.O.L. ; (El.-m) :	145.40			
Inst.Cap. ; (MW) :	76.93	115.39	153.86	230.79
Firm Engy ; (GWh) :	336.95	336.95	336.95	336.95
Secd Engy ; (GWh) :	37.32	49.76	55.98	62.20
Plnt Fctr :	0.55	0.38	0.29	0.19
Ann Bnft ; (Mil.US\$) :	32.30	49.91	53.03	58.61
Pjct Cost ; (Mil.US\$) :	402.40	431.00	453.40	513.20
Acc.Bnft ; (Mil.US\$) :	589.83	610.65	648.83	808.91
Acc.Cost ; (Mil.US\$) :	568.91	609.82	641.51	722.21
B/C Ratio :	1.03	1.00	1.01	1.12
B-C :	20.92	0.83	7.31	86.69
D.Rate :	0.05	0.08	0.08	0.07

SCHEME ID NO: 2-008-06-19-0  
 SCHEME NAME: NANENG

R.D.Coeff. ; (%) :	70.00			
Q-firm ; (m <sup>3</sup> /s) :	16.70			
Q-max ; (m <sup>3</sup> /s) :	33.40	50.10	66.80	100.20
F.S.L. ; (El.-m) :	474.00			
A.O.L. ; (El.-m) :	455.50			
M.O.L. ; (El.-m) :	418.60			
Inst.Cap. ; (MW) :	40.99	61.49	81.98	122.98
Firm Engy ; (GWh) :	179.55	179.55	179.55	179.55
Scnd Engy ; (GWh) :	19.94	26.58	29.91	33.23
Plnt Fctr :	0.55	0.38	0.29	0.19
Ann Bnft ; (Mil.US\$) :	17.21	26.60	28.27	31.24
Pjct Cost ; (Mil.US\$) :	214.60	225.40	238.20	264.60
Acc.Bnft ; (Mil.US\$) :	314.36	325.49	345.85	382.21
Acc.Cost ; (Mil.US\$) :	303.40	318.92	337.03	374.38
B/C Ratio :	1.03	1.02	1.02	1.02
B-C :	10.96	6.57	8.82	7.83
D.Rate :	0.05	0.08	0.08	0.08

SCHEME ID NO: 2-008-29-60-0  
 SCHEME NAME: UP.CASECNAN-2

R.D.Coeff. ; (%) :	95.00			
Q-firm ; (m <sup>3</sup> /s) :	9.90			
Q-max ; (m <sup>3</sup> /s) :	19.80	29.70	39.60	59.39
F.S.L. ; (El.-m) :	795.00			
A.O.L. ; (El.-m) :	774.00			
M.O.L. ; (El.-m) :	731.90			
Inst.Cap. ; (MW) :	31.81	47.72	63.63	95.44
Firm Engy ; (GWh) :	139.35	139.35	139.35	139.35
Scnd Engy ; (GWh) :	23.38	31.18	35.07	38.97
Plnt Fctr :	0.58	0.40	0.31	0.21
Ann Bnft ; (Mil.US\$) :	13.78	16.41	23.20	25.65
Pjct Cost ; (Mil.US\$) :	165.50	181.40	194.80	223.40
Acc.Bnft ; (Mil.US\$) :	251.60	258.79	283.91	354.07
Acc.Cost ; (Mil.US\$) :	233.98	255.08	275.62	314.38
B/C Ratio :	1.07	1.01	1.03	1.12
B-C :	17.61	3.70	8.29	39.68
D.Rate :	0.05	0.06	0.08	0.07

SCHEME ID NO: 1-010-00-01-0  
 SCHEME NAME: LUYA

R.D.Coeff. ;(%):	70.00			
Q-firm;(m3/s):	43.80			
Q-max ;(m3/s):	87.60	131.40	175.20	262.79
F.S.L. ;(El.-m):	310.00			
A.O.L. ;(El.-m):	279.70			
M.O.L. ;(El.-m):	219.10			
Inst.Cap. ;(MW):	137.22	205.84	274.45	411.68
Firm Engy;(GWh):	601.06	601.06	601.06	601.06
Scnd Engy;(GWh):	100.22	133.62	150.33	167.03
Plnt Fctr:	0.58	0.40	0.31	0.21
Ann Bnft ;(Mil.US\$):	59.40	70.77	99.99	110.54
Pjct Cost;(Mil.US\$):	755.70	789.20	822.80	885.80
Acc.Bnft ;(Mil.US\$):	1084.58	1115.49	1223.32	1352.34
Acc.Cost ;(Mil.US\$):	1068.40	1109.79	1164.18	1253.32
B/C Ratio:	1.01	1.00	1.05	1.07
B-C :	16.18	5.70	59.13	99.01
D.Rate :	0.05	0.06	0.08	0.08

SCHEME ID NO: 2-008-13-32-0  
 SCHEME NAME: TABUK

R.D.Coeff. ;(%):	80.00			
Q-firm;(m3/s):	12.00			
Q-max ;(m3/s):	24.00	36.00	48.00	71.99
F.S.L. ;(El.-m):	146.00			
A.O.L. ;(El.-m):	136.50			
M.O.L. ;(El.-m):	117.40			
Inst.Cap. ;(MW):	12.24	18.37	24.49	36.74
Firm Engy;(GWh):	53.65	53.65	53.65	53.65
Scnd Engy;(GWh):	16.49	21.99	24.74	27.49
Plnt Fctr:	0.65	0.47	0.36	0.25
Ann Bnft ;(Mil.US\$):	5.70	6.84	10.13	11.21
Pjct Cost;(Mil.US\$):	72.40	77.10	81.70	91.20
Acc.Bnft ;(Mil.US\$):	104.09	107.95	123.99	137.15
Acc.Cost ;(Mil.US\$):	99.74	105.01	110.58	123.44
B/C Ratio:	1.04	1.02	1.12	1.11
B-C :	4.34	2.93	13.41	13.71
D.Rate :	0.05	0.06	0.08	0.08

SCHEME ID NO: 2-039-00-01-0  
 SCHEME NAME: DIKATAYAN

R.D.Coeff.;(%):	70.00			
Q-firm;(m3/s):	18.50			
Q-max;(m3/s):	37.00	55.50	74.00	111.00
F.S.L. ;(El.-m):	166.00			
A.O.L. ;(El.-m):	147.00			
M.O.L. ;(El.-m):	108.90			
Inst.Cap.;(MW):	39.16	58.75	78.33	117.50
Firm Enrgy;(GWh):	171.56	171.56	171.56	171.56
Scnd Enrgy;(GWh):	40.97	54.63	61.46	68.29
Plnt Fctr:	0.61	0.43	0.33	0.23
Ann Bnft ;(Mil.US\$):	17.61	21.07	30.52	33.75
Pjct Cost;(Mil.US\$):	240.40	251.40	263.20	286.60
Acc.Bnft ;(Mil.US\$):	378.31	384.67	373.42	412.94
Acc.Cost ;(Mil.US\$):	344.48	355.42	372.40	405.51
B/C Ratio:	1.09	1.08	1.00	1.01
B-C :	33.82	29.25	1.01	7.42
D.Rate :	0.04	0.05	0.08	0.08

SCHEME ID NO: 1-003-00-01-0  
 SCHEME NAME: BAGULIN

R.D.Coeff.;(%):	70.00			
Q-firm;(m3/s):	22.60			
Q-max;(m3/s):	45.20	67.80	90.40	135.60
F.S.L. ;(El.-m):	298.00			
A.O.L. ;(El.-m):	275.30			
M.O.L. ;(El.-m):	229.80			
Inst.Cap.;(MW):	61.13	91.70	122.26	183.40
Firm Enrgy;(GWh):	267.76	267.76	267.76	267.76
Scnd Enrgy;(GWh):	45.17	60.23	67.76	75.29
Plnt Fctr:	0.58	0.40	0.31	0.21
Ann Bnft ;(Mil.US\$):	26.49	31.56	44.63	49.33
Pjct Cost;(Mil.US\$):	363.40	378.10	390.90	422.80
Acc.Bnft ;(Mil.US\$):	569.15	576.24	615.95	603.59
Acc.Cost ;(Mil.US\$):	520.74	534.55	550.10	598.22
B/C Ratio:	1.09	1.07	1.11	1.00
B-C :	48.40	41.69	65.84	5.37
D.Rate :	0.04	0.05	0.07	0.08

SCHEME ID NO: 2-008-08-26-0  
 SCHEME NAME: DALAYA

R.D.Coef. ; (%) :	52.00			
Q-firm ; (m3/s) :	15.90			
Q-max ; (m3/s) :	31.80	47.70	63.60	95.39
F.S.L. ; (El.-m) :	222.00			
A.O.L. ; (El.-m) :	200.80			
M.O.L. ; (El.-m) :	158.60			
Inst.Cap. ; (MW) :	33.53	50.30	67.06	100.60
Firm Engy ; (GWh) :	146.87	146.87	146.87	146.87
Scnd Engy ; (GWh) :	46.29	61.72	69.44	77.15
Plnt Fctr :	0.65	0.47	0.36	0.25
Ann Bnft ; (Mil.US\$) :	15.66	18.82	27.92	30.89
Pjct Cost ; (Mil.US\$) :	205.10	214.70	225.70	245.30
Acc.Bnft ; (Mil.US\$) :	336.60	343.74	341.66	377.94
Acc.Cost ; (Mil.US\$) :	293.90	303.54	319.34	347.07
B/C Ratio :	1.14	1.13	1.06	1.08
B-C :	42.69	40.20	22.32	30.86
D.Rate :	0.04	0.05	0.08	0.08

SCHEME ID NO: 4-007-00-04-0  
 SCHEME NAME: UP.AGOS-1S

R.D.Coef. ; (%) :	20.00			
Q-firm ; (m3/s) :	7.80			
Q-max ; (m3/s) :	15.60	23.40	31.20	46.79
F.S.L. ; (El.-m) :	252.00			
A.O.L. ; (El.-m) :	242.70			
M.O.L. ; (El.-m) :	224.20			
Inst.Cap. ; (MW) :	7.79	11.69	15.59	23.38
Firm Engy ; (GWh) :	34.14	34.14	34.14	34.14
Scnd Engy ; (GWh) :	16.15	21.53	24.22	26.92
Plnt Fctr :	0.73	0.54	0.42	0.29
Ann Bnft ; (Mil.US\$) :	2.75	4.75	5.44	8.14
Pjct Cost ; (Mil.US\$) :	58.20	62.40	66.60	70.60
Acc.Bnft ; (Mil.US\$) :	108.16	86.83	99.38	99.59
Acc.Cost ; (Mil.US\$) :	93.59	85.96	91.75	95.55
B/C Ratio :	1.15	1.01	1.08	1.04
B-C :	14.57	0.86	7.62	4.03
D.Rate :	0.01	0.05	0.05	0.08



SCHEME ID NO: 2-047-00-01-0

SCHEME NAME: PALANAN

R.D.Coef. ;(%):	18.00			
Q-firm;(m3/s):	9.40			
Q-max ;(m3/s):	18.80	28.20	37.60	56.39
F.S.L. ;(El.-m):	94.00			
A.O.L. ;(El.-m):	86.90			
M.O.L. ;(El.-m):	72.60			
Inst.Cap. ;(MW):	7.78	11.67	15.56	23.35
Firm Engy;(GWh):	34.09	34.09	34.09	34.09
Scnd Engy;(GWh):	18.62	24.83	27.93	31.04
Plnt Fctr:	0.77	0.57	0.45	0.31
Ann Bnft ;(Mil.US\$):	2.81	4.92	5.63	8.57
Pjct Cost;(Mil.US\$):	59.80	63.40	66.90	73.40
Acc.Bnft ;(Mil.US\$):	110.22	89.92	102.85	104.89
Acc.Cost ;(Mil.US\$):	96.16	87.34	92.16	99.34
B/C Ratio:	1.14	1.02	1.11	1.05
B-C :	14.05	2.57	10.68	5.54
D.Rate :	0.01	0.05	0.05	0.08



C - 6 INVENTORY OF

IDENTIFIED HYDROPOWER SITE



I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME : RIZAL SCHEME ID : 1-002-00-01-0-1

RIVER SYSTEM : ARINGAY COORDINATES : N16-22-51 E120-25-34  
 STREAM : GALIANO STUDY LEVEL : IDENTIFIED  
 WATER RESOURCES REGION : I IN THE PREVIOUS STUDY  
 PROVINCE : LA UNION

HYDRO/TOPO INFORMATION

CATCHMENT AREA (KM2) :	117.0	MAIN :	117.0	INTER TRANSFER TOTAL :	0.0	STREAM GAGE ID :	4-1-017-NW-114
AVER. BASIN RAINFALL (MM/YR) :	3478	DENUDATION RATE (MM/YR) :	1.4	GAGE CATCHMENT (KM2) :	304		
AVERAGE DISCHARGE (M3/S) :	12.0	EVAPORATION RATE (MM/DAY) :	3.5	GAGE AVER.DISCHARGE (M3/S) :	29.2		

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.52

RESERVOIR

FULL SUPPLY LEVEL (EL.M) :	180.9	GROSS STORAGE VOL. (MIL M3) :	253.4
AVERAGE OPERATING LEVEL (EL.M) :	162.1	ACTIVE STORAGE VOL. (MIL M3) :	196.8
MINIMUM OPERATING LEVEL (EL.M) :	124.5	DEAD STORAGE VOL. (MIL M3) :	56.6
DRAWDOWN DEPTH ( M ) :	56.4	SEDIMENT VOL. (MIL M3) :	8.2

MAIN DAM (WEIR)

CREST ELEVATION (EL.M) :	186.9	CREST LENGTH ( M ) :	562.2
DAM HEIGHT ( M ) :	140.2	EMBANKMENT VOL. (MIL M3) :	8.90

WATERWAY

HEADRACE :	LENGTH ( M ) :	960.0	DIAMETER (WIDTH) ( M ) :	2.7	NOS. :	1
PENSTOCK :	HORIZONTAL L ( M ) :	200.0	DIAMETER ( M ) :	2.4	NOS. :	1
DIVERSION :	LENGTH ( M ) :	1340.0	DIAMETER ( M ) :	6.8	NOS. :	2
EXCAVATION VOL TOTAL (1000 M3) :		102.8				

DISCHARGE /HEAD

PLANT MAX. DISCHARGE (M3/S) :	16.7	AVERAGE NET HEAD ( M ) :	110.0
FIRM DISCHARGE (M3/S) :	8.4	TAILWATER LEVEL (EL.M) :	46.7

POWER /ENERGY

INSATLLED CAPACITY (MW) :	15.1	ANNUAL TOTAL ENERGY (GWH) :	83.2
FIRM POWER (MW) :	7.6	FIRM ENERGY (GWH) :	66.3
MIN.GUARANTEED POWER (MW) :	9.5	SECONDARY ENERGY (GWH) :	16.9

TRANSMISSION LINE

LENGTH (KM) :	4.0	TO :	AGOO	69 K V SINGLE CIRCUIT	NOS. OF CIRCUIT :	1
ACCESS ROAD LENGTH (KM) :	5.0	FROM :	ANDUYAN			

CONSTRUCTION COST

TOTAL COST (MIL USD) :	171.3	POWER COST (MIL USD) :	169.4
TOTAL COST/KW (USD/KW) :	11306.7	TRANSMISSION COST (MIL USD) :	0.5
TOTAL COST/KWH (USD/KWH) :	2.398	ACCESS ROAD COST (MIL USD) :	1.4

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3069-11  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-003-00-01-0-1

SCHEME : BAGULIN

RIVER SYSTEM : NAGUILIAN WATER RESOURCES REGION : 1  
 STREAM : NAGUILIAN PROVINCE : LA UNION  
 COORDINATES : N16-35-56 E120-28-44  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 297.0 (MAIN : 297.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-017-NW-114  
 AVER. BASIN RAINFALL (MM/YR) : 3352. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 304.  
 AVERAGE DISCHARGE (M3/S) : 29.3 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 298.0 GROSS STORAGE VOL. (MIL M3) : 919.0  
 AVERAGE OPERATING LEVEL (EL.M) : 275.3 ACTIVE STORAGE VOL. (MIL M3) : 546.4  
 MINIMUM OPERATING LEVEL (EL.M) : 229.8 DEAD STORAGE VOL. (MIL M3) : 272.7  
 DRAWDOWN DEPTH ( M ) : 68.2 SEDIMENT VOL. (MIL M3) : 20.8

MAIN DAM CREST ELEVATION (EL.M) : 304.0 CREST LENGTH ( M ) : 716.0  
 (WEIR) DAM HEIGHT ( M ) : 197.0 EMBANKMENT VOL. (MIL M3) : 22.14

WATERWAY HEADRAGE : LENGTH ( M ) : 880.0 DIAMETER (WIDTH) ( M ) : 5.4 NOS. : 2  
 PENSTOCK : HORIZONT. L ( M ) : 190.0 DIAMETER ( M ) : 4.1 NOS. : 2  
 DIVERSION : LENGTH ( M ) : 1600.0 DIAMETER ( M ) : 8.8 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 242.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 135.9 AVERAGE NET HEAD ( M ) : 164.3  
 /HEAD FIRM DISCHARGE (M3/S) : 22.6 TAILWATER LEVEL (EL.M) : 107.0

POWER UNSATLLED CAPACITY (MW) : 133.8 ANNUAL TOTAL ENERGY (GWH) : 342.9  
 /ENERGY FIRM POWER (MW) : 30.6 FIRM ENERGY (GWH) : 268.4  
 MIN. GUARANTEED POWER (MW) : 126.6 SECONDARY ENERGY (GWH) : 74.6

TRANSMISSION LINE LENGTH (KM) : 18.0 TO : BAUANG 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 10.0 FROM : GUSING NORTE

CONSTRUCTION COST

TOTAL COST (MIL USD) : 422.8 POWER COST (MIL USD) : 416.2  
 TOTAL COST/KW (USD/KW) : 2000.4 TRANSMISSION COST (MIL USD) : 3.8  
 TOTAL COST/KWH (USD/KWH) : 1.454 ACCESS ROAD COST (MIL USD) : 2.9

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3069-1  
 TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-010-00-01-0-1

SCHEME : LUYA

RIVER SYSTEM : AMBURAYAN  
 STREAM : AMBURAYAN  
 WATER RESOURCES REGION : I  
 PROVINCE : ILOCOS SUR  
 COORDINATES : N16-47-55 E120-32-09  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 599.0 (MAIN : 599., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-017-NW-114  
 AVER. BASIN RAINFALL (MM/YR) : 3214. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 304.  
 AVERAGE DISCHARGE (M3/S) : 56.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 310.0  
 AVERAGE OPERATING LEVEL (EL.M) : 279.7  
 MINIMUM OPERATING LEVEL (EL.M) : 219.1  
 DRAWDOWN DEPTH ( M ) : 90.9

GROSS STORAGE VOL. (MIL M3) : 1769.4  
 ACTIVE STORAGE VOL. (MIL M3) : 1245.8  
 DEAD STORAGE VOL. (MIL M3) : 523.6  
 SEDIMENT VOL. (MIL M3) : 41.9

MAIN DAM CREST ELEVATION (EL.M) : 316.0  
 (WEIR) DAM HEIGHT ( M ) : 231.0

CREST LENGTH ( M ) : 945.0  
 EMBANKMENT VOL. (MIL M3) : 60.70

WATERWAY HEADRACE : LENGTH ( M ) : 900.0  
 PENSTOCK : HORIZONTAL L ( M ) : 240.0  
 DIVERSION : LENGTH ( M ) : 1280.0  
 EXCAVATION VOL TOTAL (1000 M3) : 328.1

DIAMETER (WIDTH) ( M ) : 6.1 NOS. : 3  
 DIAMETER ( M ) : 4.5 NOS. : 3  
 DIAMETER ( M ) : 8.8 NOS. : 3

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 262.8  
 /HEAD FIRM DISCHARGE (M3/S) : 43.8

AVERAGE NET HEAD ( M ) : 190.3  
 TAILWATER LEVEL (EL.M) : 85.0

POWER INSATLLED CAPACITY (MW) : 411.7  
 /ENERGY FIRM POWER (MW) : 68.6  
 MIN. GUARANTEED POWER (MW) : 267.2

ANNUAL TOTAL ENERGY (GWH) : 766.5  
 FIRM ENERGY (GWH) : 601.0  
 SECONDARY ENERGY (GWH) : 167.5

TRANSMISSION

LINE LENGTH (KM) : 45.0 TO : BANANG NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 0. FROM :

CONSTRUCTION COST

TOTAL COST (MIL USD) : 885.8  
 TOTAL COST/KW (USD/KW) : 2151.9  
 TOTAL COST/KWH (USD/KWH) : 1.360

POWER COST (MIL USD) : 871.8  
 TRANSMISSION COST (MIL USD) : 14.1  
 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3170-111  
 TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-010-00-01-1-2

SCHEME : LUYA (ROR ALT.)

RIVER SYSTEM : AMBURAYAN  
STREAM : AMBURAYAN

WATER RESOURCES REGION : I  
PROVINCE : ILOCOS SUR

COORDINATES : N16-40-21 E120-34-00  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 403.0 (MAIN : 403.0 INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-017-NW-114  
AVER. BASIN RAINFALL (MM/YR) : 3400. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 304.  
AVERAGE DISCHARGE (M3/S) : 40.3 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.51

PONDAGE FULL SUPPLY LEVEL (EL.M) : 273.0 PONDAGE STORAGE VOL. (1000M3) : 131.1  
AVERAGE OPERATING LEVEL (EL.M) : 270.8 ACTIVE STORAGE VOL. (1000M3) : 76.2  
MINIMUM OPERATING LEVEL (EL.M) : 268.5  
DRAWDOWN DEPTH (M) : 4.5

MAIN DAM CREST ELEVATION (EL.M) : 273.0 CREST LENGTH (M) : 31.8  
(WEIR) WEIR HEIGHT (M) : 13.0 WEIR CONCRETE VOL. (1000 M3) : 11.6

WATERWAY HEADRACE : LENGTH (M) : 6750.0 DIAMETER (WIDTH) (M) : 4.3 NOS. : 1  
PENSTOCK : HORIZONTAL L (M) : 200.0 DIAMETER (M) : 3.4 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 101.9

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 40.3 AVERAGE NET HEAD (M) : 119.4  
/HEAD FIRM DISCHARGE (M3/S) : 2.6 TAILWATER LEVEL (EL.M) : 140.0

POWER INSALLED CAPACITY (MW) : 39.6 ANNUAL TOTAL ENERGY (GWH) : 163.8  
/ENERGY FIRM POWER (MW) : 2.6 FIRM ENERGY (GWH) : 22.3  
MIN. GUARANTEED POWER (MW) : 2.3 SECONDARY ENERGY (GWH) : 141.0

TRANSMISSION

LINE LENGTH (KM) : 35.0 TO : LA TRINIDAD 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 2

ACCESS ROAD LENGTH (KM) : 15.0 FROM : NEAREST PROVINCIAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 55.8 POWER COST (MIL USD) : 48.8  
TOTAL COST/KW (USD/KW) : 1410.2 TRANSMISSION COST (MIL USD) : 2.8  
TOTAL COST/KWH (USD/KWH) : 0.858 ACCESS ROAD COST (MIL USD) : 4.3

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3170-111 1970  
TECHNICAL COMMENT : - ALTERNATIVE PLAN OF LUYA (RESERVOIR TYPE DEVELOPMENT) SCREENED OUT AT THE FIRST SCREENING.

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-010-00-02-0-2

SCHEME : BAKUM

RIVER SYSTEM : AMBURAYAN  
STREAM : BAKUM

WATER RESOURCES REGION : I  
PROVINCE : BENGUET

COORDINATES : N16-48-49 E120-38-50  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 108.3 (MAIN : 108.3 INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-017-NW-14  
AVER. BASIN RAINFALL (MM/YR) : 3193. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 304.  
AVERAGE DISCHARGE (M3/S) : 10.1 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.51

PONDAGE FULL SUPPLY LEVEL (EL.M) : 689.2 PONDAGE STORAGE VOL. (1000M3) : 84.1  
AVERAGE OPERATING LEVEL (EL.M) : 688.7 ACTIVE STORAGE VOL. (1000M3) : 19.1  
MINIMUM OPERATING LEVEL (EL.M) : 688.2  
DRAWDOWN DEPTH ( M ) : 1.0

MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 689.2 CREST LENGTH ( M ) : 60.5  
WEIR HEIGHT ( M ) : 7.2 WEIR CONCRETE VOL. (1000 M3) : 7.6

WATERWAY HEADRACE : LENGTH ( M ) : 4650.0 DIAMETER (WIDTH) ( M ) : 2.6 NOS. : 1  
PENSTOCK : HORIZONT. L ( M ) : 350.0 DIAMETER ( M ) : 1.8 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 25.8

DISCHARGE /HEAD PLANT MAX. DISCHARGE (M3/S) : 10.1 AVERAGE NET HEAD ( M ) : 407.0  
FIRM DISCHARGE (M3/S) : 0.7 TAILWATER LEVEL (EL.M) : 267.0

POWER /ENERGY UNSATLLED CAPACITY (MW) : 33.9 ANNUAL TOTAL ENERGY (GWH) : 136.1  
FIRM POWER (MW) : 2.2 FIRM ENERGY (GWH) : 19.5  
MIN. GUARANTEED POWER (MW) : 2.0 SECONDARY ENERGY (GWH) : 118.6

TRANSMISSION LINE LENGTH (KM) : 18.2 TO : BALAOAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 2  
ACCESS ROAD LENGTH (KM) : 7.0 FROM : NEAREST PROVINCIAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 26.9 POWER COST (MIL USD) : 23.1  
TOTAL COST/KW (USD/KW) : 793.3 TRANSMISSION COST (MIL USD) : 1.8  
TOTAL COST/KWH (USD/KWH) : 0.488 ACCESS ROAD COST (MIL USD) : 2.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3170-111 1970  
TECHNICAL COMMENT : NONE

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-010-01-03-0-1

SCHEME : TIBUNEC

RIVER SYSTEM : AMBURAYAN  
 STREAM : BAKUM  
 WATER RESOURCES REGION : I  
 PROVINCE : ILOCOS SUR

COORDINATES : N16-52-14 E120-33-22  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 241.0 (MAIN : 241.0 INTER TRANSFER TOTAL : 0.)  
 AVER. BASIN RAINFALL (MM/YR) : 2870. (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 304.  
 AVERAGE DISCHARGE (M3/S) : 20.8 (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.52

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 223.5 GROSS STORAGE VOL. (MIL M3) : 463.6  
 AVERAGE OPERATING LEVEL (EL.M) : 202.9 ACTIVE STORAGE VOL. (MIL M3) : 341.8  
 MINIMUM OPERATING LEVEL (EL.M) : 161.5 DEAD STORAGE VOL. (MIL M3) : 121.8  
 DRAWDOWN DEPTH ( M ) : 62.1 SEDIMENT VOL. (MIL M3) : 16.9

MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 229.5 CREST LENGTH ( M ) : 602.6  
 DAM HEIGHT ( M ) : 165.5 EMBANKMENT VOL. (MIL M3) : 15.28

WATERWAY HEADRACE : LENGTH ( M ) : 440.0 DIAMETER (WIDTH) ( M ) : 6.1  
 PENSTOCK : HORIZONT. L ( M ) : 190.0 DIAMETER ( M ) : 4.6  
 DIVERSION : LENGTH ( M ) : 940.0 DIAMETER ( M ) : 8.3  
 EXCAVATION VOL TOTAL (1000 M3) : 119.0 NOS. : 1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 87.2 AVERAGE NET HEAD ( M ) : 136.0  
 /HEAD FIRM DISCHARGE (M3/S) : 14.5 TAILWATER LEVEL (EL.M) : 64.0

POWER UNSATLLED CAPACITY (MW) : 97.7 ANNUAL TOTAL ENERGY (GWH) : 201.9  
 /ENERGY FIRM POWER (MW) : 16.3 FIRM ENERGY (GWH) : 142.6  
 MIN. GUARANTEED POWER (MW) : 64.7 SECONDARY ENERGY (GWH) : 59.3

TRANSMISSION LINE LENGTH (KM) : 27.0 TO : BALAOCAN NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 0. FROM :

CONSTRUCTION COST

TOTAL COST (MIL USD) : 288.6 POWER COST (MIL USD) : 283.7  
 TOTAL COST/KW (USD/KW) : 2957.5 TRANSMISSION COST (MIL USD) : 5.1  
 TOTAL COST/KWH (USD/KWH) : 1.801 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3:70-IV  
 TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-010-01-04-0-2

SCHEME : AMBURAYAN

RIVER SYSTEM : AMBURAYAN      WATER RESOURCES REGION : I  
 STREAM : AMBURAYAN      PROVINCE : BENGUET

COORDINATES : N16-36-53 E120-37-54  
 STUDY LEVEL : NEWLY IDENTIFIED  
 THROUGH LNPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 339.6      (MAIN : 340.)      INTER TRANSFER TOTAL : 0.)      STREAM GAGE ID : 4-1-017-HW-14  
 AVER. BASIN RAINFALL (MM/YR) : 3466.      DENUDATION RATE (MM/YR) : 1.4      GAGE CATCHMENT (KM2) : 304.  
 AVERAGE DISCHARGE (M3/S) : 34.7      EVAPORATION RATE (MM/DAY) : 3.5      GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER      OUTPUT FACTOR : 0.51

PONDAGE      FULL SUPPLY LEVEL (EL.M) : 517.3      PONDAGE STORAGE VOL. (1000M3) : 220.4  
 AVERAGE OPERATING LEVEL (EL.M) : 516.3      ACTIVE STORAGE VOL. (1000M3) : 65.5  
 MINIMUM OPERATING LEVEL (EL.M) : 515.2  
 DRAWDOWN DEPTH ( M ) : 2.2

MAIN DAM (WEIR)      CREST ELEVATION (EL.M) : 517.3      CREST LENGTH ( M ) : 67.3  
 WEIR HEIGHT ( M ) : 10.3      WEIR CONCRETE VOL. (1000 M3) : 14.7

WATERWAY      HEADRACE :      LENGTH ( M ) : 12800.0      DIAMETER (WIDTH) ( M ) : 4.1      NOS. : 1  
 PENSTOCK :      HORIZONTAL L ( M ) : 365.0      DIAMETER ( M ) : 3.1      NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 172.1

DISCHARGE /HEAD      PLANT MAX. DISCHARGE (M3/S) : 34.7      AVERAGE NET HEAD ( M ) : 214.2  
 FIRM DISCHARGE (M3/S) : 2.3      TAILWATER LEVEL (EL.M) : 280.0

POWER /ENERGY      UNSATLLED CAPACITY (MW) : 61.1      ANNUAL TOTAL ENERGY (GWH) : 249.8  
 FIRM POWER (MW) : 4.0      FIRM ENERGY (GWH) : 35.1  
 MIN. GUARANTEED POWER (MW) : 3.6      SECONDARY ENERGY (GWH) : 214.7

TRANSMISSION LINE      LENGTH (KM) : 32.8      TO : LA TRINIDAD      115 K V      SINGLE CIRCUIT      NOS. OF CIRCUIT : 2  
 ACCESS ROAD LENGTH (KM) : 15.4      FROM : PROVINCIAL ROAD NEAR KIBUNGA

CONSTRUCTION COST

TOTAL COST (MIL USD) : 80.7      POWER COST (MIL USD) : 72.6  
 TOTAL COST/KW (USD/KW) : 1320.4      TRANSMISSION COST (MIL USD) : 3.7  
 TOTAL COST/KWH (USD/KWH) : 0.811      ACCESS ROAD COST (MIL USD) : 4.4

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : NONE  
 MAP USED (1:50,000 SCALE) : 3170-111 1970  
 TECHNICAL COMMENT : - JOINTED AND CAVED LIMESTONE FORMATION AT THE INTAKE WEIR SITE  
 SUSCEPTIBLE TO LEAKAGE FROM PONDAGE  
 - ONE TRIBUTARY INTAKE

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-011-00-01-0-1

SCHEME : USO

RIVER SYSTEM : CHICO  
STREAM : CHICO

WATER RESOURCES REGION : I  
PROVINCE : ILOCOS SUR

COORDINATES : N16-58-26 E120-32-17  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 114.0 (MAIN : 114.0, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-017-NW-114  
AVER. BASIN RAINFALL (MM/YR) : 2656. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 304.  
AVERAGE DISCHARGE (M3/S) : 8.7 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.62

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 205.0  
AVERAGE OPERATING LEVEL (EL.M) : 190.4  
MINIMUM OPERATING LEVEL (EL.M) : 161.3  
DRAWDOWN DEPTH ( M ) : 43.7  
CREST ELEVATION (EL.M) : 211.0  
DAM HEIGHT ( M ) : 120.0  
HEADRACE : LENGTH ( M ) : 580.0  
PENSTOCK : HORIZONTAL L ( M ) : 200.0  
DIVERSION : LENGTH ( M ) : 1220.0  
EXCAVATION VOL TOTAL (1000 M3) : 90.2

GROSS STORAGE VOL. (MIL M3) : 272.1  
ACTIVE STORAGE VOL. (MIL M3) : 170.6  
DEAD STORAGE VOL. (MIL M3) : 101.5  
SEDIMENT VOL. (MIL M3) : 8.0

MAIN DAM (WEIR) CREST LENGTH ( M ) : 823.5  
DAM HEIGHT ( M ) : 14.55

WATERWAY DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
PENSTOCK : DIAMETER ( M ) : 2.2 NOS. : 1  
DIVERSION : DIAMETER ( M ) : 6.7 NOS. : 2

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 12.8  
FIRM DISCHARGE (M3/S) : 6.4  
AVERAGE NET HEAD ( M ) : 95.7  
TAILWATER LEVEL (EL.M) : 91.0

POWER /ENERGY INSTALLED CAPACITY (MW) : 10.1 ANNUAL TOTAL ENERGY (GWH) : 53.4  
FIRM POWER (MW) : 5.0 FIRM ENERGY (GWH) : 44.2  
MIN. GUARANTEED POWER (MW) : 6.7 SECONDARY ENERGY (GWH) : 9.2

TRANSMISSION LINE LENGTH (KM) : 40.0 TO : BALAOAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 0. FROM :

CONSTRUCTION COST

TOTAL COST (MIL USD) : 225.0 POWER COST (MIL USD) : 223.5  
TOTAL COST/KW (USD/KW) : 22307.5 TRANSMISSION COST (MIL USD) : 1.5  
TOTAL COST/KWH (USD/KWH) : 4.792 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3170-IV  
TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-011-00-02-0-2

SCHEME : CHICO-R

RIVER SYSTEM : CHICO  
STREAM : CHICO-R

WATER RESOURCES REGION : I  
PROVINCE : ILOCOS SUR.

COORDINATES : N16-59-27 E120-35-00  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LRPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 126.3 (MAIN) : 126.3 INTER TRANSFER TOTAL : 0.0 STREAM GAGE ID : 4-1-017-NW-14  
AVER. BASIN RAINFALL (MM/YR) : 2575. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 304.  
AVERAGE DISCHARGE (M3/S) : 9.3 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 29.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.51

PONDAGE FULL SUPPLY LEVEL (EL.M) : 304.3 PONDAGE STORAGE VOL. (1000M3) : 65.0  
AVERAGE OPERATING LEVEL (EL.M) : 303.7 ACTIVE STORAGE VOL. (1000M3) : 17.6  
MINIMUM OPERATING LEVEL (EL.M) : 303.2  
DRAWDOWN DEPTH ( M ) : 1.2

MAIN DAM CREST ELEVATION (EL.M) : 304.3 CREST LENGTH ( M ) : 70.8  
(WEIR) WEIR HEIGHT ( M ) : 7.3 WEIR CONCRETE VOL. (1000 M3) : 9.0

WATERWAY HEADRACE : LENGTH ( M ) : 10780.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
PENSTOCK : HORIZONTAL L ( M ) : 685.0 DIAMETER ( M ) : 1.8 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 55.1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 9.3 AVERAGE NET HEAD ( M ) : 135.8  
/HEAD FIRM DISCHARGE (M3/S) : 0.6 TAILWATER LEVEL (EL.M) : 96.0

POWER INSATLLED CAPACITY (MW) : 14.3 ANNUAL TOTAL ENERGY (GWH) : 58.2  
/ENERGY FIRM POWER (MW) : 0.9 FIRM ENERGY (GWH) : 8.2  
MIN. GUARANTEED POWER (MW) : 0.8 SECONDARY ENERGY (GWH) : 50.0

TRANSMISSION

LINE LENGTH (KM) : 37.0 TO : BALAGAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 8.5 FROM : SOYU

CONSTRUCTION COST

TOTAL COST (MIL USD) : 31.3 POWER COST (MIL USD) : 27.4  
TOTAL COST/KW (USD/KW) : 2191.6 TRANSMISSION COST (MIL USD) : 1.5  
TOTAL COST/KWH (USD/KWH) : 1.347 ACCESS ROAD COST (MIL USD) : 2.4

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3170-1V  
TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-02-0-1

SCHEME : LANGIDEN

RIVER SYSTEM : ABRA  
 STREAM : MALAPAAO  
 WATER RESOURCES REGION : 1  
 PROVINCE : ABRA  
 COORDINATES : N17-40-50 E120-32-30  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 70.0 (MAIN : 70.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-008-NW-105  
 AVER. BASIN RAINFALL (MM/YR) : 2250. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 2.8 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.55

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 202.0 GROSS STORAGE VOL. (MIL M3) : 82.3  
 AVERAGE OPERATING LEVEL (EL.M) : 189.8 ACTIVE STORAGE VOL. (MIL M3) : 58.2  
 MINIMUM OPERATING LEVEL (EL.M) : 165.3 DEAD STORAGE VOL. (MIL M3) : 24.1  
 DRAWDOWN DEPTH ( M ) : 36.7 SEDIMENT VOL. (MIL M3) : 4.9

MAIN DAM CREST ELEVATION (EL.M) : 208.0 CREST LENGTH ( M ) : 384.0  
 (WEIR) DAM HEIGHT ( M ) : 102.4 EMBANKMENT VOL. (MIL M3) : 3.53

WATERWAY HEADRAGE : LENGTH ( M ) : 450.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 150.0 DIAMETER ( M ) : 1.4 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 720.0 DIAMETER ( M ) : 2.3 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 41.0

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 4.5 AVERAGE NET HEAD ( M ) : 82.1  
 /HEAD FIRM DISCHARGE (M3/S) : 2.2 TAILWATER LEVEL (EL.M) : 105.6

POWER INSTALLED CAPACITY (MW) : 3.0 ANNUAL TOTAL ENERGY (GWH) : 15.3  
 /ENERGY FIRM POWER (MW) : 1.5 FIRM ENERGY (GWH) : 13.2  
 MIN. GUARANTEED POWER (MW) : 2.0 SECONDARY ENERGY (GWH) : 2.1

TRANSMISSION LINE LENGTH (KM) : 21.0 TO : BANTAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 12.5 FROM : MADENG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 79.6 POWER COST (MIL USD) : 75.1  
 TOTAL COST/KW (USD/KW) : 26360.7 TRANSMISSION COST (MIL USD) : 1.0  
 TOTAL COST/KWH (USD/KWH) : 5.750 ACCESS ROAD COST (MIL USD) : 3.5

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3173-111  
 TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-03-0-1

SCHEME : BANDI

COORDINATES : N17-43-10 E120-38-40  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

WATER RESOURCES REGION : I  
 PROVINCE : ABRA

RIVER SYSTEM : ABRA  
 STREAM : SAQUET-SOOT

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 85.7 (MAIN : 86.7 INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2250. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 3.5 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.73

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 178.0 GROSS STORAGE VOL. (MIL M3) : 110.0  
 AVERAGE OPERATING LEVEL (EL.M) : 166.5 ACTIVE STORAGE VOL. (MIL M3) : 80.0  
 MINIMUM OPERATING LEVEL (EL.M) : 143.6 DEAD STORAGE VOL. (MIL M3) : 29.9  
 DRAWDOWN DEPTH ( M ) : 34.4 SEDIMENT VOL. (MIL M3) : 6.0

MAIN DAM CREST ELEVATION (EL.M) : 184.0 CREST LENGTH ( M ) : 870.7  
 (WEIR) DAM HEIGHT ( M ) : 87.0 EMBANKMENT VOL. (MIL M3) : 12.35

WATERWAY HEADRAGE : LENGTH ( M ) : 676.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 140.0 DIAMETER ( M ) : 1.6 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 870.0 DIAMETER ( M ) : 8.8 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 55.9

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 5.7 AVERAGE NET HEAD ( M ) : 67.6  
 /HEAD FIRM DISCHARGE (M3/S) : 2.8 TAILWATER LEVEL (EL.M) : 97.0

POWER INSATLLED CAPACITY (MW) : 3.1 ANNUAL TOTAL ENERGY (GWH) : 15.6  
 /ENERGY FIRM POWER (MW) : 1.6 FIRM ENERGY (GWH) : 13.8  
 MIN. GUARANTEED POWER (MW) : 2.0 SECONDARY ENERGY (GWH) : 1.9

TRANSMISSION LINE LENGTH (KM) : 35.0 TO : BANTAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 0.5 FROM : BANDI

CONSTRUCTION COST

TOTAL COST (MIL USD) : 182.1 POWER COST (MIL USD) : 180.6  
 TOTAL COST/KW (USD/KW) : 57849.3 TRANSMISSION COST (MIL USD) : 1.4  
 TOTAL COST/KWH (USD/KWH) : 12.696 ACCESS ROAD COST (MIL USD) : 0.1

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3173-111  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-04-0-1

SCHEME : ALIP

RIVER SYSTEM : ABRA  
STREAM : PALSIGUAN

WATER RESOURCES REGION : I  
PROVINCE : ABRA

COORDINATES : N17-47-00 E120-42-20  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 188.6 (MAIN : 189., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 2729. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 10.5 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT

RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 293.0 GROSS STORAGE VOL. (MIL M3) : 332.7  
AVERAGE OPERATING LEVEL (EL.M) : 273.1 ACTIVE STORAGE VOL. (MIL M3) : 248.7  
MINIMUM OPERATING LEVEL (EL.M) : 233.4 DEAD STORAGE VOL. (MIL M3) : 84.0  
DRAWDOWN DEPTH ( M ) : 59.6 SEDIMENT VOL. (MIL M3) : 13.2

MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 299.0 CREST LENGTH ( M ) : 338.3  
DAM HEIGHT ( M ) : 147.7 EMBANKMENT VOL. (MIL M3) : 8.29

WATERWAY HEADRAGE : LENGTH ( M ) : 470.0 DIAMETER (WIDTH) ( M ) : 2.7 NOS. : 1  
PENSTOCK : HORIZONTAL L ( M ) : 160.0 DIAMETER ( M ) : 2.4 NOS. : 1  
DIVERSION : LENGTH ( M ) : 1380.0 DIAMETER ( M ) : 7.8 NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 134.3

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 17.5 AVERAGE NET HEAD ( M ) : 118.1  
/HEAD FIRM DISCHARGE (M3/S) : 8.7 TAILWATER LEVEL (EL.M) : 151.3

POWER /ENERGY UNSATLLED CAPACITY (MW) : 17.0 ANNUAL TOTAL ENERGY (GWH) : 83.2  
FIRM POWER (MW) : 8.5 FIRM ENERGY (GWH) : 74.5  
MIN. GUARANTEED POWER (MW) : 10.7 SECONDARY ENERGY (GWH) : 8.3

TRANSMISSION LINE LENGTH (KM) : 10.0 TO : BANGUED  
ACCESS ROAD LENGTH (KM) : 8.0 FROM : LAGAYAN

69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1

CONSTRUCTION COST

TOTAL COST (MIL USD) : 174.4  
TOTAL COST/KW (USD/KW) : 10257.4  
TOTAL COST/KWH (USD/KWH) : 2.261

POWER COST (MIL USD) : 171.5  
TRANSMISSION COST (MIL USD) : 0.6  
ACCESS ROAD COST (MIL USD) : 2.3

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3173-111  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-05-0-1  
 COORDINATES : N17-14-42 E120-40-36  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S.RECONNAISSANCE)

WATER RESOURCES REGION : I  
 PROVINCE : ILOCOS SUR

STREAM : ABRA  
 RIVER SYSTEM : ABRA

HYDRO/TOPO. INFORMATION  
 CATCHMENT AREA (KM2) : 1134.0  
 AVER. BASIN RAINFALL (MM/YR) : 2750.  
 AVERAGE DISCHARGE (M3/S) : 64.0  
 INTER TRANSFER TOTAL : 0.  
 DENUDATION RATE (MM/YR) : 1.4  
 EVAPORATION RATE (MM/DAY) : 3.5  
 STREAM GAGE ID : 4-1-008-NW-106  
 GAGE CATCHMENT (KM2) : 2575.  
 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN  
 TYPE OF DEVELOPMENT : RESERVOIR  
 RESERVOIR DEVELOPMENT RATIO : 0.43

RESERVOIR  
 FULL SUPPLY LEVEL (EL.M) : 320.0  
 AVERAGE OPERATING LEVEL (EL.M) : 306.3  
 MINIMUM OPERATING LEVEL (EL.M) : 278.8  
 DRAWDOWN DEPTH (M) : 41.2  
 GROSS STORAGE VOL. (MIL M3) : 1131.6  
 ACTIVE STORAGE VOL. (MIL M3) : 868.0  
 DEAD STORAGE VOL. (MIL M3) : 263.6  
 SEDIMENT VOL. (MIL M3) : 79.4

MAIN DAM (WEIR)  
 CREST ELEVATION (EL.M) : 326.0  
 DAM HEIGHT (M) : 122.0  
 CREST LENGTH (M) : 365.0  
 EMBANKMENT VOL. (MIL M3) : 5.69

WATERWAY  
 HEADRAGE : LENGTH (M) : 500.0  
 PENSTOCK : HORIZONTAL L (M) : 200.0  
 DIVERSION : LENGTH (M) : 750.0  
 EXCAVATION VOL TOTAL (1000 M3) : 235.7  
 DIAMETER (WIDTH) (M) : 6.1  
 DIAMETER (M) : 4.6  
 DIAMETER (M) : 8.2  
 NOS. : 2  
 NOS. : 2  
 NOS. : 5

DISCHARGE / HEAD  
 PLANT MAX. DISCHARGE (M3/S) : 173.0  
 FIRM DISCHARGE (M3/S) : 43.3  
 AVERAGE NET HEAD (M) : 99.8  
 TAILWATER LEVEL (EL.M) : 204.0

POWER / ENERGY  
 INSTALLED CAPACITY (MW) : 142.1  
 FIRM POWER (MW) : 35.5  
 MIN. GUARANTEED POWER (MW) : 98.1  
 ANNUAL TOTAL ENERGY (GWH) : 438.4  
 FIRM ENERGY (GWH) : 311.2  
 SECONDARY ENERGY (GWH) : 127.2

TRANSMISSION LINE  
 LENGTH (KM) : 31.7  
 TO : SAN ESTEBAN  
 FROM : NEAREST PROVINCIAL ROAD  
 230 K V DOUBLE CIRCUIT  
 NOS. OF CIRCUIT : 1

ACCESS ROAD LENGTH (KM) : 3.1  
 CONSTRUCTION COST  
 TOTAL COST (MIL USD) : 249.9  
 TOTAL COST/KW (USD/KW) : 1758.7  
 TOTAL COST/KWH (USD/KWH) : 0.715  
 POWER COST (MIL USD) : 243.2  
 TRANSMISSION CCST (MIL USD) : 5.8  
 ACCESS ROAD COST (MIL USD) : 0.9

OTHER INFORMATION  
 LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : NONE  
 MAP USED (1:50,000 SCALE) : 3171-IV, 1979  
 TECHNICAL COMMENT : - ACTUAL C.A. AT SUPO DAMSITE (1293 SQ. KMS.) IS ADJUSTED TO 1134. SQ. KMS. TAKING ACCOUNT OF 9.0 CMS OF IRRIGATION REQUIREMENT TO BE DIVERTED AT UPSTREAM OF SUPO SITE.

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-06-0-1

SCHEME : ETEB

RIVER SYSTEM : ABRA  
 STREAM : ABRA  
 WATER RESOURCES REGION : I  
 PROVINCE : ILOCOS SUR  
 COORDINATES : N17-10-42 E120-40-22  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S, RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 911.0 (MAIN : 911.0, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2750.0 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 51.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.60

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 371.0 GROSS STORAGE VOL. (MIL M3) : 1626.2  
 AVERAGE OPERATING LEVEL (EL.M) : 357.8 ACTIVE STORAGE VOL. (MIL M3) : 972.5  
 MINIMUM OPERATING LEVEL (EL.M) : 331.4 DEAD STORAGE VOL. (MIL M3) : 653.7  
 DRAWDOWN DEPTH ( M ) : 39.6 SEDIMENT VOL. (MIL M3) : 63.8

MAIN DAM CREST ELEVATION (EL.M) : 377.0 CREST LENGTH ( M ) : 461.8  
 (WEIR) DAM HEIGHT ( M ) : 104.0 EMBANKMENT VOL. (MIL M3) : 6.06

WATERWAY HEADRACE : LENGTH ( M ) : 460.0 DIAMETER (WIDTH) ( M ) : 5.8 NOS. : 2  
 PENSTOCK : HORIZONT. L ( M ) : 220.0 DIAMETER ( M ) : 4.5 NOS. : 2  
 DIVERSION : LENGTH ( M ) : 970.0 DIAMETER ( M ) : 8.6 NOS. : 4  
 EXCAVATION VOL TOTAL (1000 M3) : 259.0

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 157.8 AVERAGE NET HEAD ( M ) : 82.5  
 /HEAD FIRM DISCHARGE (M3/S) : 39.4 TAILWATER LEVEL (EL.M) : 273.0

POWER UNSATTLED CAPACITY (MW) : 107.1 ANNUAL TOTAL ENERGY (GWH) : 296.4  
 /ENERGY FIRM POWER (MW) : 26.8 FIRM ENERGY (GWH) : 234.6  
 MIN. GUARANTEED POWER (MW) : 69.3 SECONDARY ENERGY (GWH) : 61.9

TRANSMISSION LINE LENGTH (KM) : 36.5 TO : SAN ESTEBAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 0.2 FROM : NEAREST PROVINCIAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 239.4 POWER COST (MIL USD) : 232.9  
 TOTAL COST/KW (USD/KW) : 2235.6 TRANSMISSION COST (MIL USD) : 6.5  
 TOTAL COST/KWH (USD/KWH) : 0.946 ACCESS ROAD COST (MIL USD) : 0.1

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : MIXED - SCARCE POPULATION  
 SUBMERGED ROAD : PROVINCIAL ROAD 0.2 KMS.  
 MAP USED (1:50,000 SCALE) : 3171-1V 1979  
 TECHNICAL COMMENT : - NONE

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-022-00-07-0-1

SCHEME : BUCNIT

RIVER SYSTEM : ABRA  
STREAM : ABRA

WATER RESOURCES REGION : I  
PROVINCE : ILOCOS SUR

COORDINATES : N17-05-18 E120-44-00  
STUDY LEVEL : UNSCALED  
(PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 589.0 (MAIN : 589.0, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-006-NW-105  
AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 33.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.65

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 460.0 GROSS STORAGE VOL. (MIL M3) : 1036.5  
AVERAGE OPERATING LEVEL (EL.M) : 447.0 ACTIVE STORAGE VOL. (MIL M3) : 581.2  
MINIMUM OPERATING LEVEL (EL.M) : 420.9 DEAD STORAGE VOL. (MIL M3) : 355.3  
DRAWDOWN DEPTH ( M ) : 39.1 SEDIMENT VOL. (MIL M3) : 41.2

MAIN DAM CREST ELEVATION (EL.M) : 456.0 CREST LENGTH ( M ) : 878.2  
(WEIR) DAM HEIGHT ( M ) : 136.0 EMBANKMENT VOL. (MIL M3) : 16.85

WATERWAY HEADRAGE : LENGTH ( M ) : 580.0 DIAMETER (WIDTH) ( M ) : 5.8 NOS. : 2  
PENSTOCK : HORIZONT. L ( M ) : 150.0 DIAMETER ( M ) : 4.4 NOS. : 2  
DIVERSION : LENGTH ( M ) : 970.0 DIAMETER ( M ) : 8.8 NOS. : 3  
EXCAVATION VOL TOTAL (1000 M3) : 212.9

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 157.3 AVERAGE NET HEAD ( M ) : 114.4  
/HEAD FIRM DISCHARGE (M3/S) : 26.2 TAILWATER LEVEL (EL.M) : 330.0

POWER INSATLLED CAPACITY (MW) : 148.1 ANNUAL TOTAL ENERGY (GWH) : 269.9  
/ENERGY FIRM POWER (MW) : 24.7 FIRM ENERGY (GWH) : 216.2  
MIN. GUARANTEED POWER (MW) : 108.9 SECONDARY ENERGY (GWH) : 53.7

TRANSMISSION LINE LENGTH (KM) : 50.0 TO : SAN ESTEBAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 15.0 FROM : CERVANTES

CONSTRUCTION COST

TOTAL COST (MIL USD) : 362.2 POWER COST (MIL USD) : 349.5  
TOTAL COST/KW (USD/KW) : 2446.1 TRANSMISSION COST (MIL USD) : 8.4  
TOTAL COST/KWH (USD/KWH) : 1.559 ACCESS ROAD COST (MIL USD) : 4.3

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3171-111  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-08-0-1

SCHEME : UPPER BUCNIT

RIVER SYSTEM : ABRA  
 STREAM : ABRA  
 WATER RESOURCES REGION : I  
 PROVINCE : ILOCOS SUR

COORDINATES : N17-03-30 E120-44-45  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S, RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 572.0 (MAIN : 572.0, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 32.3 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 473.0 GROSS STORAGE VOL. (MIL M3) : 1020.4  
 AVERAGE OPERATING LEVEL (EL.M) : 459.9 ACTIVE STORAGE VOL. (MIL M3) : 712.4  
 MINIMUM OPERATING LEVEL (EL.M) : 433.7 DEAD STORAGE VOL. (MIL M3) : 308.0  
 DRAWDOWN DEPTH (M) : 39.3 SEDIMENT VOL. (MIL M3) : 40.0

MAIN DAM CREST ELEVATION (EL.M) : 479.0 CREST LENGTH (M) : 875.6  
 (WEIR) DAM HEIGHT (M) : 119.0 EMBANKMENT VOL. (MIL M3) : 10.90

WATERWAY HEADRACE : LENGTH (M) : 700.0 DIAMETER (WIDTH) (M) : 5.7 NOS. : 2  
 PENSTOCK : HORIZONT. L (M) : 270.0 DIAMETER (M) : 4.5 NOS. : 2  
 DIVERSION : LENGTH (M) : 1250.0 DIAMETER (M) : 8.7 NOS. : 3  
 EXCAVATION VOL TOTAL (1000 M3) : 269.6

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 156.0 AVERAGE NET HEAD (M) : 96.9  
 /HEAD FIRM DISCHARGE (M3/S) : 26.0 TAILWATER LEVEL (EL.M) : 360.0

POWER INSATLLED CAPACITY (MW) : 124.4 ANNUAL TOTAL ENERGY (GWH) : 223.1  
 /ENERGY FIRM POWER (MW) : 20.7 FIRM ENERGY (GWH) : 181.6  
 MIN. GUARANTEED POWER (MW) : 86.4 SECONDARY ENERGY (GWH) : 41.4

TRANSMISSION LINE LENGTH (KM) : 53.0 TO : SAN ESTEBAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 10.5 FROM : CERVANTES

CONSTRUCTION COST

TOTAL COST (MIL USD) : 306.1 POWER COST (MIL USD) : 294.3  
 TOTAL COST/KW (USD/KW) : 2461.0 TRANSMISSION COST (MIL USD) : 8.9  
 TOTAL COST/KWH (USD/KWH) : 1.578 ACCESS ROAD COST (MIL USD) : 3.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3171-111  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-09-0-1

SCHEME : DAYAPAN

RIVER SYSTEM : ABRA  
STREAM : ABRA

WATER RESOURCES REGION : 1  
PROVINCE : ILOCOS SUR

COORDINATES : N16-55-10 E120-44-12  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 162.0 (MAIN) : 162.0 INTER TRANSFER TOTAL : 0.0 STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 3166. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 11.3 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 746.0 GROSS STORAGE VOL. (MIL M3) : 354.1  
AVERAGE OPERATING LEVEL (EL.M) : 721.4 ACTIVE STORAGE VOL. (MIL M3) : 248.9  
MINIMUM OPERATING LEVEL (EL.M) : 672.1 DEAD STORAGE VOL. (MIL M3) : 105.1  
DRAWDOWN DEPTH ( M ) : 73.9 SEDIMENT VOL. (MIL M3) : 11.3

MAIN DAM CREST ELEVATION (EL.M) : 752.0 CREST LENGTH ( M ) : 595.2  
(WEIR) DAM HEIGHT ( M ) : 196.0 EMBANKMENT VOL. (MIL M3) : 23.13

WATERWAY HEADRACE : LENGTH ( M ) : 1060.0 DIAMETER (WIDTH) ( M ) : 2.8 NOS. : 1  
PENSTOCK : HORIZONT. L ( M ) : 430.0 DIAMETER ( M ) : 2.4 NOS. : 1  
DIVERSION : LENGTH ( M ) : 1410.0 DIAMETER ( M ) : 7.4 NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 131.0

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 18.5 AVERAGE NET HEAD ( M ) : 157.7  
/HEAD FIRM DISCHARGE (M3/S) : 9.2 TAILWATER LEVEL (EL.M) : 556.0

POWER INSATLLED CAPACITY (MW) : 23.9 ANNUAL TOTAL ENERGY (GWH) : 118.4  
/ENERGY FIRM POWER (MW) : 12.0 FIRM ENERGY (GWH) : 104.9  
MIN. GUARANTEED POWER (MW) : 15.7 SECONDARY ENERGY (GWH) : 13.5

TRANSMISSION LINE LENGTH (KM) : 12.0 TO : QUINAANG 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 4.0 FROM : CAMAY

CONSTRUCTION COST

TOTAL COST (MIL USD) : 337.3 POWER COST (MIL USD) : 335.4  
TOTAL COST/KW (USD/KW) : 14083.3 TRANSMISSION COST (MIL USD) : 0.7  
TOTAL COST/KWH (USD/KWH) : 3.036 ACCESS ROAD COST (MIL USD) : 1.1

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3170-IV  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-00-10-0-2

SCHEME : ABRA

RIVER SYSTEM : ABRA  
STREAM : ABRA

WATER RESOURCES REGION : I  
PROVINCE : BENGUET

COORDINATES : N16-50-44 E120-43-52  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 107.1 (MAIN : 107.1, INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 3000. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 6.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.57

PONDAGE FULL SUPPLY LEVEL (EL.M) : 804.3 PONDAGE STORAGE VOL. (1000M3) : 75.9  
AVERAGE OPERATING LEVEL (EL.M) : 803.6 ACTIVE STORAGE VOL. (1000M3) : 25.9  
MINIMUM OPERATING LEVEL (EL.M) : 802.9  
DRAWDOWN DEPTH ( M ) : 1.5

MAIN DAM CREST ELEVATION (EL.M) : 804.3 CREST LENGTH ( M ) : 63.0  
(WEIR) WEIR HEIGHT ( M ) : 7.3 WEIR CONCRETE VOL. (1000 M3) : 8.1

WATERWAY HEADRACE : LENGTH ( M ) : 6000.0 DIAMETER (WIDTH) ( M ) : 2.2 NOS. : 1  
PENSTOCK : HORIZONTAL L ( M ) : 360.0 DIAMETER ( M ) : 1.6 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 23.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 6.9 AVERAGE NET HEAD ( M ) : 189.2  
/HEAD FIRM DISCHARGE (M3/S) : 0.9 TAILWATER LEVEL (EL.M) : 600.0

POWER INSATLLED CAPACITY (MW) : 10.7 ANNUAL TOTAL ENERGY (GWH) : 49.8  
/ENERGY FIRM POWER (MW) : 1.4 FIRM ENERGY (GWH) : 12.3  
MIN. GUARANTEED POWER (MW) : 1.3 SECONDARY ENERGY (GWH) : 37.5

TRANSMISSION LINE LENGTH (KM) : 8.0 TO : QUINAOANG 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 10.0 FROM : NEAREST NATIONAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 16.5 POWER COST (MIL USD) : 15.1  
TOTAL COST/KW (USD/KW) : 1724.5 TRANSMISSION COST (MIL USD) : 0.6  
TOTAL COST/KWH (USD/KWH) : 0.788 ACCESS ROAD COST (MIL USD) : 2.9

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : MIXED - SCARCE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3170-IV 1970  
TECHNICAL COMMENT : - NONE



I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-022-01-11-0-1

SCHEME : NAGLIBACAN

RIVER SYSTEM : ABRA  
STREAM : ANAYAN

WATER RESOURCES REGION : I  
PROVINCE : ABRA

COORDINATES : N17-51-30 E120-53-00  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 128.3 (MAIN : 128., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 7.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR      RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR      FULL SUPPLY LEVEL (EL.M) : 494.0      GROSS STORAGE VOL. (MIL M3) : 226.2  
AVERAGE OPERATING LEVEL (EL.M) : 475.3      ACTIVE STORAGE VOL. (MIL M3) : 171.2  
MINIMUM OPERATING LEVEL (EL.M) : 437.9      DEAD STORAGE VOL. (MIL M3) : 55.0  
DRAWDOWN DEPTH ( M ) : 56.1      SEDIMENT VOL. (MIL M3) : 9.0  
MAIN DAM      CREST ELEVATION (EL.M) : 500.0      CREST LENGTH ( M ) : 426.7  
(WEIR)      DAM HEIGHT ( M ) : 150.0      EMBANKMENT VOL. (MIL M3) : 8.52  
WATERWAY      HEADRACE : LENGTH ( M ) : 540.0      DIAMETER (WIDTH) ( M ) : 2.5      NOS. : 1  
PENSTOCK : HORIZONTAL L ( M ) : 120.0      DIAMETER ( M ) : 2.1      NOS. : 1  
DIVERSION : LENGTH ( M ) : 1100.0      DIAMETER ( M ) : 7.0      NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 86.6

DISCHARGE      PLANT MAX. DISCHARGE (M3/S) : 12.0      AVERAGE NET HEAD ( M ) : 121.9  
/HEAD      FIRM DISCHARGE (M3/S) : 6.0      TAILWATER LEVEL (EL.M) : 350.0  
POWER      INSTALLED CAPACITY (MW) : 12.1      ANNUAL TOTAL ENERGY (GWH) : 59.1  
/ENERGY      FIRM POWER (MW) : 6.0      FIRM ENERGY (GWH) : 52.8  
MIN. GUARANTEED POWER (MW) : 8.0      SECONDARY ENERGY (GWH) : 6.2

TRANSMISSION

LINE      LENGTH (KM) : 27.0      TO : HMOI      69 K V SINGLE CIRCUIT      NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 38.0      FROM : SAN JUAN

CONSTRUCTION COST

TOTAL COST (MIL USD) : 171.7      POWER COST (MIL USD) : 159.7  
TOTAL COST/KW (USD/KW) : 14227.5      TRANSMISSION COST (MIL USD) : 1.2  
TOTAL COST/KWH (USD/KWH) : 3.137      ACCESS ROAD COST (MIL USD) : 10.8

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3173-1  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-01-12-0-1

SCHEME : TINEG-1

RIVER SYSTEM : ABRA  
STREAM : TINEG

WATER RESOURCES REGION : I  
PROVINCE : ABRA

COORDINATES : N17-47-00 E120-47-00  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 992.4 (MAIN : 992.4 INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 56.0 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 324.0 GROSS STORAGE VOL. (MIL M3) : 1777.5  
AVERAGE OPERATING LEVEL (EL.M) : 299.1 ACTIVE STORAGE VOL. (MIL M3) : 1324.3  
MINIMUM OPERATING LEVEL (EL.M) : 249.4 DEAD STORAGE VOL. (MIL M3) : 453.2  
DRAWDOWN DEPTH (M) : 74.6 SEDIMENT VOL. (MIL M3) : 69.5

MAIN DAM CREST ELEVATION (EL.M) : 330.0 CREST LENGTH (M) : 840.0  
(WEIR) DAM HEIGHT (M) : 193.7 EMBANKMENT VOL. (MIL M3) : 30.07

WATERWAY HEADRACE : LENGTH (M) : 910.0 DIAMETER (WIDTH) (M) : 6.3 NOS. : 3  
PENSTOCK : HORIZONTAL L (M) : 160.0 DIAMETER (M) : 4.7 NOS. : 3  
DIVERSTION : LENGTH (M) : 1400.0 DIAMETER (M) : 8.9 NOS. : 4  
EXCAVATION VOL TOTAL (1000 M3) : 439.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 250.5 AVERAGE NET HEAD (M) : 159.4  
/HEAD FIRM DISCHARGE (M3/S) : 46.7 TAILWATER LEVEL (EL.M) : 136.3

POWER UNSATLLED CAPACITY (MW) : 367.9 ANNUAL TOTAL ENERGY (GWH) : 639.5  
/ENERGY FIRM POWER (MW) : 51.3 FIRM ENERGY (GWH) : 537.2  
MIN. GUARANTEED POWER (MW) : 241.1 SECONDARY ENERGY (GWH) : 102.3

TRANSMISSION LINE LENGTH (KM) : 15.0 TO : NEW S/S (SAN ESTEBAN-BATONG 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 16.0 FROM : LAGAYAN

CONSTRUCTION COST

TOTAL COST (MIL USD) : 528.7 POWER COST (MIL USD) : 618.6  
TOTAL COST/KW (USD/KWH) : 1708.6 TRANSMISSION COST (MIL USD) : 5.5  
TOTAL COST/KWH (USD/KWH) : 1.107 ACCESS ROAD COST (MIL USD) : 4.6

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3173-11  
TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-022-01-13-0-1

SCHEME : TINEG-2

RIVER SYSTEM : ABRA  
STREAM : TINEG

WATER RESOURCES REGION : I  
PROVINCE : ABRA

COORDINATES : N17-48-30 E120-52-00  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 317.9 (MAIN : 318., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 17.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT

RESERVOIR DEVELOPMENT RATIO : 0.55

RESERVOIR

FULL SUPPLY LEVEL (EL.M) : 492.5  
AVERAGE OPERATING LEVEL (EL.M) : 468.3  
MINIMUM OPERATING LEVEL (EL.M) : 419.7  
DRAWDOWN DEPTH (M) : 72.9  
CREST ELEVATION (EL.M) : 498.5  
DAM HEIGHT (M) : 198.5  
LENGTH (M) : 840.0  
HORIZONTAL (M) : 260.0  
DIVERSTION : LENGTH (M) : 1470.0  
EXCAVATION VOL TOTAL (1000 M3) : 215.1

GROSS STORAGE VOL. (MIL M3) : 418.4  
ACTIVE STORAGE VOL. (MIL M3) : 311.1  
DEAD STORAGE VOL. (MIL M3) : 107.3  
SEDIMENT VOL. (MIL M3) : 22.3

CREST LENGTH (M) : 644.5  
EMBANKMENT VOL. (MIL M3) : 19.40

DIAMETER (WIDTH) (M) : 5.8  
DIAMETER (M) : 4.4  
DIAMETER (M) : 7.4

NOS. : 1  
NOS. : 1  
NOS. : 3

PLANT MAX. DISCHARGE (M3/S) : 80.6  
FIRM DISCHARGE (M3/S) : 13.4

AVERAGE NET HEAD (M) : 164.2  
TAILWATER LEVEL (EL.M) : 300.0

INSATLLED CAPACITY (MW) : 108.9  
FIRM POWER (MW) : 18.1  
MIN. GUARANTEED POWER (MW) : 73.0

ANNUAL TOTAL ENERGY (GWH) : 210.0  
FIRM ENERGY (GWH) : 159.0  
SECONDARY ENERGY (GWH) : 51.0

TRANSMISSION

LENGTH (KM) : 27.0 TO : HMOI  
ACCESS ROAD LENGTH (KM) : 36.0 FROM : SAN JUAN

230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1

CONSTRUCTION COST

TOTAL COST (MIL USD) : 371.9  
TOTAL COST/KW (USD/KW) : 3416.3  
TOTAL COST/KWH (USD/KWH) : 2.134

POWER COST (MIL USD) : 356.6  
TRANSMISSION COST (MIL USD) : 5.1  
ACCESS ROAD COST (MIL USD) : 10.3

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3173-11  
TECHNICAL COMMENT :

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**I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S**  
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SCHEME ID : 1-022-01-14-0-1  
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SCHEME : TINEG-3  
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RIVER SYSTEM : ABRA  
 STREAM : TINEG  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-47-20 E120-57-35  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

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**HYDRO/TOPO. INFORMATION**  
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CATCHMENT AREA (KM2) : 235.1 (MAIN : 235., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2375.  
 AVERAGE DISCHARGE (M3/S) : 11.4 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 134.6

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**SELECTED PLAN**  
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TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 645.0 GROSS STORAGE VOL. (MIL M3) : 362.0  
 AVERAGE OPERATING LEVEL (EL.M) : 626.5 ACTIVE STORAGE VOL. (MIL M3) : 269.6  
 MINIMUM OPERATING LEVEL (EL.M) : 589.6 DEAD STORAGE VOL. (MIL M3) : 92.3  
 DRAWDOWN DEPTH ( M ) : 55.4 SEDIMENT VOL. (MIL M3) : 16.5

MAIN DAM CREST ELEVATION (EL.M) : 651.0 CREST LENGTH ( M ) : 749.6  
 DAM HEIGHT ( M ) : 143.8 EMBANKMENT VOL. (MIL M3) : 13.93

WATERWAY HEADRACE : LENGTH ( M ) : 400.0 DIAMETER (WIDTH) ( M ) : 2.8 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 470.0 DIAMETER ( M ) : 2.5 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1400.0 DIAMETER ( M ) : 8.3 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 155.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 19.0 AVERAGE NET HEAD ( M ) : 114.3  
 /HEAD FIRM DISCHARGE (M3/S) : 9.5 TAILWATER LEVEL (EL.M) : 507.2

POWER INSATLLED CAPACITY (MW) : 17.9 ANNUAL TOTAL ENERGY (GWH) : 87.3  
 /ENERGY FIRM POWER (MW) : 8.9 FIRM ENERGY (GWH) : 78.2  
 MIN. GUARANTEED POWER (MW) : 11.5 SECONDARY ENERGY (GWH) : 9.1

TRANSMISSION LINE LENGTH (KM) : 39.0 TO : HMOI 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 51.0 FROM : SAN JUAN

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**CONSTRUCTION COST**  
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TOTAL COST (MIL USD) : 257.0 POWER COST (MIL USD) : 241.0  
 TOTAL COST/KW (USD/KWH) : 14395.6 TRANSMISSION COST (MIL USD) : 1.5  
 TOTAL COST/KWH (USD/KWH) : 3.175 ACCESS ROAD COST (MIL USD) : 14.5

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**OTHER INFORMATION**  
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LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3173-11  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-02-15-0-2

SCHEME : BINONGAN-R

RIVER SYSTEM : ABRA  
STREAM : BINONGAN

WATER RESOURCES REGION : I  
PROVINCE : ABRA

COORDINATES : N17-38-48 E120-58-53  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 296.9 (MAIN : 297.7, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-008-NW-108  
AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 14.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.80

PONDAGE FULL SUPPLY LEVEL (EL.M) : 521.5 PONDAGE STORAGE VOL. (1000M3) : 109.3  
AVERAGE OPERATING LEVEL (EL.M) : 520.1 ACTIVE STORAGE VOL. (1000M3) : 54.1  
MINIMUM OPERATING LEVEL (EL.M) : 518.8  
DRAWDOWN DEPTH (M) : 2.7

MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 521.5 CREST LENGTH (M) : 116.4  
WEIR HEIGHT (M) : 8.5 WEIR CONCRETE VOL. (1000 M3) : 17.5

WATERWAY HEADRAGE : LENGTH (M) : 17500.0 DIAMETER (WIDTH) (M) : 2.1 NOS. : 1  
PENSTOCK : HORIZONT. L (M) : 265.0 DIAMETER (M) : 1.6 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 61.3

DISCHARGE /HEAD PLANT MAX. DISCHARGE (M3/S) : 6.2 AVERAGE NET HEAD (M) : 110.7  
FIRM DISCHARGE (M3/S) : 1.9 TAILWATER LEVEL (EL.M) : 380.0

POWER /ENERGY UNSATLLED CAPACITY (MW) : 5.7 ANNUAL TOTAL ENERGY (GWH) : 37.5  
FIRM POWER (MW) : 1.7 FIRM ENERGY (GWH) : 15.0  
MIN. GUARANTEED POWER (MW) : 1.5 SECONDARY ENERGY (GWH) : 22.5

TRANSMISSION LINE LENGTH (KM) : 36.0 TO : BANGUED 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 27.0 FROM : LAGAYAN

CONSTRUCTION COST

TOTAL COST (MIL USD) : 35.3 POWER COST (MIL USD) : 26.2  
TOTAL COST/KW (USD/KW) : 6244.4 TRANSMISSION COST (MIL USD) : 1.4  
TOTAL COST/KWH (USD/KWH) : 1.624 ACCESS ROAD COST (MIL USD) : 7.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3172-1  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-03-16-0-1

SCHEME : PAGANAO

RIVER SYSTEM : ABRA  
 STREAM : MALANAS  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-39-50 E120-49-14  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 154.0 (MAIN : 154.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 7.5 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 273.0 GROSS STORAGE VOL. (MIL M3) : 236.9  
 AVERAGE OPERATING LEVEL (EL.M) : 258.4 ACTIVE STORAGE VOL. (MIL M3) : 176.6  
 MINIMUM OPERATING LEVEL (EL.M) : 229.2 DEAD STORAGE VOL. (MIL M3) : 60.3  
 DRAWDOWN DEPTH ( M ) : 43.8 SEDIMENT VOL. (MIL M3) : 10.8

MAIN DAM CREST ELEVATION (EL.M) : 279.0 CREST LENGTH ( M ) : 511.8  
 (WEIR) DAM HEIGHT ( M ) : 125.4 EMBANKMENT VOL. (MIL M3) : 7.10

WATERWAY HEADRACE : LENGTH ( M ) : 600.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 280.0 DIAMETER ( M ) : 2.1 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1230.0 DIAMETER ( M ) : 7.3 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 107.7

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 12.3 AVERAGE NET HEAD ( M ) : 100.6  
 /HEAD FIRM DISCHARGE (M3/S) : 6.2 TAILWATER LEVEL (EL.M) : 153.6

POWER UNSATLLED CAPACITY (MW) : 10.2 ANNUAL TOTAL ENERGY (GWH) : 50.1  
 /ENERGY FIRM POWER (MW) : 5.1 FIRM ENERGY (GWH) : 44.7  
 MIN. GUARANTEED POWER (MW) : 6.9 SECONDARY ENERGY (GWH) : 5.4

TRANSMISSION LINE LENGTH (KM) : 15.0 TO : BANGUED 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 17.0 FROM : LAMAG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 151.3 POWER COST (MIL USD) : 145.6  
 TOTAL COST/KW (USD/KW) : 14812.0 TRANSMISSION COST (MIL USD) : 0.8  
 TOTAL COST/KWH (USD/KWH) : 3.263 ACCESS ROAD COST (MIL USD) : 4.8

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-I  
 TECHNICAL COMMENT :

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**I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S**  
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SCHEME ID : 1-022-03-17-0-1  
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SCHEME : MALANAS (LICUANO)

RIVER SYSTEM : ABRA  
 STREAM : KAWAYAN  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-37-00 E120-54-00  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

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**HYDRO/TOPO. INFORMATION**  
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CATCHMENT AREA (KM2) : 94.6 (MAIN : 95., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 4.6 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

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**SELECTED PLAN**  
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TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 432.0 GROSS STORAGE VOL. (MIL M3) : 144.7  
 AVERAGE OPERATING LEVEL (EL.M) : 417.8 ACTIVE STORAGE VOL. (MIL M3) : 108.5  
 MINIMUM OPERATING LEVEL (EL.M) : 389.4 DEAD STORAGE VOL. (MIL M3) : 36.2  
 DRAWDOWN DEPTH ( M ) : 42.6 SEDIMENT VOL. (MIL M3) : 6.6

MAIN DAM CREST ELEVATION (EL.M) : 438.0 CREST LENGTH ( M ) : 454.5  
 (WEIR) DAM HEIGHT ( M ) : 107.2 EMBANKMENT VOL. (MIL M3) : 5.68

WATERWAY HEADRACE : LENGTH ( M ) : 720.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 190.0 DIAMETER ( M ) : 1.8 NOS. : 1  
 DIVERSTON : LENGTH ( M ) : 1000.0 DIAMETER ( M ) : 6.4 NOS. : 2  
 EXCAVATION VOL. TOTAL (1000 M3) : 72.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 7.6 AVERAGE NET HEAD ( M ) : 84.3  
 /HEAD FIRM DISCHARGE (M3/S) : 3.8 TAILWATER LEVEL (EL.M) : 330.8

POWER INSATLLED CAPACITY (MW) : 5.3 ANNUAL TOTAL ENERGY (GWH) : 25.9  
 /ENERGY FIRM POWER (MW) : 2.6 FIRM ENERGY (GWH) : 23.0  
 MIN. GUARANTEED POWER (MW) : 3.3 SECONDARY ENERGY (GWH) : 2.9

TRANSMISSION LINE LENGTH (KM) : 26.0 TO : BANGUED 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 17.0 FROM : NALBAGAN

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**CONSTRUCTION COST**  
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TOTAL COST (MIL USD) : 120.5 POWER COST (MIL USD) : 114.6  
 TOTAL COST/KW (USD/KW) : 22944.9 TRANSMISSION COST (MIL USD) : 1.1  
 TOTAL COST/KWH (USD/KWH) : 5.051 ACCESS ROAD COST (MIL USD) : 4.8

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**OTHER INFORMATION**  
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LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-1  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-04-18-0-1

SCHEME : TAPING

RIVER SYSTEM : ABRA  
 STREAM : BAAY  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-33-55 E120-46-50  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 111.0 (MAIN : 111.0) INTER TRANSFER TOTAL : 0.2 STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 5.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.55

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 206.3 GROSS STORAGE VOL. (MIL M3) : 128.3  
 AVERAGE OPERATING LEVEL (EL.M) : 192.7 ACTIVE STORAGE VOL. (MIL M3) : 93.4  
 MINIMUM OPERATING LEVEL (EL.M) : 165.7 DEAD STORAGE VOL. (MIL M3) : 34.9  
 DRAWDOWN DEPTH ( M ) : 40.6 SEDIMENT VOL. (MIL M3) : 7.8

MAIN DAM CREST ELEVATION (EL.M) : 212.3 CREST LENGTH ( M ) : 995.1  
 (WEIR) DAM HEIGHT ( M ) : 105.3 EMBANKMENT VOL. (MIL M3) : 10.09

WATERWAY HEADRACE : LENGTH ( M ) : 700.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 330.0 DIAMETER ( M ) : 1.8 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1580.0 DIAMETER ( M ) : 6.7 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 114.6

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 8.0 AVERAGE NET HEAD ( M ) : 82.2  
 /HEAD FIRM DISCHARGE (M3/S) : 4.0 TAILWATER LEVEL (EL.M) : 107.0

POWER UNSATLLED CAPACITY (MW) : 5.4 ANNUAL TOTAL ENERGY (GWH) : 28.5  
 /ENERGY FIRM POWER (MW) : 2.7 FIRM ENERGY (GWH) : 23.7  
 MIN. GUARANTEED POWER (MW) : 3.5 SECONDARY ENERGY (GWH) : 4.6

TRANSMISSION LINE LENGTH (KM) : 18.0 TO : BANGUED 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 4.0 FROM : TAPING

CONSTRUCTION COST

TOTAL COST (MIL USD) : 178.5 POWER COST (MIL USD) : 176.5  
 TOTAL COST/KW (USD/KW) : 33040.5 TRANSMISSION COST (MIL USD) : 0.9  
 TOTAL COST/KWH (USD/KWH) : 7.110 ACCESS ROAD COST (MIL USD) : 1.1

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-1  
 TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-05-19-0-1

SCHEME : UPPER MAGUYEPEP

RIVER SYSTEM : ABRA  
 STREAM : BUCLOC  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-26-50 E120-47-07  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 156.4 (MAIN ; 156.4, INTER TRANSFER TOTAL : 0.)  
 AVER. BASIN RAINFALL (MM/YR) : 2500. (MM/YR) : 1.4  
 AVERAGE DISCHARGE (M3/S) : 7.6 (MM/DAY) : 3.5  
 STREAM GAGE ID : 4-1-008-NW-106  
 GAGE CATCHMENT (KM2) : 2575.  
 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.65

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 331.6 GROSS STORAGE VOL. (MIL M3) : 214.3  
 AVERAGE OPERATING LEVEL (EL.M) : 317.0 ACTIVE STORAGE VOL. (MIL M3) : 155.5  
 MINIMUM OPERATING LEVEL (EL.M) : 287.7 DEAD STORAGE VOL. (MIL M3) : 58.9  
 DRAWDOWN DEPTH ( M ) : 44.0 SEDIMENT VOL. (MIL M3) : 10.9

MAIN DAM CREST ELEVATION (EL.M) : 937.6 CREST LENGTH ( M ) : 531.1  
 (WEIR) DAM HEIGHT ( M ) : 121.2 EMBANKMENT VOL. (MIL M3) : 6.72

WATERWAY HEADRACE : LENGTH ( M ) : 880.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 280.0 DIAMETER ( M ) : 2.1 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1140.0 DIAMETER ( M ) : 7.4 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 102.3

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 12.0 AVERAGE NET HEAD ( M ) : 95.9  
 /HEAD FIRM DISCHARGE (M3/S) : 6.0 TAILWATER LEVEL (EL.M) : 216.4

POWER INSATLLED CAPACITY (MW) : 9.5 ANNUAL TOTAL ENERGY (GWH) : 47.8  
 /ENERGY FIRM POWER (MW) : 4.7 FIRM ENERGY (GWH) : 41.5  
 MIN. GUARANTEED POWER (MW) : 6.3 SECONDARY ENERGY (GWH) : 6.3

TRANSMISSION LINE LENGTH (KM) : 55.0 TO : BANTAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 14.0 FROM : SALLDENG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 145.4 POWER COST (MIL USD) : 139.5  
 TOTAL COST/KW (USD/KW) : 15349.5 TRANSMISSION COST (MIL USD) : 2.0  
 TOTAL COST/KWH (USD/KWH) : 3.351 ACCESS ROAD COST (MIL USD) : 4.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-11  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-05-20-0-1

SCHEME : BUCLOC

RIVER SYSTEM : ABRA  
 STREAM : SULDEN  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-26-34 E120-52-04  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 103.3 (MAIN : 103.3 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 5.0 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 437.0 GROSS STORAGE VOL. (MIL M3) : 158.8  
 AVERAGE OPERATING LEVEL (EL.M) : 423.6 ACTIVE STORAGE VOL. (MIL M3) : 118.5  
 MINIMUM OPERATING LEVEL (EL.M) : 396.7 DEAD STORAGE VOL. (MIL M3) : 40.3  
 DRAWDOWN DEPTH ( M ) : 40.3 SEDIMENT VOL. (MIL M3) : 7.2

MAIN DAM CREST ELEVATION (EL.M) : 443.0 CREST LENGTH ( M ) : 657.8  
 (WEIR) DAM HEIGHT ( M ) : 114.6 EMBANKMENT VOL. (MIL M3) : 8.92

WATERWAY HEADRACE : LENGTH ( M ) : 530.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 180.0 DIAMETER ( M ) : 1.8 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1100.0 DIAMETER ( M ) : 6.5 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 76.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 3.3 AVERAGE NET HEAD ( M ) : 92.5  
 /HEAD FIRM DISCHARGE (M3/S) : 4.1 TAILWATER LEVEL (EL.M) : 328.4

POWER INSATLLED CAPACITY (MW) : 6.3 ANNUAL TOTAL ENERGY (GWH) : 30.9  
 /ENERGY FIRM POWER (MW) : 3.1 FIRM ENERGY (GWH) : 27.5  
 MIN. GUARANTEED POWER (MW) : 4.2 SECONDARY ENERGY (GWH) : 3.4

TRANSMISSION LINE LENGTH (KM) : 38.0 TO : BANGUED 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 25.0 FROM : SALLBERG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 163.4 POWER COST (MIL USD) : 154.8  
 TOTAL COST/KW (USD/KW) : 25997.3 TRANSMISSION COST (MIL USD) : 1.5  
 TOTAL COST/KWH (USD/KWH) : 5.726 ACCESS ROAD COST (MIL USD) : 7.1

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-11  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-05-21-0-1

SCHEME : DAGUJOMAN

RIVER SYSTEM : ABRA  
STREAM : BUCLOC

WATER RESOURCES REGION : I  
PROVINCE : ABRA

COORDINATES : N17-27-25 E120-55-00  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 66.1 (MAIN : 66.1, INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 3.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 521.0 GROSS STORAGE VOL. (MIL M3) : 101.4  
AVERAGE OPERATING LEVEL (EL.M) : 510.4 ACTIVE STORAGE VOL. (MIL M3) : 70.8  
MINIMUM OPERATING LEVEL (EL.M) : 409.1 DEAD STORAGE VOL. (MIL M3) : 30.6  
DRAWDOWN DEPTH (M) : 31.9 SEDIMENT VOL. (MIL M3) : 4.6

MAIN DAM CREST ELEVATION (EL.M) : 527.0 CREST LENGTH (M) : 757.0  
(WEIR) DAM HEIGHT (M) : 87.0 EMBANKMENT VOL. (MIL M3) : 5.03

WATERWAY HEADRACE : LENGTH (M) : 400.0 DIAMETER (WIDTH) (M) : 2.5 NOS. : 1  
PENSTOCK : HORIZONTAL (M) : 220.0 DIAMETER (M) : 1.5 NOS. : 1  
DIVERSION : LENGTH (M) : 1640.0 DIAMETER (M) : 8.1 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 87.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 5.1 AVERAGE NET HEAD (M) : 68.1  
/HEAD FIRM DISCHARGE (M3/S) : 2.6 TAILWATER LEVEL (EL.M) : 440.0

POWER INSTALLED CAPACITY (MW) : 2.9 ANNUAL TOTAL ENERGY (GWH) : 14.4  
/ENERGY FIRM POWER (MW) : 1.4 FIRM ENERGY (GWH) : 12.6  
MIN. GUARANTEED POWER (MW) : 1.9 SECONDARY ENERGY (GWH) : 1.8

TRANSMISSION LINE LENGTH (KM) : 41.0 TO : BANGUED 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 30.0 FROM : SALLDENG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 112.6 POWER COST (MIL USD) : 102.5  
TOTAL COST/KW (USD/KW) : 39084.0 TRANSMISSION COST (MIL USD) : 1.6  
TOTAL COST/KWH (USD/KWH) : 8.555 ACCESS ROAD COST (MIL USD) : 8.5

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3172-11  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-05-22-0-1

SCHEME : BOYAN

COORDINATES : N17-24-47 E120-46-36  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

WATER RESOURCES REGION : 1  
 PROVINCE : ABRA

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 196.1 (MAIN : 186., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 9.0 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.50

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 361.1 GROSS STORAGE VOL. (MIL M3) : 223.2  
 AVERAGE OPERATING LEVEL (EL.M) : 362.4 ACTIVE STORAGE VOL. (MIL M3) : 170.8  
 MINIMUM OPERATING LEVEL (EL.M) : 325.0 DEAD STORAGE VOL. (MIL M3) : 52.4  
 DRAWDOWN DEPTH (M) : 56.2 SEDIMENT VOL. (MIL M3) : 13.0

MAIN DAM CREST ELEVATION (EL.M) : 387.1 CREST LENGTH (M) : 976.1  
 (WEIR) DAM HEIGHT (M) : 143.8 EMBANKMENT VOL. (MIL M3) : 15.89

WATERWAY HEADRACE : LENGTH (M) : 870.0 DIAMETER (WIDTH) (M) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L (M) : 390.0 DIAMETER (M) : 2.2 NOS. : 1  
 DIVERSION : LENGTH (M) : 1510.0 DIAMETER (M) : 7.7 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 147.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 14.0 AVERAGE NET HEAD (M) : 112.9  
 /HEAD FIRM DISCHARGE (M3/S) : 7.0 TAILWATER LEVEL (EL.M) : 243.3

POWER INSTALLED CAPACITY (MW) : 13.0 ANNUAL TOTAL ENERGY (GWH) : 66.5  
 /ENERGY FIRM POWER (MW) : 6.5 FIRM ENERGY (GWH) : 56.8  
 MIN. GUARANTEED POWER (MW) : 3.3 SECONDARY ENERGY (GWH) : 9.7

TRANSMISSION LINE LENGTH (KM) : 56.0 TO : BANTAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 20.0 FROM : SALLDENG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 275.1 POWER COST (MIL USD) : 267.4  
 TOTAL COST/KW (USD/KW) : 21205.9 TRANSMISSION COST (MIL USD) : 2.0  
 TOTAL COST/KWH (USD/KWH) : 4.605 ACCESS ROAD COST (MIL USD) : 5.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-11  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-05-23-0-2

SCHEME : IKMIN

RIVER SYSTEM : ABRA  
 STREAM : IKMIN  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-22-48 E120-48-25  
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 192.8 (MAIN : 193. INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DEWIDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 9.3 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.57

PONDAGE FULL SUPPLY LEVEL (EL.M) : 342.2 PONDAGE STORAGE VOL. (1000M3) : 66.8  
 AVERAGE OPERATING LEVEL (EL.M) : 340.7 ACTIVE STORAGE VOL. (1000M3) : 35.1  
 MINIMUM OPERATING LEVEL (EL.M) : 339.2  
 DRAWDOWN DEPTH (M) : 3.1

MAIN DAM CREST ELEVATION (EL.M) : 342.2 CREST LENGTH (M) : 75.6  
 (WEIR) WEIR HEIGHT (M) : 9.2 WEIR CONCRETE VOL. (1000 M3) : 13.5

WATERWAY HEADRACE : LENGTH (M) : 10650.0 DIAMETER (WIDTH) (M) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L (M) : 350.0 DIAMETER (M) : 1.9 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 53.7

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 9.4 AVERAGE NET HEAD (M) : 132.6  
 /HEAD FIRM DISCHARGE (M3/S) : 1.2 TAILWATER LEVEL (EL.M) : 190.0

POWER UNSATLLED CAPACITY (MW) : 10.2 ANNUAL TOTAL ENERGY (GWH) : 47.6  
 /ENERGY FIRM POWER (MW) : 1.3 FIRM ENERGY (GWH) : 11.7  
 MIN. GUARANTEED POWER (MW) : 1.2 SECONDARY ENERGY (GWH) : 35.9

TRANSMISSION LINE LENGTH (KM) : 40.0 TO : SAN ESTEBAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 20.5 FROM : LAYUCAN

CONSTRUCTION COST

TOTAL COST (MIL USD) : 31.5 POWER COST (MIL USD) : 24.2  
 TOTAL COST/KW (USD/KW) : 3033.8 TRANSMISSION COST (MIL USD) : 1.5  
 TOTAL COST/KWH (USD/KWH) : 1.406 ACCESS ROAD COST (MIL USD) : 5.8

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBBERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3170-111  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-05-24-0-1

SCHEME : TOQUENG

RIVER SYSTEM : ABRA  
 STREAM : 1KM1N  
 WATER RESOURCES REGION : 1  
 PROVINCE : ABRA  
 COORDINATES : N17-22-46 E120-49-53  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 137.1 (MAIN : 137., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 6.6 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.65

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 534.3 GROSS STORAGE VOL. (MIL M3) : 187.0  
 AVERAGE OPERATING LEVEL (EL.M) : 518.4 ACTIVE STORAGE VOL. (MIL M3) : 136.3  
 MINIMUM OPERATING LEVEL (EL.M) : 486.4 DEAD STORAGE VOL. (MIL M3) : 50.7  
 DRAWDOWN DEPTH ( M ) : 47.9 SEDIMENT VOL. (MIL M3) : 9.6

MAIN DAM CREST ELEVATION (EL.M) : 540.3 CREST LENGTH ( M ) : 688.2  
 (WEIR) DAM HEIGHT ( M ) : 124.9 EMBANKMENT VOL. (MIL M3) : 11.23

WATERWAY HEADRACE : LENGTH ( M ) : 720.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 310.0 DIAMETER ( M ) : 2.0 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1240.0 DIAMETER ( M ) : 7.1 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 102.3

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 10.5 AVERAGE NET HEAD ( M ) : 98.8  
 /HEAD FIRM DISCHARGE (M3/S) : 5.3 TAILWATER LEVEL (EL.M) : 415.4

POWER INSATLLED CAPACITY (MW) : 8.6 ANNUAL TOTAL ENERGY (GWH) : 43.2  
 /ENERGY FIRM POWER (MW) : 4.3 FIRM ENERGY (GWH) : 37.5  
 MIN. GUARANTEED POWER (MW) : 5.5 SECONDARY ENERGY (GWH) : 5.7

TRANSMISSION LINE LENGTH (KM) : 36.0 TO : BONTOC 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 30.0 FROM : SALLOENG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 200.5 POWER COST (MIL USD) : 190.5  
 TOTAL COST/KW (USD/KW) : 23392.5 TRANSMISSION COST (MIL USD) : 1.4  
 TOTAL COST/KWH (USD/KWH) : 5.108 ACCESS ROAD COST (MIL USD) : 8.6

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-11  
 TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-022-05-25-0-1

SCHEME : DANAC

RIVER SYSTEM : ABRA  
STREAM : (KMIN)

WATER RESOURCES REGION : 1  
PROVINCE : ABRA

COORDINATES : N17-23-05 E120-52-38  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 86.7 (MAIN : 87. INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 4.2 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 134.5

SELECTED PLAN

TYPE OF DEVELOPMENT

RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 641.0  
 AVERAGE OPERATING LEVEL (EL.M) : 625.2  
 MINIMUM OPERATING LEVEL (EL.M) : 593.6  
 DRAWDOWN DEPTH ( M ) : 47.4  
 CREST ELEVATION (EL.M) : 647.0  
 DAM HEIGHT ( M ) : 127.0  
 HEADRACE : LENGTH ( M ) : 660.0  
 PENSTOCK : HORIZONTAL L ( M ) : 220.0  
 DIVERSION : LENGTH ( M ) : 1170.0  
 EXCAVATION VOL TOTAL (1000 M3) : 74.6

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 7.0  
 /HEAD FIRM DISCHARGE (M3/S) : 3.5

POWER INSATLLED CAPACITY (MW) : 5.9  
 /ENERGY FIRM POWER (MW) : 2.9  
 MIN. GUARANTEED POWER (MW) : 3.9

TRANSMISSION LINE LENGTH (KM) : 32.0 TO : BONTOC  
 ACCESS ROAD LENGTH (KM) : 36.5 FROM : SALLDENG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 120.3  
 TOTAL COST/KW (USD/KW) : 20505.4  
 TOTAL COST/KWH (USD/KWH) : 4.521

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3172-11  
 TECHNICAL COMMENT :

RESERVOIR DEVELOPMENT RATIO : 0.75  
 GROSS STORAGE VOL. (MIL M3) : 131.3  
 ACTIVE STORAGE VOL. (MIL M3) : 99.4  
 DEAD STORAGE VOL. (MIL M3) : 31.9  
 SEDIMENT VOL. (MIL M3) : 6.1  
 CREST LENGTH ( M ) : 366.9  
 EMBANKMENT VOL. (MIL M3) : 5.24  
 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 DIAMETER ( M ) : 1.7 NOS. : 1  
 DIAMETER ( M ) : 8.8 NOS. : 1  
 AVERAGE NET HEAD ( M ) : 102.1  
 TAILWATER LEVEL (EL.M) : 520.0  
 ANNUAL TOTAL ENERGY (GWH) : 28.7  
 FIRM ENERGY (GWH) : 25.7  
 SECONDARY ENERGY (GWH) : 3.0

69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 POWER COST (MIL USD) : 108.6  
 TRANSMISSION COST (MIL USD) : 1.3  
 ACCESS ROAD COST (MIL USD) : 10.4

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-06-26-0-1

SCHEME : AMLUAGAN

RIVER SYSTEM : ABRA  
 STREAM : DAMANIT  
 WATER RESOURCES REGION : I  
 PROVINCE : ABRU

COORDINATES : N17-18-35 E120-43-00  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 112.0 (MAIN : 112.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 5.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 311.0 GROSS STORAGE VOL. (MIL M3) : 169.4  
 AVERAGE OPERATING LEVEL (EL.M) : 294.6 ACTIVE STORAGE VOL. (MIL M3) : 119.9  
 MINIMUM OPERATING LEVEL (EL.M) : 261.7 DEAD STORAGE VOL. (MIL M3) : 49.5  
 DRAWDOWN DEPTH ( M ) : 49.3 SEDIMENT VOL. (MIL M3) : 7.8

MAIN DAM CREST ELEVATION (EL.M) : 317.0 CREST LENGTH ( M ) : 870.0  
 (WEIR) DAM HEIGHT ( M ) : 126.0 EMBANKMENT VOL. (MIL M3) : 14.04

WATERWAY HEADRACE : LENGTH ( M ) : 620.0 DIAMETER (WIDTH) ( M ) : 2.5  
 PENSTOCK : HORIZONTAL L ( M ) : 380.0 DIAMETER ( M ) : 1.9  
 DIVERSION : LENGTH ( M ) : 1470.0 DIAMETER ( M ) : 6.7  
 EXCAVATION VOL TOTAL (1000 M3) : 107.3 NOS. : 1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 8.8 AVERAGE NET HEAD ( M ) : 99.4  
 /HEAD FIRM DISCHARGE (M3/S) : 4.4 TAILWATER LEVEL (EL.M) : 191.0

POWER INSATTLLED CAPACITY (MW) : 7.2 ANNUAL TOTAL ENERGY (GWH) : 35.9  
 /ENERGY FIRM POWER (MW) : 3.6 FIRM ENERGY (GWH) : 31.5  
 MIN. GUARANTEED POWER (MW) : 4.6 SECONDARY ENERGY (GWH) : 4.3

TRANSMISSION LINE LENGTH (KM) : 24.0 TO : SAN ESTEBAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 13.0 FROM : SAN EMILIO

CONSTRUCTION COST

TOTAL COST (MIL USD) : 226.3 POWER COST (MIL USD) : 221.5  
 TOTAL COST/KW (USD/KW) : 31423.5 TRANSMISSION COST (MIL USD) : 1.1  
 TOTAL COST/KWH (USD/KWH) : 6.892 ACCESS ROAD COST (MIL USD) : 3.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3171-IV  
 TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-06-27-0-2

SCHEME : DAMANIT

RIVER SYSTEM : ABRA  
STREAM : DAMANIT

WATER RESOURCES REGION : 1  
PROVINCE : ABRA

COORDINATES : N17-20-31 E120-49-39  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 45.0 (MAIN : 45. INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-003-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 2.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.57

PONDAGE FULL SUPPLY LEVEL (EL.M) : 706.7 PONDAGE STORAGE VOL. (1000M3) : 33.8  
AVERAGE OPERATING LEVEL (EL.M) : 706.4 ACTIVE STORAGE VOL. (1000M3) : 8.2  
MINIMUM OPERATING LEVEL (EL.M) : 706.0  
DRAWDOWN DEPTH ( M ) : 0.7

MAIN DAM CREST ELEVATION (EL.M) : 706.7 CREST LENGTH ( M ) : 45.4  
(WEIR) WEIR HEIGHT ( M ) : 5.7 WEIR CONCRETE VOL. (1000 M3) : 4.3

WATERWAY HEADRACE : LENGTH ( M ) : 4250.0 DIAMETER (WIDTH) ( M ) : 1.8  
PENSTOCK : HORIZONT. L ( M ) : 790.0 DIAMETER ( M ) : 1.3  
EXCAVATION VOL TOTAL (1000 M3) : 12.1 NOS. : 1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 2.2 AVERAGE NET HEAD ( M ) : 352.7  
/HEAD FIRM DISCHARGE (M3/S) : 0.3 TAILWATER LEVEL (EL.M) : 346.0

POWER INSATLLED CAPACITY (MW) : 6.3 ANNUAL TOTAL ENERGY (GWH) : 29.3  
/ENERGY FIRM POWER (MW) : 0.8 FIRM ENERGY (GWH) : 7.2  
MIN. GUARANTEED POWER (MW) : 0.7 SECONDARY ENERGY (GWH) : 22.1

TRANSMISSION

LINE LENGTH (KM) : 44.0 TO : SAN ESTEBAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1

ACCESS ROAD LENGTH (KM) : 30.5 FROM : LAYUAN

CONSTRUCTION COST

TOTAL COST (MIL USD) : 20.5 POWER COST (MIL USD) : 10.2  
TOTAL COST/KW (USD/KW) : 3233.6 TRANSMISSION COST (MIL USD) : 1.7  
TOTAL COST/KWH (USD/KWH) : 1.479 ACCESS ROAD COST (MIL USD) : 8.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3172-111  
TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-022-06-28-0-1

SCHEME : NAINA

RIVER SYSTEM : ABRA  
STREAM : UTIP

WATER RESOURCES REGION : I  
PROVINCE : ABRA

COORDINATES : N17-15-37 E120-43-20  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 216.0 (MAIN : 216., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
AVERAGE DISCHARGE (M3/S) : 12.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.50

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 412.2 GROSS STORAGE VOL. (MIL M3) : 272.4  
AVERAGE OPERATING LEVEL (EL.M) : 393.6 ACTIVE STORAGE VOL. (MIL M3) : 192.2  
MINIMUM OPERATING LEVEL (EL.M) : 356.5 DEAD STORAGE VOL. (MIL M3) : 80.2  
DRAWDOWN DEPTH ( M ) : 55.7 SEDIMENT VOL. (MIL M3) : 15.1

MAIN DAM CREST ELEVATION (EL.M) : 418.2 CREST LENGTH ( M ) : 907.4  
(WEIR) DAM HEIGHT ( M ) : 143.2 EMBANKMENT VOL. (MIL M3) : 17.94

WATERWAY HEADRACE : LENGTH ( M ) : 1310.0 DIAMETER (WIDTH) ( M ) : 2.7 NOS. : 1  
PENSTOCK : HORIZONT. L ( M ) : 240.0 DIAMETER ( M ) : 2.4 NOS. : 1  
DIVERSTION : LENGTH ( M ) : 1140.0 DIAMETER ( M ) : 8.1 NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 125.6

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 17.5 AVERAGE NET HEAD ( M ) : 112.1  
/HEAD FIRM DISCHARGE (M3/S) : 8.8 TAILWATER LEVEL (EL.M) : 275.0

POWER INSATLLED CAPACITY (MW) : 16.2 ANNUAL TOTAL ENERGY (GWH) : 87.0  
/ENERGY FIRM POWER (MW) : 8.1 FIRM ENERGY (GWH) : 70.8  
MIN.GUARANTEED POWER (MW) : 10.3 SECONDARY ENERGY (GWH) : 16.1

TRANSMISSION LINE LENGTH (KM) : 33.0 TO : SAN ESTEBAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 14.0 FROM : SAN EMILIO

CONSTRUCTION COST

TOTAL COST (MIL USD) : 280.4 POWER COST (MIL USD) : 275.0  
TOTAL COST/KW (USD/KW) : 17322.6 TRANSMISSION COST (MIL USD) : 1.3  
TOTAL COST/KWH (USD/KWH) : 3.704 ACCESS ROAD COST (MIL USD) : 4.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3171-1V  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-06-29-0-2

SCHEME : UTIP

WATER RESOURCES REGION : I  
 PROVINCE : ABRA  
 COORDINATES : N17-15-17 E120-49-32  
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

RIVER SYSTEM : ABRA  
 STREAM : UTIP

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 144.2 (MAIN : 144.2 INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 8.1 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.57

PONDAGE FULL SUPPLY LEVEL (EL.M) : 558.5 PONDAGE STORAGE VOL. (1000M3) : 90.9  
 AVERAGE OPERATING LEVEL (EL.M) : 557.8 ACTIVE STORAGE VOL. (1000M3) : 30.6  
 MINIMUM OPERATING LEVEL (EL.M) : 557.0  
 DRAWDOWN DEPTH ( M ) : 1.5

MAIN DAM CREST ELEVATION (EL.M) : 558.5 CREST LENGTH ( M ) : 83.6  
 WEIR HEIGHT ( M ) : 7.5 WEIR CONCRETE VOL. (1000 M3) : 10.9

WATERWAY HEADRACE : LENGTH ( M ) : 7330.0 DIAMETER (WIDTH) ( M ) : 2.3  
 PENSTOCK : HORIZONTAL L ( M ) : 540.0 DIAMETER ( M ) : 1.7  
 EXCAVATION VOL TOTAL (1000 M3) : 32.6

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 8.1 AVERAGE NET HEAD ( M ) : 170.6  
 /HEAD FIRM DISCHARGE (M3/S) : 1.1 TAILWATER LEVEL (EL.M) : 370.0

POWER INSATLLED CAPACITY (MW) : 11.4 ANNUAL TOTAL ENERGY (GWH) : 53.0  
 /ENERGY FIRM POWER (MW) : 1.5 FIRM ENERGY (GWH) : 13.1  
 MIN. GUARANTEED POWER (MW) : 1.3 SECONDARY ENERGY (GWH) : 39.9

TRANSMISSION LINE LENGTH (KM) : 45.0 TO : SAN ESTEBAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 34.0 FROM : SAN EMILIO

CONSTRUCTION COST

TOTAL COST (MIL USD) : 30.5 POWER COST (MIL USD) : 19.1  
 TOTAL COST/KW (USD/KW) : 2656.3 TRANSMISSION COST (MIL USD) : 1.7  
 TOTAL COST/KWH (USD/KWH) : 1.217 ACCESS ROAD COST (MIL USD) : 9.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3171-1  
 TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-022-07-30-0-1

SCHEME : KUMANGA

COORDINATES : N17-11-10 E120-43-24  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

WATER RESOURCES REGION :  
 PROVINCE : ABRA

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 84.2 (MAIN : 84., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575.  
 AVERAGE DISCHARGE (M3/S) : 4.8 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.60

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 436.7 GROSS STORAGE VOL. (MIL M3) : 117.3  
 AVERAGE OPERATING LEVEL (EL.M) : 420.7 ACTIVE STORAGE VOL. (MIL M3) : 89.9  
 MINIMUM OPERATING LEVEL (EL.M) : 388.7 DEAD STORAGE VOL. (MIL M3) : 27.4  
 DRAWDOWN DEPTH ( M ) : 48.0 SEDIMENT VOL. (MIL M3) : 5.9

MAIN DAM CREST ELEVATION (EL.M) : 442.7 CREST LENGTH ( M ) : 493.4  
 (WEIR) DAM HEIGHT ( M ) : 117.4 EMBANKMENT VOL. (MIL M3) : 7.02

WATERWAY HEADRACE : LENGTH ( M ) : 630.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 180.0 DIAMETER ( M ) : 1.7 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1320.0 DIAMETER ( M ) : 8.7 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 32.2

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 7.3 AVERAGE NET HEAD ( M ) : 92.7  
 /HEAD FIRM DISCHARGE (M3/S) : 3.7 TAILWATER LEVEL (EL.M) : 325.3

POWER INSATLLED CAPACITY (MW) : 5.6 ANNUAL TOTAL ENERGY (GWH) : 28.7  
 /ENERGY FIRM POWER (MW) : 2.8 FIRM ENERGY (GWH) : 24.5  
 MIN. GUARANTEED POWER (MW) : 3.5 SECONDARY ENERGY (GWH) : 4.3

TRANSMISSION LINE LENGTH (KM) : 40.0 TO : SAN ESTEBAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 10.0 FROM : MALIDEG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 130.3 POWER COST (MIL USD) : 130.3  
 TOTAL COST/KW (USD/KW) : 24111.8 TRANSMISSION COST (MIL USD) : 1.5  
 TOTAL COST/KWH (USD/KWH) : 5.231 ACCESS ROAD COST (MIL USD) : 2.9

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3171-IV  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-022-07-31-0-1

SCHEME : SUYSUYAN

RIVER SYSTEM : ABRA  
 STREAM : BALASEAN  
 WATER RESOURCES REGION : I  
 PROVINCE : ILOCOS SUR  
 COORDINATES : N17-07-30 E120-44-20  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 135.0 (MAIN) : 135.0 INTER TRANSFER TOTAL : 0.0 STREAM GAGE ID : 4-1-008-NW-106  
 AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2575  
 AVERAGE DISCHARGE (M3/S) : 7.6 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 134.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 505.0 GROSS STORAGE VOL. (MIL M3) : 237.6  
 AVERAGE OPERATING LEVEL (EL.M) : 488.8 ACTIVE STORAGE VOL. (MIL M3) : 168.1  
 MINIMUM OPERATING LEVEL (EL.M) : 456.4 DEAD STORAGE VOL. (MIL M3) : 69.5  
 DRAWDOWN DEPTH ( M ) : 48.6 SEDIMENT VOL. (MIL M3) : 9.4

MAIN DAM CREST ELEVATION (EL.M) : 511.0 CREST LENGTH ( M ) : 662.0  
 (WEIR) DAM HEIGHT ( M ) : 125.0 EMBANKMENT VOL. (MIL M3) : 10.77

WATERWAY HEADRAGE : LENGTH ( M ) : 640.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 220.0 DIAMETER ( M ) : 2.1 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1090.0 DIAMETER ( M ) : 7.1 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 89.2

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 12.3 AVERAGE NET HEAD ( M ) : 98.9  
 /HEAD FIRM DISCHARGE (M3/S) : 6.2 TAILWATER LEVEL (EL.M) : 386.0

POWER UNSATLLED CAPACITY (MW) : 10.0 ANNUAL TOTAL ENERGY (GWH) : 50.0  
 /ENERGY FIRM POWER (MW) : 5.0 FIRM ENERGY (GWH) : 44.0  
 MIN. GUARANTEED POWER (MW) : 6.4 SECONDARY ENERGY (GWH) : 6.0

TRANSMISSION LINE LENGTH (KM) : 46.0 TO : SAN ESTEBAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 13.0 FROM : MALIDEG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 182.8 POWER COST (MIL USD) : 182.8  
 TOTAL COST/KW (USD/KW) : 18737.9 TRANSMISSION COST (MIL USD) : 1.7  
 TOTAL COST/KWH (USD/KWH) : 4.110 ACCESS ROAD COST (MIL USD) : 3.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3171-111  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-037-00-01-0-1

SCHEME : DINGRAS

RIVER SYSTEM : LAOAG  
 STREAM : MADONGAN  
 WATER RESOURCES REGION : 1  
 PROVINCE : ILOCOS NORTE  
 COORDINATES : N18-00-29 E120-45-39  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S, RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 152.9 (MAIN : 153., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-003-NW-102  
 AVER. BASIN RAINFALL (MM/YR) : 2750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 534.  
 AVERAGE DISCHARGE (M3/S) : 8.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 25.3

SELECTED PLAN

TYPE OF DEVELOPMENT

RESERVOIR DEVELOPMENT RATIO : 0.46

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 216.3  
 AVERAGE OPERATING LEVEL (EL.M) : 203.8  
 MINIMUM OPERATING LEVEL (EL.M) : 178.6  
 DRAWDOWN DEPTH (M) : 37.7  
 CREST ELEVATION (EL.M) : 222.3  
 DAM HEIGHT (M) : 96.7  
 HEADRACE : LENGTH (M) : 370.0  
 PENSTOCK : HORIZONTAL L (M) : 290.0  
 DIVERSION : LENGTH (M) : 1030.0  
 EXCAVATION VOL TOTAL (1000 M3) : 89.1

GROSS STORAGE VOL. (MIL M3) : 186.6  
 ACTIVE STORAGE VOL. (MIL M3) : 121.6  
 DEAD STORAGE VOL. (MIL M3) : 65.0  
 SEDIMENT VOL. (MIL M3) : 10.7

PLANT MAX. DISCHARGE (M3/S) : 8.3  
 FIRM DISCHARGE (M3/S) : 4.2

CREST LENGTH (M) : 597.1  
 EMBANKMENT VOL. (MIL M3) : 5.82

DIAMETER (M) : 2.5  
 HORIZONTAL L (M) : 1.8  
 LENGTH (M) : 7.3

NOS. : 1  
 NOS. : 1  
 NOS. : 2

ANNUAL TOTAL ENERGY (GWH) : 35.9  
 FIRM ENERGY (GWH) : 22.5  
 MIN. GUARANTEED POWER (MW) : 3.3

AVERAGE NET HEAD (M) : 75.3  
 TAILWATER LEVEL (EL.M) : 125.6  
 ANNUAL TOTAL ENERGY (GWH) : 35.9  
 FIRM ENERGY (GWH) : 22.5  
 SECONDARY ENERGY (GWH) : 13.4

TRANSMISSION

LINE LENGTH (KM) : 16.0 TO : MARCOS 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1

ACCESS ROAD LENGTH (KM) : 5.5 FROM : SAN MEGRO

CONSTRUCTION COST

TOTAL COST (MIL USD) : 122.0  
 TOTAL COST/KW (USD/KW) : 23713.0  
 TOTAL COST/KWH (USD/KWH) : 4.595

POWER COST (MIL USD) : 119.7  
 TRANSMISSION COST (MIL USD) : 0.8  
 ACCESS ROAD COST (MIL USD) : 1.6

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3174-11  
 TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 1-039-00-01-0-1

SCHEME : VINTAR  
 RIVER SYSTEM : VINTAR  
 STREAM : VINTAR

WATER RESOURCES REGION : I  
 PROVINCE : ILOCOS NORTE

COORDINATES : N18-22-08 E120-44-32  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 121.3 (MAIN : 121.3, INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-003-NW-102  
 AVER. BASIN RAINFALL (MM/YR) : 3050. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 534.  
 AVERAGE DISCHARGE (M3/S) : 7.8 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 25.3

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.65

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 116.0 GROSS STORAGE VOL. (MIL M3) : 242.3  
 AVERAGE OPERATING LEVEL (EL.M) : 109.6 ACTIVE STORAGE VOL. (MIL M3) : 159.9  
 MINIMUM OPERATING LEVEL (EL.M) : 98.9 DEAD STORAGE VOL. (MIL M3) : 82.3  
 DRAWDOWN DEPTH ( M ) : 19.1 SEDIMENT VOL. (MIL M3) : 8.5

MAIN DAM CREST ELEVATION (EL.M) : 122.0 CREST LENGTH ( M ) : 468.0  
 (WEIR) DAM HEIGHT ( M ) : 51.8 EMBANKMENT VOL. (MIL M3) : 1.91

WATERWAY HEADRACE : LENGTH ( M ) : 300.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL ( M ) : 200.0 DIAMETER ( M ) : 1.8 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 820.0 DIAMETER ( M ) : 6.8 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 62.3

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 8.0 AVERAGE NET HEAD ( M ) : 37.7  
 /HEAD FIRM DISCHARGE (M3/S) : 4.0 TAILWATER LEVEL (EL.M) : 70.2

POWER INSATLLED CAPACITY (MW) : 2.5 ANNUAL TOTAL ENERGY (GWH) : 16.9  
 /ENERGY FIRM POWER (MW) : 1.2 FIRM ENERGY (GWH) : 10.9  
 MIN. GUARANTEED POWER (MW) : 1.6 SECONDARY ENERGY (GWH) : 6.0

TRANSMISSION LINE LENGTH (KM) : 13.0 TO : LAOAG 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 1.0 FROM : LIPAY

CONSTRUCTION COST

TOTAL COST (MIL USD) : 57.2 POWER COST (MIL USD) : 56.2  
 TOTAL COST/KW (USD/KW) : 22904.8 TRANSMISSION COST (MIL USD) : 0.7  
 TOTAL COST/KWH (USD/KWH) : 4.490 ACCESS ROAD COST (MIL USD) : 0.3

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3175-111  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-039-00-02-0-1

SCHEME : TAMDAGAN

RIVER SYSTEM : VINTAR  
 STREAM : TAMDAGAN  
 WATER RESOURCES REGION : 1  
 PROVINCE : ILOCOS NORTE  
 COORDINATES : N13-18-05 E120-47-20  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 244.0 (MAIN : 244., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-003-NW-102  
 AVER. BASIN RAINFALL (MM/YR) : 3333. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 534.  
 AVERAGE DISCHARGE (M3/S) : 17.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 25.3

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.46

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 204.0 GROSS STORAGE VOL. (MIL M3) : 383.0  
 AVERAGE OPERATING LEVEL (EL.M) : 188.5 ACTIVE STORAGE VOL. (MIL M3) : 259.4  
 MINIMUM OPERATING LEVEL (EL.M) : 157.6 DEAD STORAGE VOL. (MIL M3) : 123.5  
 DRAWDOWN DEPTH ( M ) : 46.3 SEDIMENT VOL. (MIL M3) : 17.1  
 MAIN DAM CREST ELEVATION (EL.M) : 210.0 CREST LENGTH ( M ) : 499.8  
 (WEIR) DAM HEIGHT ( M ) : 115.0 EMBANKMENT VOL. (MIL M3) : 8.79  
 WATERWAY HEADRAGE : LENGTH ( M ) : 840.0 DIAMETER (WIDTH) ( M ) : 2.7 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 140.0 DIAMETER ( M ) : 2.5 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 960.0 DIAMETER ( M ) : 8.4 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 111.2

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 17.8 AVERAGE NET HEAD ( M ) : 89.3  
 /HEAD FIRM DISCHARGE (M3/S) : 8.9 TAILWATER LEVEL (EL.M) : 95.0  
 POWER UNSATLLED CAPACITY (MW) : 13.1 ANNUAL TOTAL ENERGY (GWH) : 91.2  
 /ENERGY FIRM POWER (MW) : 6.5 FIRM ENERGY (GWH) : 57.4  
 MIN. GUARANTEED POWER (MW) : 8.2 SECONDARY ENERGY (GWH) : 33.9

TRANSMISSION LINE LENGTH (KM) : 22.0 TO : LAOAG 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 7.0 FROM : DIIPLAT

CONSTRUCTION COST

TOTAL COST (MIL USD) : 170.5 POWER COST (MIL USD) : 167.5  
 TOTAL COST/KW (USD/KW) : 13015.4 TRANSMISSION COST (MIL USD) : 1.0  
 TOTAL COST/KWH (USD/KWH) : 2.524 ACCESS ROAD COST (MIL USD) : 2.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3174-1  
 TECHNICAL COMMENT :



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**I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S**  
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SCHEME ID : 1-047-00-01-0-1  
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SCHEME : BULU-1(ILOCCOS)

WATER RESOURCES REGION : I  
 PROVINCE : ILOCCOS NORTE

COORDINATES : N18-31-08 E120-50-52  
 STUDY LEVEL : IDENTIFIED  
 IN THE PREVIOUS STUDY

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**HYDRO/TOPO. INFORMATION**  
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CATCHMENT AREA (KM2) : 166.1 (MAIN : 166.1 INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-003-RW-102  
 AVER. BASIN RAINFALL (MM/YR) : 3750. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 534.  
 AVERAGE DISCHARGE (M3/S) : 14.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 25.3

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**SELECTED PLAN**  
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TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.41

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 203.7 GROSS STORAGE VOL. (MIL M3) : 267.0  
 AVERAGE OPERATING LEVEL (EL.M) : 185.7 ACTIVE STORAGE VOL. (MIL M3) : 185.8  
 MINIMUM OPERATING LEVEL (EL.M) : 149.6 DEAD STORAGE VOL. (MIL M3) : 81.1  
 DRAWDOWN DEPTH ( M ) : 54.1 SEDIMENT VOL. (MIL M3) : 11.6

MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 209.7 ( M ) : 459.2  
 DAM HEIGHT ( M ) : 159.7 (MIL M3) : 10.69

WATERWAY HEADRACE : LENGTH ( M ) : 800.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 300.0 DIAMETER ( M ) : 2.2 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1300.0 DIAMETER ( M ) : 7.5 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 119.6

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 14.0 AVERAGE NET HEAD ( M ) : 129.9  
 /HEAD FIRM DISCHARGE (M3/S) : 7.0 TAILWATER LEVEL (EL.M) : 50.0

POWER INSALLED CAPACITY (MW) : 14.9 ANNUAL TOTAL ENERGY (GWH) : 104.9  
 /ENERGY FIRM POWER (MW) : 7.5 FIRM ENERGY (GWH) : 65.5  
 MIN. GUARANTEED POWER (MW) : 10.3 SECONDARY ENERGY (GWH) : 39.4

TRANSMISSION LINE LENGTH (KM) : 8.0 TO : BANGUI NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 2.0 FROM : ADAM

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**CONSTRUCTION COST**  
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TOTAL COST (MIL USD) : 197.4 POWER COST (MIL USD) : 156.2  
 TOTAL COST /KW (USD/KW) : 13204.4 TRANSMISSION COST (MIL USD) : 0.6  
 TOTAL COST /KWH (USD/KWH) : 2.554 ACCESS ROAD COST (MIL USD) : 0.6

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**OTHER INFORMATION**  
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LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3175-1  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 1-047-00-02-0-2

SCHEME : BULU-2(ILOCOS)

RIVER SYSTEM : BULU  
STREAM : BULU

WATER RESOURCES REGION : I  
PROVINCE : ILOCOS NORTE

COORDINATES : N18-28-48 E120-52-54  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 129.7 (MAIN : 130., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-1-003-NW-102  
AVER. BASIN RAINFALL (MM/YR) : 4000. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 534.  
AVERAGE DISCHARGE (M3/S) : 12.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 25.3

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.60

PONDAGE FULL SUPPLY LEVEL (EL.M) : 187.1 PONDAGE STORAGE VOL. (1000M3) : 311.0  
AVERAGE OPERATING LEVEL (EL.M) : 187.0 ACTIVE STORAGE VOL. (1000M3) : 14.0  
MINIMUM OPERATING LEVEL (EL.M) : 187.0  
DRAWDOWN DEPTH ( M ) : 0.1

MAIN DAM CREST ELEVATION (EL.M) : 187.1 CREST LENGTH ( M ) : 107.8  
(WEIR) WEIR HEIGHT ( M ) : 6.1 WEIR CONCRETE VOL. (1000 M3) : 10.0

WATERWAY HEADRAGE : LENGTH ( M ) : 4900.0 DIAMETER (WIDTH) ( M ) : 2.3 NOS. : 1  
PENSTOCK : HORIZONT. L ( M ) : 220.0 DIAMETER ( M ) : 1.8 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 20.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 7.8 AVERAGE NET HEAD ( M ) : 116.9  
/HEAD FIRM DISCHARGE (M3/S) : 0.5 TAILWATER LEVEL (EL.M) : 60.0

POWER INSATLLED CAPACITY (MW) : 7.5 ANNUAL TOTAL ENERGY (GWH) : 35.7  
/ENERGY FIRM POWER (MW) : 0.5 FIRM ENERGY (GWH) : 4.1  
MIN. GUARANTEED POWER (MW) : 0.4 SECONDARY ENERGY (GWH) : 31.6

TRANSMISSION LINE LENGTH (KM) : 42.0 TO : LAOAG 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 15.5 FROM : ADAM

CONSTRUCTION COST

TOTAL COST (MIL USD) : 19.3 POWER COST (MIL USD) : 13.3  
TOTAL COST/KW (USD/KW) : 2581.5 TRANSMISSION COST (MIL USD) : 1.6  
TOTAL COST/KWH (USD/KWH) : 1.421 ACCESS ROAD COST (MIL USD) : 4.4

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3175-11  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-005-00-01-0-1

SCHEME : LUNA

RIVER SYSTEM : GATTU  
STREAM : ZIVANAN

WATER RESOURCES REGION : II  
PROVINCE : KAL-APAYAO

COORDINATES : N18-26-50 E121-14-00  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 255.5 (MAIN : 256., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-005-NW-203  
AVER. BASIN RAINFALL (MM/YR) : 4000. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
AVERAGE DISCHARGE (M3/S) : 27.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.53

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 100.0 GROSS STORAGE VOL. (MIL M3) : 671.0  
AVERAGE OPERATING LEVEL (EL.M) : 88.5 ACTIVE STORAGE VOL. (MIL M3) : 458.3  
MINIMUM OPERATING LEVEL (EL.M) : 65.4 DEAD STORAGE VOL. (MIL M3) : 212.7  
DRAWDOWN DEPTH ( M ) : 34.6 SEDIMENT VOL. (MIL M3) : 17.9

MAIN DAM CREST ELEVATION (EL.M) : 106.0 CREST LENGTH ( M ) : 563.0  
(WEIR) DAM HEIGHT ( M ) : 96.0 EMBANKMENT VOL. (MIL M3) : 7.34

WATERWAY HEADRAGE : LENGTH ( M ) : 700.0 DIAMETER (WIDTH) ( M ) : 5.9 NOS. : 1  
PENSTOCK : HORIZONT. L ( M ) : 180.0 DIAMETER ( M ) : 4.6 NOS. : 1  
DIVERSION : LENGTH ( M ) : 860.0 DIAMETER ( M ) : 8.8 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 74.6

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 82.5 AVERAGE NET HEAD ( M ) : 76.2  
/HEAD FIRM DISCHARGE (M3/S) : 20.6 TAILWATER LEVEL (EL.M) : 10.0

POWER UNSATLLED CAPACITY (MW) : 51.7 ANNUAL TOTAL ENERGY (GWH) : 145.5  
/ENERGY FIRM POWER (MW) : 12.9 FIRM ENERGY (GWH) : 113.2  
MIN. GUARANTEED POWER (MW) : 34.3 SECONDARY ENERGY (GWH) : 32.2

TRANSMISSION

LINE LENGTH (KM) : 30.0 TO : BALLESTEROS 115 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 2  
ACCESS ROAD LENGTH (KM) : 13.5 FROM : PAMPLONA

CONSTRUCTION COST

TOTAL COST (MIL USD) : 172.5 POWER COST (MIL USD) : 165.3  
TOTAL COST/KW (USD/KW) : 3336.8 TRANSMISSION COST (MIL USD) : 3.4  
TOTAL COST/KWH (USD/KWH) : 1.404 ACCESS ROAD COST (MIL USD) : 3.8

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3275-111  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-005-00-02-0-1

SCHEME : ZIMIGUI

RIVER SYSTEM : GATTU  
STREAM : ZIMIGUI

WATER RESOURCES REGION : 11  
PROVINCE : KAL-APAYAO

COORDINATES : N12-24-45 E121-12-06  
STUDY LEVEL : IDENTIFIED  
IN THE PREVIOUS STUDY

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 342.7 (MAIN : 343., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-005-NW-203  
AVER. BASIN RAINFALL (MM/YR) : 4749. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
AVERAGE DISCHARGE (M3/S) : 44.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.57

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 74.0 GROSS STORAGE VOL. (MIL M3) : 1427.9  
AVERAGE OPERATING LEVEL (EL.M) : 64.3 ACTIVE STORAGE VOL. (MIL M3) : 807.4  
MINIMUM OPERATING LEVEL (EL.M) : 44.9 DEAD STORAGE VOL. (MIL M3) : 620.5  
DRAWDOWN DEPTH ( M ) : 29.1 SEDIMENT VOL. (MIL M3) : 24.0

MAIN DAM CREST ELEVATION (EL.M) : 80.0 CREST LENGTH ( M ) : 685.0  
(WEIR) DAM HEIGHT ( M ) : 74.0 EMBANKMENT VOL. (MIL M3) : 5.60

WATERWAY HEADRACE : LENGTH ( M ) : 620.0 DIAMETER (WIDTH) ( M ) : 5.4 NOS. : 2  
PENSTOCK : HORIZONT. L ( M ) : 160.0 DIAMETER ( M ) : 4.4 NOS. : 2  
DIVERSION : LENGTH ( M ) : 960.0 DIAMETER ( M ) : 6.6 NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 93.0

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 139.5 AVERAGE NET HEAD ( M ) : 56.3  
/HEAD FIRM DISCHARGE (M3/S) : 34.9 TAILWATER LEVEL (EL.M) : 6.0

POWER INSTALLED CAPACITY (MW) : 64.7 ANNUAL TOTAL ENERGY (GWH) : 177.5  
/ENERGY FIRM POWER (MW) : 16.2 FIRM ENERGY (GWH) : 141.6  
MIN. GUARANTEED POWER (MW) : 40.4 SECONDARY ENERGY (GWH) : 35.9

TRANSMISSION LINE LENGTH (KM) : 21.0 TO : BALLESTEROS 115 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 2  
ACCESS ROAD LENGTH (KM) : 10.5 FROM : PAMPLONA

CONSTRUCTION COST

TOTAL COST (MIL USD) : 171.3 POWER COST (MIL USD) : 165.6  
TOTAL COST/KW (USD/KW) : 2648.1 TRANSMISSION COST (MIL USD) : 2.6  
TOTAL COST/KWH (USD/KWH) : 1.124 ACCESS ROAD COST (MIL USD) : 3.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3275-11  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-006-00-01-0-1  
 SCHEME : SISIRITAN  
 RIVER SYSTEM : ABULOG  
 STREAM : ABULOG  
 WATER RESOURCES REGION : II  
 PROVINCE : KAL-APAYAO  
 COORDINATES : N18-09-42 E121-21-00  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION  
 CATCHMENT AREA (KM2) : 1870.0 (MAIN : 1870.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-005-NW-203  
 AVER. BASIN RAINFALL (MM/YR) : 4004. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
 AVERAGE DISCHARGE (M3/S) : 200.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN  
 TYPE OF DEVELOPMENT : RESERVOIR  
 RESERVOIR DEVELOPMENT RATIO : 0.30

RESERVOIR  
 FULL SUPPLY LEVEL (EL.M) : 100.0 GROSS STORAGE VOL. (MIL M3) : 3443.0  
 AVERAGE OPERATING LEVEL (EL.M) : 88.4 ACTIVE STORAGE VOL. (MIL M3) : 1900.8  
 MINIMUM OPERATING LEVEL (EL.M) : 65.2 DEAD STORAGE VOL. (MIL M3) : 1542.2  
 DRAWDOWN DEPTH ( M ) : 34.8 SEDIMENT VOL. (MIL M3) : 130.9  
 CREST ELEVATION (EL.M) : 106.0 CREST LENGTH ( M ) : 890.5  
 DAM HEIGHT ( M ) : 96.0 EMBANKMENT VOL. (MIL M3) : 11.45  
 WATERWAY  
 HEADRACE : LENGTH ( M ) : 620.0 DIAMETER (WIDTH) ( M ) : 6.4  
 PENSTOCK : HORIZONT. L ( M ) : 250.0 DIAMETER ( M ) : 4.9  
 DIVERSION : LENGTH ( M ) : 970.0 DIAMETER ( M ) : 7.8  
 EXCAVATION VOL TOTAL (1000 M3) : 311.0 NOS. : 7

DISCHARGE  
 PLANT MAX. DISCHARGE (M3/S) : 668.6 AVERAGE NET HEAD ( M ) : 76.0  
 FIRM DISCHARGE (M3/S) : 111.4 TAILWATER LEVEL (EL.M) : 10.0  
 POWER  
 INSTALLED CAPACITY (MW) : 418.3 ANNUAL TOTAL ENERGY (GWH) : 1081.6  
 FIRM POWER (MW) : 69.7 FIRM ENERGY (GWH) : 610.7  
 MIN. GUARANTEED POWER (MW) : 276.9 SECONDARY ENERGY (GWH) : 471.0

TRANSMISSION  
 LINE LENGTH (KM) : 44.4 TO : CAMALANIUGAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 0. FROM : NATIONAL ROAD BESIDE DAMSITE

CONSTRUCTION COST  
 TOTAL COST (MIL USD) : 536.8 POWER COST (MIL USD) : 522.9  
 TOTAL COST/KW (USD/KW) : 1283.4 TRANSMISSION COST (MIL USD) : 13.9  
 TOTAL COST/KWH (USD/KWH) : 0.714 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION  
 LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : PROVINCIAL ROAD 8.0 KMS.  
 MAP USED (1:50,000 SCALE) : 3274-11 1977  
 TECHNICAL COMMENT : - PERMEABLE LIMESTONE FORMATION AT THE RIGHT ABUTMENT SUSCEPTIBLE TO LEAKAGE IN THE RESERVOIR

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-006-00-02-0-1

SCHEME : GUBULAYAN

RIVER SYSTEM : ABULOG  
 STREAM : ABULOG  
 WATER RESOURCES REGION : 11  
 PROVINCE : KAL-APAYAO  
 COORDINATES : N18-06-18 E121-18-18  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 1609.7 (MAIN : 1610., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-005-NW-203  
 AVER. BASIN RAINFALL (MM/YR) : 3975. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
 AVERAGE DISCHARGE (M3/S) : 171.5 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.80

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 206.0 GROSS STORAGE VOL. (MIL M3) : 5408.8  
 AVERAGE OPERATING LEVEL (EL.M) : 182.3 ACTIVE STORAGE VOL. (MIL M3) : 4325.8  
 MINIMUM OPERATING LEVEL (EL.M) : 134.8 DEAD STORAGE VOL. (MIL M3) : 1083.0  
 DRAWDOWN DEPTH ( M ) : 71.2 SEDIMENT VOL. (MIL M3) : 112.7

MAIN DAM CREST ELEVATION (EL.M) : 212.0 CREST LENGTH ( M ) : 912.0  
 (WEIR) DAM HEIGHT ( M ) : 190.0 EMBANKMENT VOL. (MIL M3) : 27.41

WATERWAY HEADRAGE : LENGTH ( M ) : 990.0 DIAMETER (WIDTH) ( M ) : 6.2 NOS. : 5  
 PENSTOCK : HORIZONT. L ( M ) : 370.0 DIAMETER ( M ) : 4.6 NOS. : 5  
 DIVERSION : LENGTH ( M ) : 1390.0 DIAMETER ( M ) : 7.5 NOS. : 3  
 EXCAVATION VOL TOTAL (1000 M3) : 368.0

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 450.2 AVERAGE NET HEAD ( M ) : 155.7  
 /HEAD FIRM DISCHARGE (M3/S) : 150.1 TAILWATER LEVEL (EL.M) : 22.0

POWER INSATLLED CAPACITY (MW) : 577.1 ANNUAL TOTAL ENERGY (GWH) : 1869.6  
 /ENERGY FIRM POWER (MW) : 192.4 FIRM ENERGY (GWH) : 1685.0  
 MIN.GUARANTEED POWER (MW) : 302.1 SECONDARY ENERGY (GWH) : 184.6

TRANSMISSION LINE LENGTH (KM) : 56.0 TO : CAMALANIUGAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 2.0 FROM : ARIPIP

CONSTRUCTION COST

TOTAL COST (MIL USD) : 742.9 POWER COST (MIL USD) : 707.8  
 TOTAL COST/KW (USD/KW) : 1287.3 TRANSMISSION COST (MIL USD) : 34.5  
 TOTAL COST/KWH (USD/KWH) : 0.427 ACCESS ROAD COST (MIL USD) : 0.6

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : NONE  
 MAP USED (1:50,000 SCALE) : 3274-11 1977  
 TECHNICAL COMMENT : - Limestone formation with probable cracks and caves  
 - SITE GEOLOGY AFFECTED BY FAULTS  
 - NOT PROCEEDED TO 2ND SCREENING DUE TO GEOLOGIC ASPECTS

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 2-006-00-03-0-1  
 SCHEME : BULU  
 RIVER SYSTEM : ABULOG  
 STREAM : ABULOG  
 WATER RESOURCES REGION : II  
 PROVINCE : KAL-APAYAO  
 COORDINATES : N18-02-30 E121-13-00  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S-RECONNAISSANCE)

HYDRO/TOPO. INFORMATION  
 CATCHMENT AREA (KM2) : 1540.0 (MAIN : 1540.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-005-NW-203  
 AVER. BASIN RAINFALL (MM/YR) : 4020. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
 AVERAGE DISCHARGE (M3/S) : 166.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.70  
 RESERVOIR FULL SUPPLY LEVEL (EL.M) : 218.0 GROSS STORAGE VOL. (MIL M3) : 5227.8  
 AVERAGE OPERATING LEVEL (EL.M) : 199.2 ACTIVE STORAGE VOL. (MIL M3) : 3669.7  
 MINIMUM OPERATING LEVEL (EL.M) : 161.5 DEAD STORAGE VOL. (MIL M3) : 1558.1  
 DRAWDOWN DEPTH ( M ) : 56.5 SEDIMENT VOL. (MIL M3) : 107.8  
 MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 224.0 CREST LENGTH ( M ) : 624.0  
 DAM HEIGHT ( M ) : 145.7 EMBANKMENT VOL. (MIL M3) : 15.91  
 WATERWAY HEADRACE : LENGTH ( M ) : 600.0 DIAMETER (WIDTH) ( M ) : 6.0 NOS. : 5  
 PENSTOCK : HORIZONTAL L ( M ) : 170.0 DIAMETER ( M ) : 4.5 NOS. : 5  
 DIVERSION : LENGTH ( M ) : 1170.0 DIAMETER ( M ) : 7.5 NOS. : 3  
 EXCAVATION VOL TOTAL (1000 M3) : 253.1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 419.5 AVERAGE NET HEAD ( M ) : 118.1  
 /HEAD FIRM DISCHARGE (M3/S) : 139.8 TAILWATER LEVEL (EL.M) : 78.3  
 POWER UNSATLLED CAPACITY (MW) : 408.0 ANNUAL TOTAL ENERGY (GWH) : 1365.1  
 /ENERGY FIRM POWER (MW) : 136.0 FIRM ENERGY (GWH) : 1191.2  
 MIN. GUARANTEED POWER (MW) : 264.7 SECONDARY ENERGY (GWH) : 174.0

TRANSMISSION LINE LENGTH (KM) : 65.5 TO : CAMALANIUGAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 4.0 FROM : KABUGAO

CONSTRUCTION COST  
 TOTAL COST (MIL USD) : 517.7 POWER COST (MIL USD) : 496.6  
 TOTAL COST/KW (USD/KW) : 1268.8 TRANSMISSION COST (MIL USD) : 19.9  
 TOTAL COST/KWH (USD/KWH) : 0.416 ACCESS ROAD COST (MIL USD) : 1.1

OTHER INFORMATION  
 LAND USE IN RESERVOIR AREA : MIXED - DENSE POPULATION  
 SUBMERGED ROAD : PROVINCIAL ROAD 10.0 KMS  
 MAP USED (1:50,000 SCALE) : 3274-111 1975  
 TECHNICAL COMMENT : - SITE GEOLOGY AFFECTED BY FAULTS

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-006-01-04-0-1

SCHEME : MABABARAYAN

RIVER SYSTEM : ABULOG  
STREAM : APAYAO

WATER RESOURCES REGION : 11  
PROVINCE : KAL-APAYAO

COORDINATES : N18-02-00 E121-08-00  
STUDY LEVEL : UNSCALED  
(PRE-F/S-RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 1007.0 (MAIN : 1007.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-005-NW-203  
AVER. BASIN RAINFALL (MM/YR) : 4081. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
AVERAGE DISCHARGE (M3/S) : 110.6 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.45

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 240.0 GROSS STORAGE VOL. (MIL M3) : 2250.6  
AVERAGE OPERATING LEVEL (EL.M) : 222.3 ACTIVE STORAGE VOL. (MIL M3) : 1570.2  
MINIMUM OPERATING LEVEL (EL.M) : 188.8 DEAD STORAGE VOL. (MIL M3) : 680.4  
DRAWDOWN DEPTH ( M ) : 53.2 SEDIMENT VOL. (MIL M3) : 70.5  
MAIN DAM CREST ELEVATION (EL.M) : 246.0 CREST LENGTH ( M ) : 704.0  
(WEIR) DAM HEIGHT ( M ) : 145.0 EMBANKMENT VOL. (MIL M3) : 16.82  
WATERWAY HEADRACK : LENGTH ( M ) : 760.0 DIAMETER (WIDTH) ( M ) : 5.7 NOS. : 4  
PENSTOCK : HORIZONT. L ( M ) : 120.0 DIAMETER ( M ) : 4.4 NOS. : 4  
DIVERSION : LENGTH ( M ) : 1000.0 DIAMETER ( M ) : 8.3 NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 197.1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 311.4 AVERAGE NET HEAD ( M ) : 118.6  
/HEAD FIRM DISCHARGE (M3/S) : 77.9 TAILWATER LEVEL (EL.M) : 101.0  
POWER INSTALLED CAPACITY (MW) : 304.0 ANNUAL TOTAL ENERGY (GWH) : 907.3  
/ENERGY FIRM POWER (MW) : 76.0 FIRM ENERGY (GWH) : 665.7  
MIN. GUARANTEED POWER (MW) : 202.9 SECONDARY ENERGY (GWH) : 241.6

TRANSMISSION

LINE LENGTH (KM) : 75.0 TO : CAMALANIUGAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 6.0 FROM : KABUGAO

CONSTRUCTION COST

TOTAL COST (MIL USD) : 456.3 POWER COST (MIL USD) : 432.0  
TOTAL COST/KW (USD/KW) : 1501.3 TRANSMISSION COST (MIL USD) : 22.6  
TOTAL COST/KWH (USD/KWH) : 0.618 ACCESS ROAD COST (MIL USD) : 1.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : MIXED - SCARCE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3274-111 1977  
TECHNICAL COMMENT : - TOPOGRAPHIC LIMIT +/- 250.0 M.  
- FAULT FRACTURED ZONE IN THE RESERVOIR AREA



I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME : DIBAGAT  
 RIVER SYSTEM : ABULOG  
 STREAM : APAYAO  
 WATER RESOURCES REGION : II  
 PROVINCE : KAL-APAYAO  
 COORDINATES : N18-05-20 E121-07-17  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S, RECONNAISSANCE)

SCHEME ID : 2-006-01-05-0-1

HYDRO/TOPO. INFORMATION  
 CATCHMENT AREA (KM2) : 798.9 (MAIN : 799.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-005-NW-203  
 AVER. BASIN RAINFALL (MM/YR) : 4135.0 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
 AVERAGE DISCHARGE (M3/S) : 89.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.80

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 341.0 GROSS STORAGE VOL. (MIL M3) : 2857.7  
 AVERAGE OPERATING LEVEL (EL.M) : 314.6 ACTIVE STORAGE VOL. (MIL M3) : 2249.2  
 MINIMUM OPERATING LEVEL (EL.M) : 261.8 DEAD STORAGE VOL. (MIL M3) : 608.5  
 DRAWDOWN DEPTH ( M ) : 79.2 SEDIMENT VOL. (MIL M3) : 55.9  
 MAIN DAM CREST ELEVATION (EL.M) : 347.0 CREST LENGTH ( M ) : 572.1  
 (WEIR) DAM HEIGHT ( M ) : 192.0 EMBANKMENT VOL. (MIL M3) : 18.60  
 WATERWAY HEADRACE : LENGTH ( M ) : 700.0 DIAMETER (WIDTH) ( M ) : 5.8 NOS. : 3  
 PENSTOCK : HORIZONTAL ( M ) : 140.0 DIAMETER ( M ) : 4.3 NOS. : 3  
 DIVERSION : LENGTH ( M ) : 1030.0 DIAMETER ( M ) : 7.9 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 164.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 234.4 AVERAGE NET HEAD ( M ) : 156.4  
 /HEAD FIRM DISCHARGE (M3/S) : 78.1 TAILWATER LEVEL (EL.M) : 155.0  
 POWER INSTALLED CAPACITY (MW) : 301.7 ANNUAL TOTAL ENERGY (GWH) : 977.7  
 /ENERGY FIRM POWER (MW) : 100.6 FIRM ENERGY (GWH) : 880.9  
 MIN. GUARANTEED POWER (MW) : 190.3 SECONDARY ENERGY (GWH) : 96.8

TRANSMISSION LINE LENGTH (KM) : 75.6 TO : CAMALANIUGAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 3.6 FROM : NEAREST NATIONAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 451.8 POWER COST (MIL USD) : 428.0  
 TOTAL COST/KW (USD/KW) : 1497.5 TRANSMISSION COST (MIL USD) : 22.8  
 TOTAL COST/KWH (USD/KWH) : 0.497 ACCESS ROAD COST (MIL USD) : 1.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : NONE  
 MAP USED (1:50,000 SCALE) : 3274-111 1977  
 TECHNICAL COMMENT : - NONE

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-005-01-06-0-1

SCHEME : AGBULU

RIVER SYSTEM : ABULOG  
 STREAM : APAYAO  
 WATER RESOURCES REGION : II  
 PROVINCE : KAL-APAYAO  
 COORDINATES : N18-08-20 E121-05-00  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S, RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 706.0 (MAIN) : 706.0 INTER TRANSFER TOTAL : 0.0 STREAM GAGE ID : 4-2-005-NW-203  
 AVER. BASIN RAINFALL (MM/YR) : 3977.0 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
 AVERAGE DISCHARGE (M3/S) : 75.2 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.75

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 346.0 GROSS STORAGE VOL. (MIL M3) : 2370.0  
 AVERAGE OPERATING LEVEL (EL.M) : 323.4 ACTIVE STORAGE VOL. (MIL M3) : 1779.7  
 MINIMUM OPERATING LEVEL (EL.M) : 278.1 DEAD STORAGE VOL. (MIL M3) : 590.3  
 DRAWDOWN DEPTH (M) : 67.9 SEDIMENT VOL. (MIL M3) : 49.4

MAIN DAM CREST ELEVATION (EL.M) : 352.0 CREST LENGTH (M) : 380.0  
 (WEIR) DAM HEIGHT (M) : 167.0 EMBANKMENT VOL. (MIL M3) : 10.09

WATERWAY HEADRACE : LENGTH (M) : 780.0 DIAMETER (WIDTH) (M) : 6.4 NOS. : 2  
 PENSTOCK : HORIZONT. L (M) : 120.0 DIAMETER (M) : 4.8 NOS. : 2  
 DIVERSION : LENGTH (M) : 1120.0 DIAMETER (M) : 7.7 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 160.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 193.9 AVERAGE NET HEAD (M) : 135.6  
 /HEAD FIRM DISCHARGE (M3/S) : 64.6 TAILWATER LEVEL (EL.M) : 185.0

POWER INSATLLED CAPACITY (MW) : 216.4 ANNUAL TOTAL ENERGY (GWH) : 712.5  
 FIRM POWER (MW) : 72.1 FIRM ENERGY (GWH) : 631.8  
 MIN. GUARANTEED POWER (MW) : 137.3 SECONDARY ENERGY (GWH) : 80.8

TRANSMISSION LINE LENGTH (KM) : 78.6 TO : CAMALANIGUAN 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 6.5 FROM : NEAREST NATIONAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 315.5 POWER COST (MIL USD) : 301.1  
 TOTAL COST/KW (USD/KW) : 1458.2 TRANSMISSION COST (MIL USD) : 12.5  
 TOTAL COST/KWH (USD/KWH) : 0.481 ACCESS ROAD COST (MIL USD) : 1.9

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : NONE  
 MAP USED (1:50,000 SCALE) : 3274-111 1977  
 TECHNICAL COMMENT : - THIN RIDGE ON LEFT ABUTMENT OF DAM (ABOVE EL. 360.0 M)  
 - ASSUMED FAULTS AT THE RIGHT BANK

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME : AOAN  
 RIVER SYSTEM : ABULOG  
 STREAM : APAYAO  
 WATER RESOURCES REGION : II  
 PROVINCE : KAL-APAYAO  
 SCHEME ID : 2-006-01-07-0-1  
 COORDINATES : N18-15-30 E120-00-20  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 245.7 (MAIN : 246., INTER TRANSFER TOTAL : 0.)  
 AVER. BASIN RAINFALL (MM/YR) : 4063. (MM/YR) : 1.4  
 AVERAGE DISCHARGE (M3/S) : 26.9 (MM/DAY) : 3.5  
 (PRE-F/S.RECONNAISSANCE)  
 STREAM GAGE ID : 4-2-005-NW-203  
 GAGE CATCHMENT (KM2) : 2066.  
 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT

RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 520.0  
 AVERAGE OPERATING LEVEL (EL.M) : 500.7  
 MINIMUM OPERATING LEVEL (EL.M) : 462.0  
 DRAWDOWN DEPTH ( M ) : 58.0  
 GROSS STORAGE VOL. (MIL M3) : 847.0  
 ACTIVE STORAGE VOL. (MIL M3) : 592.9  
 DEAD STORAGE VOL. (MIL M3) : 254.1  
 SEDIMENT VOL. (MIL M3) : 17.2

MAIN DAM (WEIR) CREST ELEVATION (EL.M) : 526.0  
 DAM HEIGHT ( M ) : 206.0  
 EMBANKMENT VOL. (MIL M3) : 27.57

WATERWAY HEADRACE : LENGTH ( M ) : 1060.0  
 PENSTOCK : HORIZONT. L ( M ) : 180.0  
 DIVERSION : LENGTH ( M ) : 1380.0  
 EXCAVATION VOL TOTAL (1000 M3) : 137.2  
 DIAMETER (WIDTH) ( M ) : 5.4  
 DIAMETER ( M ) : 4.1  
 DIAMETER ( M ) : 8.7  
 NOS. : 2  
 NOS. : 2  
 NOS. : 1

DISCHARGE /HEAD PLANT MAX. DISCHARGE (M3/S) : 135.6  
 FIRM DISCHARGE (M3/S) : 22.6  
 AVERAGE NET HEAD (EL.M) : 176.3  
 TAILWATER LEVEL (EL.M) : 320.0

POWER /ENERGY INSATLLED CAPACITY (MW) : 196.8  
 FIRM POWER (MW) : 32.8  
 MIN. GUARANTEED POWER (MW) : 146.3  
 ANNUAL TOTAL ENERGY (GWH) : 337.4  
 FIRM ENERGY (GWH) : 287.4  
 SECONDARY ENERGY (GWH) : 50.0

TRANSMISSION

LINE LENGTH (KM) : 49.0 TO : LADAG 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 18.0 FROM : DALIGAN

CONSTRUCTION COST

TOTAL COST (MIL USD) : 469.9  
 TOTAL COST/KW (USD/KW) : 2356.8  
 TOTAL COST/KWH (USD/KWH) : 1.534  
 POWER COST (MIL USD) : 450.5  
 TRANSMISSION COST (MIL USD) : 8.3  
 ACCESS ROAD COST (MIL USD) : 5.1

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3274-IV  
 TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 2-006-01-08-0-2

SCHEME : APAYAO

WATER RESOURCES REGION : II  
 PROVINCE : KALINGA APAYAO

COORDINATES : N16-19-18 E120-58-53  
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

RIVER SYSTEM : ABULOG  
 STREAM : APAYAO

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 148.9 (MAIN ; 149.7, INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-005-NW-203  
 AVER. BASIN RAINFALL (MM/YR) : 3533. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
 AVERAGE DISCHARGE (M3/S) : 14.0 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.68

PONDAGE FULL SUPPLY LEVEL (EL.M) : 455.1 PONDAGE STORAGE VOL. (1000M3) : 126.9  
 AVERAGE OPERATING LEVEL (EL.M) : 454.4 ACTIVE STORAGE VOL. (1000M3) : 35.7  
 MINIMUM OPERATING LEVEL (EL.M) : 453.6  
 DRAWDOWN DEPTH ( M ) : 1.4

MAIN DAM CREST ELEVATION (EL.M) : 455.1 CREST LENGTH ( M ) : 63.4  
 WEIR HEIGHT ( M ) : 8.1 WEIR CONCRETE VOL. (1000 M3) : 9.4

WATERWAY HEADRACE : LENGTH ( M ) : 8120.0 DIAMETER (WIDTH) ( M ) : 2.9 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 175.0 DIAMETER ( M ) : 2.2 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 55.2

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 14.0 AVERAGE NET HEAD ( M ) : 135.8  
 /HEAD FIRM DISCHARGE (M3/S) : 1.2 TAILWATER LEVEL (EL.M) : 305.0

POWER UNSATTL'D CAPACITY (MW) : 15.7 ANNUAL TOTAL ENERGY (GWH) : 85.3  
 /ENERGY FIRM POWER (MW) : 1.4 FIRM ENERGY (GWH) : 12.1  
 MIN. GUARANTEED POWER (MW) : 1.2 SECONDARY ENERGY (GWH) : 73.1

TRANSMISSION LINE LENGTH (KM) : 39.4 TO : PIDDIG 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 32.4 FROM : NEAREST NATIONAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 36.5 POWER COST (MIL USD) : 25.7  
 TOTAL COST/KW (USD/KW) : 2330.1 TRANSMISSION COST (MIL USD) : 1.5  
 TOTAL COST/KWH (USD/KWH) : 1.071 ACCESS ROAD COST (MIL USD) : 9.2

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : NONE  
 MAP USED (1:50,000 SCALE) : 3174-1 1977  
 TECHNICAL COMMENT : - NONE

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**I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S**  
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SCHEME ID : 2-008-01-01-0-1  
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 COORDINATES : N17-59-45 E121-27-25  
 STUDY LEVEL : UNSCALED  
 <PRE-F/S.RECONNAISSANCE>

SCHEME : ZINUNDUNGAN

RIVER SYSTEM : CAGAYAN  
 STREAM : ZINUNDUNGAN  
 WATER RESOURCES REGION : 11  
 PROVINCE : CAGAYAN

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 149.7 (MAIN : 150., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-005-NW-203  
 AVER. BASIN RAINFALL (MM/YR) : 2698. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 2066.  
 AVERAGE DISCHARGE (M3/S) : 9.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 227.2

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.65

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 89.0 GROSS STORAGE VOL. (MIL M3) : 292.2  
 AVERAGE OPERATING LEVEL (EL.M) : 81.7 ACTIVE STORAGE VOL. (MIL M3) : 202.6  
 MINIMUM OPERATING LEVEL (EL.M) : 67.0 DEAD STORAGE VOL. (MIL M3) : 89.6  
 DRAWDOWN DEPTH ( M ) : 22.0 SEDIMENT VOL. (MIL M3) : 10.5

MAIN DAM CREST ELEVATION (EL.M) : 95.0 CREST LENGTH ( M ) : 262.5  
 (WEIR) DAM HEIGHT ( M ) : 60.0 EMBANKMENT VOL. (MIL M3) : 1.14

WATERWAY HEADRAGE : LENGTH ( M ) : 660.0 DIAMETER (WIDTH) ( M ) : 2.6 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 200.0 DIAMETER ( M ) : 2.4 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1010.0 DIAMETER ( M ) : 7.8 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 53.1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 15.8 AVERAGE NET HEAD ( M ) : 43.1  
 /HEAD FIRM DISCHARGE (M3/S) : 7.9 TAILWATER LEVEL (EL.M) : 35.0

POWER INSATLLED CAPACITY (MW) : 5.6 ANNUAL TOTAL ENERGY (GWH) : 28.2  
 /ENERGY FIRM POWER (MW) : 2.8 FIRM ENERGY (GWH) : 24.6  
 MIN. GUARANTEED POWER (MW) : 3.5 SECONDARY ENERGY (GWH) : 3.6

TRANSMISSION LINE LENGTH (KM) : 47.0 TO : CAMALANIUGAN 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 3.5 FROM : TULONG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 50.4 POWER COST (MIL USD) : 47.7  
 TOTAL COST/KW (USD/KW) : 9000.6 TRANSMISSION COST (MIL USD) : 1.7  
 TOTAL COST/KWH (USD/KWH) : 1.968 ACCESS ROAD COST (MIL USD) : 1.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3273-1  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-008-02-02-0-1

SCHEME : CAPI SAYAN

RIVER SYSTEM : CAGAYAN  
STREAM : DUMKON

WATER RESOURCES REGION : II  
PROVINCE : CAGAYAN

COORDINATES : N18-03-06 E121-51-15  
STUDY LEVEL : UNSCALED  
(PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 188.5 (MAIN : 189. - INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-020-NW-225  
AVER. BASIN RAINFALL (MM/YR) : 2216. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 655.  
AVERAGE DISCHARGE (M3/S) : 8.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 51.5

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.45

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 100.0 GROSS STORAGE VOL. (MIL M3) : 152.6  
AVERAGE OPERATING LEVEL (EL.M) : 93.6 ACTIVE STORAGE VOL. (MIL M3) : 126.6  
MINIMUM OPERATING LEVEL (EL.M) : 80.8 DEAD STORAGE VOL. (MIL M3) : 26.0  
DRAWDOWN DEPTH ( M ) : 19.2 SEDIMENT VOL. (MIL M3) : 13.2

MAIN DAM CREST ELEVATION (EL.M) : 106.0 CREST LENGTH ( M ) : 688.7  
(WEIR) DAM HEIGHT ( M ) : 52.0 ENBANKMENT VOL. (MIL M3) : 2.06

WATERWAY HEADRACE : LENGTH ( M ) : 410.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
PENSTOCK : HORIZONTAL L ( M ) : 160.0 DIAMETER ( M ) : 2.1 NOS. : 1  
DIVERSION : LENGTH ( M ) : 780.0 DIAMETER ( M ) : 3.2 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 44.1

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 10.7 AVERAGE NET HEAD ( M ) : 37.7  
/HEAD FIRM DISCHARGE (M3/S) : 5.3 TAILWATER LEVEL (EL.M) : 54.0

POWER UNSATLLED CAPACITY (MW) : 3.3 ANNUAL TOTAL ENERGY (GWH) : 20.2  
/ENERGY FIRM POWER (MW) : 1.7 FIRM ENERGY (GWH) : 14.5  
MIN.GUARANTEED POWER (MW) : 2.1 SECONDARY ENERGY (GWH) : 5.7

TRANSMISSION LINE LENGTH (KM) : 32.0 TO : CAMALANJUGAN NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 13.0 FROM : CUMAG

CONSTRUCTION COST

TOTAL COST (MIL USD) : 55.6  
TOTAL COST/KW (USD/KW) : 18298.7  
TOTAL COST/KWH (USD/KWH) : 3.735

POWER COST (MIL USD) : 55.6  
TRANSMISSION COST (MIL USD) : 1.3  
ACCESS ROAD COST (MIL USD) : 3.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3374-11  
TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 2-008-03-03-0-1

SCHEME : BASAO

RIVER SYSTEM : CAGAYAN  
STREAM : CHICO

WATER RESOURCES REGION : II  
PROVINCE : KAL-APAYAO

COORDINATES : N17-14-32 E121-07-30  
STUDY LEVEL : UNSCALED  
(PRE-F/S, RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 897.0 (MAIN : 897.0, INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 334.4 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 55.9 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.70

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 768.0 GROSS STORAGE VOL. (MIL M3) : 1769.1  
AVERAGE OPERATING LEVEL (EL.M) : 740.4 ACTIVE STORAGE VOL. (MIL M3) : 1234.2  
MINIMUM OPERATING LEVEL (EL.M) : 685.2 DEAD STORAGE VOL. (MIL M3) : 534.9  
DRAWDOWN DEPTH ( M ) : 82.8 SEDIMENT VOL. (MIL M3) : 62.8

MAIN DAM CREST ELEVATION (EL.M) : 774.0 CREST LENGTH ( M ) : 1146.6  
(WEIR) DAM HEIGHT ( M ) : 264.0 EMBANKMENT VOL. (MIL M3) : 57.80

WATERWAY HEADRACE : LENGTH ( M ) : 1210.0 DIAMETER (WIDTH) ( M ) : 6.3 NOS. : 3  
PENSTOCK : HORIZONTAL ( M ) : 420.0 DIAMETER ( M ) : 4.5 NOS. : 3  
DIVERSION : LENGTH ( M ) : 1850.0 DIAMETER ( M ) : 8.1 NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 329.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 283.2 AVERAGE NET HEAD ( M ) : 224.1  
/HEAD FIRM DISCHARGE (M3/S) : 47.2 TAILWATER LEVEL (EL.M) : 510.0

POWER INSATLLED CAPACITY (MW) : 522.4 ANNUAL TOTAL ENERGY (GWH) : 894.6  
/ENERGY FIRM POWER (MW) : 87.1 FIRM ENERGY (GWH) : 762.7  
MIN. GUARANTEED POWER (MW) : 375.0 SECONDARY ENERGY (GWH) : 131.9

TRANSMISSION LINE LENGTH (KM) : 9.0 TO : BATONG BUHAY 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 2.5 FROM : LUPLUPA

CONSTRUCTION COST

TOTAL COST (MIL USD) : 909.5 POWER COST (MIL USD) : 902.2  
TOTAL COST/KW (USD/KW) : 1741.0 TRANSMISSION COST (MIL USD) : 6.6  
TOTAL COST/KWH (USD/KWH) : 1.134 ACCESS ROAD COST (MIL USD) : 0.7

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3271-11  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-008-03-04-0-2

SCHEME : CHICO-1R

RIVER SYSTEM : CAGAYAN  
STREAM : CHICO

WATER RESOURCES REGION : 11  
PROVINCE : MT. PROVINCE

COORDINATES : N17-11-10 E121-03-53  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 806.8 (MAIN : 807., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 3372. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 51.0 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OFF-RIVER OUTPUT FACTOR : 0.65

PONDAGE FULL SUPPLY LEVEL (EL.M) : 624.2 PONDAGE STORAGE VOL. (1000M3) : 510.2  
AVERAGE OPERATING LEVEL (EL.M) : 623.6 ACTIVE STORAGE VOL. (1000M3) : 178.4  
MINIMUM OPERATING LEVEL (EL.M) : 623.0  
DRAWDOWN DEPTH (M) : 1.2

MAIN DAM CREST ELEVATION (EL.M) : 624.2 CREST LENGTH (M) : 119.8  
(WEIR) WEIR HEIGHT (M) : 10.2 WEIR CONCRETE VOL. (1000 M3) : 24.2

WATERWAY HEADRACE : LENGTH (M) : 2950.0 DIAMETER (WIDTH) (M) : 4.7 NOS. : 1  
PENSTOCK : HORIZONTAL (M) : 135.0 DIAMETER (M) : 3.8 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 53.7

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 50.9 AVERAGE NET HEAD (M) : 63.4  
/HEAD FIRM DISCHARGE (M3/S) : 6.2 TAILWATER LEVEL (EL.M) : 555.0

POWER INSTALLED CAPACITY (MW) : 26.6 ANNUAL TOTAL ENERGY (GWH) : 140.2  
FIRM POWER (MW) : 3.2 FIRM ENERGY (GWH) : 28.3  
MIN. GUARANTEED POWER (MW) : 2.9 SECONDARY ENERGY (GWH) : 111.9

TRANSMISSION LINE LENGTH (KM) : 20.5 TO : SATONG BUHAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 0. FROM : NATIONAL ROAD BESIDE DAMSITE

CONSTRUCTION COST

TOTAL COST (MIL USD) : 35.0 POWER COST (MIL USD) : 35.0  
TOTAL COST/KW (USD/KW) : 1353.1 TRANSMISSION COST (MIL USD) : 1.0  
TOTAL COST/KWH (USD/KWH) : 0.581 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3271-IV 1979  
TECHNICAL COMMENT : - NONE



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-008-03-05-0-1  
 COORDINATES : N17-08-53 E121-03-08  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S.RECONNAISSANCE)

SCHEME : SADANGA

RIVER SYSTEM : CAGAYAN  
 STREAM : CHICO

WATER RESOURCES REGION : 11  
 PROVINCE : MT. PROVINCE

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 725.0 CHAIN : 725.0 INTER TRANSFER TOTAL : 0.0 STREAM GAGE ID : 4-2-063-NP-  
 AVER. BASIN RAINFALL (MM/YR) : 3413. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
 AVERAGE DISCHARGE (M3/S) : 46.8 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.65

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 890.0 GROSS STORAGE VOL. (MIL M3) : 1471.7  
 AVERAGE OPERATING LEVEL (EL.M) : 866.7 ACTIVE STORAGE VOL. (MIL M3) : 958.8  
 MINIMUM OPERATING LEVEL (EL.M) : 820.2 DEAD STORAGE VOL. (MIL M3) : 512.9  
 DRAWDOWN DEPTH ( M ) : 69.8 SEDIMENT VOL. (MIL M3) : 50.7

MAIN DAM CREST ELEVATION (EL.M) : 896.0 CREST LENGTH ( M ) : 615.6  
 (WEIR) DAM HEIGHT ( M ) : 220.0 EMBANKMENT VOL. (MIL M3) : 23.10

WATERWAY HEADRACE : LENGTH ( M ) : 1270.0 DIAMETER (WIDTH) ( M ) : 5.7 NOS. : 2  
 PENSTOCK : HORIZONTAL L ( M ) : 190.0 DIAMETER ( M ) : 4.3 NOS. : 2  
 DIVERSION : LENGTH ( M ) : 1600.0 DIAMETER ( M ) : 7.8 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 224.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 155.5 AVERAGE NET HEAD ( M ) : 186.1  
 /HEAD FIRM DISCHARGE (M3/S) : 38.9 TAILWATER LEVEL (EL.M) : 676.0

POWER INSTALLED CAPACITY (MW) : 236.2 ANNUAL TOTAL ENERGY (GWH) : 611.3  
 FIRM POWER (MW) : 59.6 FIRM ENERGY (GWH) : 521.7  
 MIN. GUARANTEED POWER (MW) : 170.2 SECONDARY ENERGY (GWH) : 89.6

TRANSMISSION LINE LENGTH (KM) : 28.1 TO : BATONG BUHAY 230 K V DOUBLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 0. FROM : NATIONAL ROAD BESIDE DAMSITE

CONSTRUCTION COST

TOTAL COST (MIL USD) : 463.0 POWER COST (MIL USD) : 453.7  
 TOTAL COST/KW (USD/KW) : 1943.4 TRANSMISSION COST (MIL USD) : 9.2  
 TOTAL COST/KWH (USD/KWH) : 0.844 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
 SUBMERGED ROAD : PROVINCIAL ROAD 8.5 KMS.  
 MAP USED (1:50,000 SCALE) : 3271-III 1979  
 TECHNICAL COMMENT : - NONE

INVENTORY OF HYDROPOWER SITES

SCHEME ID : 2-008-03-06-0-2

SCHEME : CHICO-2R

RIVER SYSTEM : CAGAYAN  
STREAM : CHICO

WATER RESOURCES REGION : II  
PROVINCE : MT. PROVINCE

COORDINATES : N17-06-56 E121-01-30  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 592.0 (MAIN : 592.0, INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 3361. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 37.2 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.65

PONDAGE FULL SUPPLY LEVEL (EL.M) : 780.4 PONDAGE STORAGE VOL. (1000M3) : 289.5  
AVERAGE OPERATING LEVEL (EL.M) : 779.6 ACTIVE STORAGE VOL. (1000M3) : 130.2  
MINIMUM OPERATING LEVEL (EL.M) : 778.9  
DRAWDOWN DEPTH (M) : 1.5

MAIN DAM CREST ELEVATION (EL.M) : 760.4 CREST LENGTH (M) : 88.5  
(WEIR) WEIR HEIGHT (M) : 9.8 WEIR CONCRETE VOL. (1000 M3) : 17.1

WATERWAY HEADRACE : LENGTH (M) : 5950.0 DIAMETER (WIDTH) (M) : 4.2 NOS. : 1  
PENSTOCK : HORIZONTAL L (M) : 275.0 DIAMETER (M) : 3.3 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 85.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 37.2 AVERAGE NET HEAD (M) : 109.1  
/HEAD FIRM DISCHARGE (M3/S) : 4.5 TAILWATER LEVEL (EL.M) : 660.0

POWER UNSATLLED CAPACITY (MW) : 33.4 ANNUAL TOTAL ENERGY (GWH) : 175.6  
/ENERGY FIRM POWER (MW) : 4.1 FIRM ENERGY (GWH) : 35.6  
MIN. GUARANTEED POWER (MW) : 3.6 SECONDARY ENERGY (GWH) : 140.0

TRANSMISSION

LINE LENGTH (KM) : 12.6 TO : BONTOC 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 2

ACCESS ROAD LENGTH (KM) : 0. FROM : NATIONAL ROAD BESIDE DAMSITE

CONSTRUCTION COST

TOTAL COST (MIL USD) : 44.4 POWER COST (MIL USD) : 43.0  
TOTAL COST/KW (USD/KW) : 1331.5 TRANSMISSION COST (MIL USD) : 1.4  
TOTAL COST/KWH (USD/KWH) : 0.573 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : MIXED - SCARCE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3271-111 1979  
TECHNICAL COMMENT : - MUTUALLY EXCLUSIVE WITH SADANGA SCHEME

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 2-008-03-07-0-2

SCHEME : CHICO-3R

RIVER SYSTEM : CAGAYAN  
STREAM : CHICO

WATER RESOURCES REGION : 11  
PROVINCE : MT. PROVINCE

COORDINATES : N17-06-01 E120-59-27  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 449.7 (MAIN : 450., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 3236. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 26.5 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.65

PONDAGE FULL SUPPLY LEVEL (EL.M) : 868.6 PONDAGE STORAGE VOL. (1000M3) : 1020.4  
AVERAGE OPERATING LEVEL (EL.M) : 868.4 ACTIVE STORAGE VOL. (1000M3) : 92.7  
MINIMUM OPERATING LEVEL (EL.M) : 868.1  
DRAWDOWN DEPTH ( M ) : 0.5

MAIN DAM CREST ELEVATION (EL.M) : 868.6 CREST LENGTH ( M ) : 95.7  
(WEIR) WEIR HEIGHT ( M ) : 8.1 WEIR CONCRETE VOL. (1000 M3) : 13.7

WATERWAY HEADRACE : LENGTH ( M ) : 3850.0 DIAMETER (WIDTH) ( M ) : 3.7 NOS. : 1  
PENSTOCK : HORIZONT. L ( M ) : 175.0 DIAMETER ( M ) : 2.9 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 42.9

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 26.5 AVERAGE NET HEAD ( M ) : 81.5  
/HEAD FIRM DISCHARGE (M3/S) : 3.2 TAILWATER LEVEL (EL.M) : 780.0

POWER INSATLLED CAPACITY (MW) : 17.8 ANNUAL TOTAL ENERGY (GWH) : 93.1  
/ENERGY FIRM POWER (MW) : 2.2 FIRM ENERGY (GWH) : 18.9  
MIN. GUARANTEED POWER (MW) : 1.5 SECONDARY ENERGY (GWH) : 74.2

TRANSMISSION

LINE LENGTH (KM) : 6.6 TO : BONTOC 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1

ACCESS ROAD LENGTH (KM) : 0. FROM : NATIONAL ROAD BESIDE DAMSITE

CONSTRUCTION COST

TOTAL COST (MIL USD) : 25.8 POWER COST (MIL USD) : 25.3  
TOTAL COST/KW (USD/KW) : 1454.2 TRANSMISSION COST (MIL USD) : 0.5  
TOTAL COST/KWH (USD/KWH) : 0.627 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : PADDY - DENSE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3171-11 1979  
TECHNICAL COMMENT : - A PART OF BONTOC TOWN AREA MIGHT BE SUBMERGED

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-002-03-08-0-1

SCHEME : BONTOC

RIVER SYSTEM : CAGAYAN  
STREAM : CHICO

WATER RESOURCES REGION : II  
PROVINCE : MT. PROVINCE

COORDINATES : N17-04-18 E120-56-30  
STUDY LEVEL : UNSCALED  
(PRE-F/S, RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 253.0 (MAIN : 253.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 3399. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 16.2 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.33

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 1056.6 GROSS STORAGE VOL. (MIL M3) : 283.6  
AVERAGE OPERATING LEVEL (EL.M) : 1043.2 ACTIVE STORAGE VOL. (MIL M3) : 169.7  
MINIMUM OPERATING LEVEL (EL.M) : 1016.3 DEAD STORAGE VOL. (MIL M3) : 114.9  
DRAWDOWN DEPTH (M) : 40.3 SEDIMENT VOL. (MIL M3) : 17.7

MAIN DAM CREST ELEVATION (EL.M) : 1062.6 CREST LENGTH (M) : 569.1  
(WEIR) DAM HEIGHT (M) : 154.6 EMBANKMENT VOL. (MIL M3) : 12.55

WATERWAY HEADRACE : LENGTH (M) : 760.0 DIAMETER (WIDTH) (M) : 5.3 NOS. : 1  
PENSTOCK : HORIZONTAL L (M) : 120.0 DIAMETER (M) : 4.2 NOS. : 1  
DIVERSION : LENGTH (M) : 1080.0 DIAMETER (M) : 8.8 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 84.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 67.4 AVERAGE NET HEAD (M) : 132.2  
/HEAD FIRM DISCHARGE (M3/S) : 11.2 TAILWATER LEVEL (EL.M) : 908.0

POWER INSALLED CAPACITY (MW) : 79.3 ANNUAL TOTAL ENERGY (GWH) : 150.6  
/ENERGY FIRM POWER (MW) : 12.2 FIRM ENERGY (GWH) : 107.1  
MIN. GUARANTEED POWER (MW) : 55.7 SECONDARY ENERGY (GWH) : 43.5

TRANSMISSION LINE LENGTH (KM) : 6.0 TO : BONTOC NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 0. FROM :

CONSTRUCTION COST

TOTAL COST (MIL USD) : 238.8 POWER COST (MIL USD) : 236.7  
TOTAL COST/KW (USD/KW) : 3256.5 TRANSMISSION COST (MIL USD) : 2.1  
TOTAL COST/KWH (USD/KWH) : 1.988 ACCESS ROAD COST (MIL USD) : 0.

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3171-11  
TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-008-04-10-0-1

SCHEME : MATALAG

RIVER SYSTEM : CAGAYAN  
STREAM : MATALAG

WATER RESOURCES REGION : II  
PROVINCE : CAGAYAN

COORDINATES : N17-49-53 E121-24-17  
STUDY LEVEL : UNSCALED  
(PRE-F/S-RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 666.4 (MAIN : 666., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 2628. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 26.4 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.67

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 81.0 GROSS STORAGE VOL. (MIL M3) : 818.7  
AVERAGE OPERATING LEVEL (EL.M) : 73.5 ACTIVE STORAGE VOL. (MIL M3) : 562.1  
MINIMUM OPERATING LEVEL (EL.M) : 58.6 DEAD STORAGE VOL. (MIL M3) : 256.6  
DRAWDOWN DEPTH (M) : 22.4 SEDIMENT VOL. (MIL M3) : 48.5

MAIN DAM CREST ELEVATION (EL.M) : 87.0 CREST LENGTH (M) : 358.2  
(WEIR) DAM HEIGHT (M) : 59.3 EMBANKMENT VOL. (MIL M3) : 1.64

WATERWAY HEADRACE : LENGTH (M) : 540.0 DIAMETER (WIDTH) (M) : 5.2 NOS. : 1  
PENSTOCK : HORIZONTAL L (M) : 120.0 DIAMETER (M) : 4.3 NOS. : 1  
DIVERSION : LENGTH (M) : 630.0 DIAMETER (M) : 7.6 NOS. : 2  
EXCAVATION VOL TOTAL (1000 M3) : 70.9

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 64.2 AVERAGE NET HEAD (M) : 44.2  
/HEAD FIRM DISCHARGE (M3/S) : 21.4 TAILWATER LEVEL (EL.M) : 27.7

POWER INSATLLED CAPACITY (MW) : 23.4 ANNUAL TOTAL ENERGY (GWH) : 80.7  
/ENERGY FIRM POWER (MW) : 7.8 FIRM ENERGY (GWH) : 68.3  
MIN. GUARANTEED POWER (MW) : 14.7 SECONDARY ENERGY (GWH) : 12.4

TRANSMISSION LINE LENGTH (KM) : 28.0 TO : PIAT 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 1.5 FROM : FERRY SINGAGA

CONSTRUCTION COST

TOTAL COST (MIL USD) : 78.2 POWER COST (MIL USD) : 78.2  
TOTAL COST/KW (USD/KW) : 3414.6 TRANSMISSION COST (MIL USD) : 1.2  
TOTAL COST/KWH (USD/KWH) : 1.109 ACCESS ROAD COST (MIL USD) : 0.4

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3273-11  
TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-008-04-11-0-2

SCHEME : NABUANGAN

RIVER SYSTEM : CAGAYAN  
STREAM : MATALAG

WATER RESOURCES REGION : 11  
PROVINCE : KALINGA APAYAO

COORDINATES : N17-42-15 E121-13-41  
STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 121.4 (MAIN : 121., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 2664. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 4.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.65

PONDAGE FULL SUPPLY LEVEL (EL.M) : 354.0 PONDAGE STORAGE VOL. (1000M3) : 49.5  
AVERAGE OPERATING LEVEL (EL.M) : 353.3 ACTIVE STORAGE VOL. (1000M3) : 17.3  
MINIMUM OPERATING LEVEL (EL.M) : 352.6  
DRAWDOWN DEPTH ( M ) : 1.4

MAIN DAM CREST ELEVATION (EL.M) : 354.0 CREST LENGTH ( M ) : 59.9  
(WEIR) WEIR HEIGHT ( M ) : 7.0 WEIR CONCRETE VOL. (1000 M3) : 7.2

WATERWAY HEADRACE : LENGTH ( M ) : 5850.0 DIAMETER (WIDTH) ( M ) : 1.9 NOS. : 1  
PENSTOCK : HORIZONTAL L ( M ) : 415.0 DIAMETER ( M ) : 1.5 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 17.9

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 4.9 AVERAGE NET HEAD ( M ) : 95.7  
/HEAD FIRM DISCHARGE (M3/S) : 0.6 TAILWATER LEVEL (EL.M) : 245.0

POWER INSATTLLED CAPACITY (MW) : 3.9 ANNUAL TOTAL ENERGY (GWH) : 20.5  
/ENERGY FIRM POWER (MW) : 0.5 FIRM ENERGY (GWH) : 4.1  
MIN. GUARANTEED POWER (MW) : 0.4 SECONDARY ENERGY (GWH) : 16.3

TRANSMISSION LENGTH (KM) : 49.0 TO : PIAT 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 24.0 FROM : CONNOR

CONSTRUCTION COST

TOTAL COST (MIL USD) : 19.8 POWER COST (MIL USD) : 11.2  
TOTAL COST/KW (USD/KW) : 5087.6 TRANSMISSION COST (MIL USD) : 1.8  
TOTAL COST/KWH (USD/KWH) : 2.188 ACCESS ROAD COST (MIL USD) : 6.8

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3273-111  
TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 2-008-05-12-0-1

SCHEME : PINUKPUK

RIVER SYSTEM : CAGAYAN  
STREAM : SALTAN

WATER RESOURCES REGION : 11  
PROVINCE : KAL-APAYAO

COORDINATES : N17-37-25 E121-22-58  
STUDY LEVEL : UNSCALED  
(PRE-F/S.RECONNAISSANCE)

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 778.0 (MAIN : 778.0, INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 2349. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 23.9 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR

RESERVOIR DEVELOPMENT RATIO : 0.63

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 156.0  
AVERAGE OPERATING LEVEL (EL.M) : 148.1  
MINIMUM OPERATING LEVEL (EL.M) : 128.4  
DRAWDOWN DEPTH ( M ) : 29.6

GROSS STORAGE VOL. (MIL M3) : 760.8  
ACTIVE STORAGE VOL. (MIL M3) : 475.8  
DEAD STORAGE VOL. (MIL M3) : 285.0  
SEDIMENT VOL. (MIL M3) : 54.5

MAIN DAM CREST ELEVATION (EL.M) : 164.0  
(WEIR) DAM HEIGHT ( M ) : 77.0

CREST LENGTH ( M ) : 1370.0  
EMBANKMENT VOL. (MIL M3) : 17.24

WATERWAY HEADRACE : LENGTH ( M ) : 500.0  
PENSTOCK : HORIZONTAL, L ( M ) : 290.0  
DIVERSION : LENGTH ( M ) : 1290.0  
EXCAVATION VOL TOTAL (1000 M3) : 135.2

DIAMETER (WIDTH) ( M ) : 4.0  
DIAMETER ( M ) : 3.4  
DIAMETER ( M ) : 7.9

NOS. : 1  
NOS. : 1  
NOS. : 2

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 38.7  
/HEAD FIRM DISCHARGE (M3/S) : 19.3

AVERAGE NET HEAD ( M ) : 58.4  
TAILWATER LEVEL (EL.M) : 87.0

POWER UNSALLED CAPACITY (MW) : 18.6  
/ENERGY FIRM POWER (MW) : 9.3  
MIN. GUARANTEED POWER (MW) : 11.7

ANNUAL TOTAL ENERGY (GWH) : 92.8  
FIRM ENERGY (GWH) : 81.4  
SECONDARY ENERGY (GWH) : 11.3

TRANSMISSION

LINE LENGTH (KM) : 32.0 TO : PIAT

NOS. OF CIRCUIT : 1

ACCESS ROAD LENGTH (KM) : 3.0 FROM : PINUKPUK

69 K V SINGLE CIRCUIT

CONSTRUCTION COST

TOTAL COST (MIL USD) : 273.7  
TOTAL COST/KW (USD/KW) : 14724.4  
TOTAL COST/KWH (USD/KWH) : 3.227

POWER COST (MIL USD) : 271.6  
TRANSMISSION COST (MIL USD) : 1.3  
ACCESS ROAD COST (MIL USD) : 0.9

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
SUBMERGED ROAD :  
MAP USED (1:50,000 SCALE) : 3272-1  
TECHNICAL COMMENT :



I N V E N T O R Y O F H Y D R O P O W E R S I T E S

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SCHEME ID : 2-008-05-13-0-1  
 COORDINATES : N17-30-15 E121-16-20  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S.RECONNAISSANCE)

SCHEME : ADAGA

RIVER SYSTEM : CAGAYAN WATER RESOURCES REGION : II  
 STREAM : SALTAN PROVINCE : KAL-APAYAO

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 352.7 (MAIN : 353., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
 AVERAGE DISCHARGE (M3/S) : 12.5 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.48

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 411.0 GROSS STORAGE VOL. (MIL M3) : 393.8  
 AVERAGE OPERATING LEVEL (EL.M) : 397.3 ACTIVE STORAGE VOL. (MIL M3) : 185.9  
 MINIMUM OPERATING LEVEL (EL.M) : 369.8 DEAD STORAGE VOL. (MIL M3) : 203.9  
 DRAWDOWN DEPTH ( M ) : 41.2 SEDIMENT VOL. (MIL M3) : 24.7  
 MAIN DAM CREST ELEVATION (EL.M) : 417.0 CREST LENGTH ( M ) : 279.7  
 (WEIR) DAM HEIGHT ( M ) : 170.0 EMBANKMENT VOL. (MIL M3) : 7.95  
 WATERWAY HEADRACE : LENGTH ( M ) : 750.0 DIAMETER (WIDTH) ( M ) : 4.9 NOS. : 1  
 PENSTOCK : HORIZONTAL, L ( M ) : 340.0 DIAMETER ( M ) : 3.9 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1220.0 DIAMETER ( M ) : 6.7 NOS. : 2  
 EXCAVATION VOL TOTAL (1000 M3) : 103.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 57.5 AVERAGE NET HEAD ( M ) : 145.8  
 /HEAD FIRM DISCHARGE (M3/S) : 9.6 TAILWATER LEVEL (EL.M) : 247.0  
 POWER INSATLLED CAPACITY (MW) : 69.0 ANNUAL TOTAL ENERGY (GWH) : 129.2  
 /ENERGY FIRM POWER (MW) : 11.5 FIRM ENERGY (GWH) : 100.8  
 MIN. GUARANTEED POWER (MW) : 53.4 SECONDARY ENERGY (GWH) : 28.4

TRANSMISSION LINE LENGTH (KM) : 47.0 TO : BATONG BUHAY 115 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 2  
 ACCESS ROAD LENGTH (KM) : 21.0 FROM : PINUKPUK TAGA

CONSTRUCTION COST

TOTAL COST (MIL USD) : 207.2 POWER COST (MIL USD) : 196.3  
 TOTAL COST/KW (USD/KW) : 3002.2 TRANSMISSION COST (MIL USD) : 4.9  
 TOTAL COST/KWH (USD/KWH) : 1.896 ACCESS ROAD COST (MIL USD) : 6.0

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3273-1  
 TECHNICAL COMMENT :

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 2-008-05-14-0-1  
 COORDINATES : N17-30-30 E121-11-00  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S.RECONNAISSANCE)

SCHEME : SALTAN-4

RIVER SYSTEM : CAGAYAN  
 STREAM : SALTAN

WATER RESOURCES REGION : II  
 PROVINCE : KAL-APAYAO

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 196.0 (MAIN : 196.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-063-NP-  
 AVER. BASIN RAINFALL (MM/YR) : 2500.0 DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
 AVERAGE DISCHARGE (M3/S) : 7.0 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER.DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.33

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 682.2 GROSS STORAGE VOL. (MIL M3) : 124.6  
 AVERAGE OPERATING LEVEL (EL.M) : 667.2 ACTIVE STORAGE VOL. (MIL M3) : 72.5  
 MINIMUM OPERATING LEVEL (EL.M) : 637.3 DEAD STORAGE VOL. (MIL M3) : 52.0  
 DRAWDOWN DEPTH ( M ) : 44.9 SEDIMENT VOL. (MIL M3) : 13.7  
 MAIN DAM CREST ELEVATION (EL.M) : 688.2 CREST LENGTH ( M ) : 564.5  
 (WEIR) DAM HEIGHT ( M ) : 178.2 EMBANKMENT VOL. (MIL M3) : 16.03  
 WATERWAY HEADRACE : LENGTH ( M ) : 720.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL ( M ) : 340.0 DIAMETER ( M ) : 1.9 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1390.0 DIAMETER ( M ) : 8.3 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 79.8

DISCHARGE PLANT MAX. DISCHARGE (MS/S) : 9.7 AVERAGE NET HEAD ( M ) : 152.0  
 /HEAD FIRM DISCHARGE (M3/S) : 4.8 TAILWATER LEVEL (EL.M) : 510.0  
 POWER UNSATLLED CAPACITY (MW) : 12.1 ANNUAL TOTAL ENERGY (GWH) : 65.9  
 FIRM POWER (MW) : 6.1 FIRM ENERGY (GWH) : 53.0  
 MIN.GUARANTEED POWER (MW) : 9.3 SECONDARY ENERGY (GWH) : 12.8

TRANSMISSION LINE LENGTH (KM) : 41.0 TO : BATONG BUHAY FROM : LOCNAD 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1

ACCESS ROAD LENGTH (KM) : 3.0 FROM : LOCNAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 249.9 POWER COST (MIL USD) : 247.5  
 TOTAL COST/KW (USD/KW) : 20636.9 TRANSMISSION COST (MIL USD) : 1.6  
 TOTAL COST/KWH (USD/KWH) : 4.393 ACCESS ROAD COST (MIL USD) : 0.9

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3272-IV  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-008-05-15-0-2

SCHEME : SALTAN

RIVER SYSTEM : CAGAYAN  
STREAM : SALTAN

WATER RESOURCES REGION : II  
PROVINCE : MT. PROVINCE

COORDINATES : N17-30-14 E121-07-50  
STUDY LEVEL : NEWLY IDENTIFIED  
THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 205.8 (MAIN : 206., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 874.  
AVERAGE DISCHARGE (M3/S) : 7.3 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.65

PONDAGE FULL SUPPLY LEVEL (EL.M) : 679.6 (EL.M) : 679.6 CREST LENGTH ( M ) : 61.5  
AVERAGE OPERATING LEVEL (EL.M) : 678.8 WEIR CONCRETE VOL. (1000 M3) : 8.4  
MINIMUM OPERATING LEVEL (EL.M) : 677.9 PONDAGE STORAGE VOL. (1000M3) : 69.3  
DRAWDOWN DEPTH ( M ) : 1.7 EXCAVATION VOL. (1000M3) : 25.6

MAIN DAM CREST ELEVATION (EL.M) : 679.6 WEIR CONCRETE VOL. (1000 M3) : 8.4  
(WEIR) ( M ) : 7.6

WATERWAY HEADRACE : LENGTH ( M ) : 8590.0 DIAMETER (WIDTH) ( M ) : 2.2 NOS. : 1  
PENSTOCK : HORIZONTAL ( M ) : 890.0 DIAMETER ( M ) : 1.6 NOS. : 1  
EXCAVATION VOL TOTAL (1000 M3) : 35.8

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 7.3 AVERAGE NET HEAD ( M ) : 201.7  
/HEAD FIRM DISCHARGE (M3/S) : 0.9 TAILWATER LEVEL (EL.M) : 454.4

POWER UNSATLLED CAPACITY (MW) : 12.1 ANNUAL TOTAL ENERGY (GWH) : 63.7  
/ENERGY FIRM POWER (MW) : 1.5 FIRM ENERGY (GWH) : 12.9  
MIN. GUARANTEED POWER (MW) : 1.3 SECONDARY ENERGY (GWH) : 50.8

TRANSMISSION LINE LENGTH (KM) : 51.6 TO : BATONG BUHAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
ACCESS ROAD LENGTH (KM) : 2.0 FROM : NEAREST PROVINCIAL ROAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 24.2 POWER COST (MIL USD) : 21.8  
TOTAL COST/KW (USD/KW) : 1995.7 TRANSMISSION COST (MIL USD) : 1.9  
TOTAL COST/KWH (USD/KWH) : 0.850 ACCESS ROAD COST (MIL USD) : 0.6

OTHER INFORMATION

LAND USE IN RESERVOIR AREA : FOREST - SCARCE POPULATION  
SUBMERGED ROAD : NONE  
MAP USED (1:50,000 SCALE) : 3172-IV 1954  
TECHNICAL COMMENT : - ONE TRIBUTARY INTAKE

I N V E N T O R Y   O F   H Y D R O P O W E R   S I T E S

SCHEME ID : 2-006-05-16-0-1  
 COORDINATES : N17-30-04 E121-07-00  
 STUDY LEVEL : UNSCALED  
 (PRE-F/S. RECONNAISSANCE)

SCHEME : SALTAN-5

RIVER SYSTEM : CAGAYAN  
 STREAM : SALTAN

WATER RESOURCES REGION : II  
 PROVINCE : KAL-APAYAO

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 136.0 (MAIN : 136.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-063-NP-  
 AVER. BASIN RAINFALL (MM/YR) : 2500. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 374.  
 AVERAGE DISCHARGE (M3/S) : 4.8 EVAPORATION RATE (MM/DAY) : 3.0 GAGE AVER. DISCHARGE (M3/S) : 54.6

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR RESERVOIR DEVELOPMENT RATIO : 0.33

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 858.1 GROSS STORAGE VOL. (MIL M3) : 85.3 NOS. : 1  
 AVERAGE OPERATING LEVEL (EL.M) : 845.9 ACTIVE STORAGE VOL. (MIL M3) : 50.3 NOS. : 1  
 MINIMUM OPERATING LEVEL (EL.M) : 821.6 DEAD STORAGE VOL. (MIL M3) : 34.9 NOS. : 1  
 DRAWDOWN DEPTH ( M ) : 36.5 SEDIMENT VOL. (MIL M3) : 9.5  
 MAIN DAM CREST ELEVATION (EL.M) : 854.1 CREST LENGTH ( M ) : 353.1  
 (WEIR) DAM HEIGHT ( M ) : 129.1 EMBANKMENT VOL. (MIL M3) : 5.42  
 WATERWAY HEADRACE : LENGTH ( M ) : 760.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONTAL L ( M ) : 410.0 DIAMETER ( M ) : 1.7 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 1130.0 DIAMETER ( M ) : 7.7 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 57.0

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 6.7 AVERAGE NET HEAD ( M ) : 106.6  
 /HEAD FIRM DISCHARGE (M3/S) : 3.3 TAILWATER LEVEL (EL.M) : 735.0  
 POWER INSATLLED CAPACITY (MW) : 5.9 ANNUAL TOTAL ENERGY (GWH) : 32.1  
 /ENERGY FIRM POWER (MW) : 2.9 FIRM ENERGY (GWH) : 25.7  
 MIN. GUARANTEED POWER (MW) : 4.3 SECONDARY ENERGY (GWH) : 6.4

TRANSMISSION LINE LENGTH (KM) : 39.0 TO : BATONG BUHAY 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 7.5 FROM : LOCNAD

CONSTRUCTION COST

TOTAL COST (MIL USD) : 116.3 POWER COST (MIL USD) : 112.7  
 TOTAL COST/KW (USD/KWH) : 19799.3 TRANSMISSION COST (MIL USD) : 1.5  
 TOTAL COST/KWH (USD/KWH) : 4.208 ACCESS ROAD COST (MIL USD) : 2.1

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3272-1V  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-008-05-17-0-1

SCHEME : BABACA-R

RIVER SYSTEM : CAGAYAN  
 STREAM : BABACA  
 WATER RESOURCES REGION : 11  
 PROVINCE : KALINGA APAYAO  
 COORDINATES : N17-35-48 E121-19-06  
 STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 247.7 (MAIN : 248.0 INTER TRANSFER TOTAL : 0.0) STREAM GAGE ID : 4-2-063-NP-  
 AVER. BASIN RAINFALL (MM/YR) : 2357. DENUDATION RATE (MM/YR) : 1.4 GAGE CATCHMENT (KM2) : 374.  
 AVERAGE DISCHARGE (M3/S) : 7.7 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RESERVOIR : RESERVOIR DEVELOPMENT RATIO : 0.58

RESERVOIR FULL SUPPLY LEVEL (EL.M) : 219.0 GROSS STORAGE VOL. (MIL M3) : 245.4  
 AVERAGE OPERATING LEVEL (EL.M) : 209.2 ACTIVE STORAGE VOL. (MIL M3) : 140.6  
 MINIMUM OPERATING LEVEL (EL.M) : 189.7 DEAD STORAGE VOL. (MIL M3) : 104.8  
 DRAWDOWN DEPTH ( M ) : 29.3 SEDIMENT VOL. (MIL M3) : 17.3

MAIN DAM CREST ELEVATION (EL.M) : 225.0 CREST LENGTH ( M ) : 270.0  
 (WEIR) DAM HEIGHT ( M ) : 98.0 EMBANKMENT VOL. (MIL M3) : 3.54

WATERWAY HEADRACE : LENGTH ( M ) : 430.0 DIAMETER (WIDTH) ( M ) : 2.5 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 90.0 DIAMETER ( M ) : 2.1 NOS. : 1  
 DIVERSION : LENGTH ( M ) : 500.0 DIAMETER ( M ) : 8.7 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 32.4

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 12.2 AVERAGE NET HEAD ( M ) : 79.8  
 /HEAD FIRM DISCHARGE (M3/S) : 6.1 TAILWATER LEVEL (EL.M) : 127.0

POWER INSATLLED CAPACITY (MW) : 8.0 ANNUAL TOTAL ENERGY (GWH) : 40.2  
 /ENERGY FIRM POWER (MW) : 4.0 FIRM ENERGY (GWH) : 35.1  
 MIN. GUARANTEED POWER (MW) : 5.8 SECONDARY ENERGY (GWH) : 5.1

TRANSMISSION LINE LENGTH (KM) : 42.0 TO : PIAT 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 11.5 FROM : PINUKPUK

CONSTRUCTION COST

TOTAL COST (MIL USD) : 37.0 POWER COST (MIL USD) : 82.1  
 TOTAL COST/KW (USD/KW) : 10847.5 TRANSMISSION COST (MIL USD) : 1.6  
 TOTAL COST/KWH (USD/KWH) : 2.373 ACCESS ROAD COST (MIL USD) : 3.3

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3272-1  
 TECHNICAL COMMENT :

I N V E N T O R Y O F H Y D R O P O W E R S I T E S

SCHEME ID : 2-006-05-18-0-2

SCHEME : BABACA

RIVER SYSTEM : CAGAYAN WATER RESOURCES REGION : II COORDINATES : N17-35-06 E121-13-23  
 STREAM : BABACA PROVINCE : KALINGA APAYAO STUDY LEVEL : NEWLY IDENTIFIED THROUGH LHPPS

HYDRO/TOPO. INFORMATION

CATCHMENT AREA (KM2) : 134.9 (MAIN : 135., INTER TRANSFER TOTAL : 0.) STREAM GAGE ID : 4-2-063-NP-  
 AVER. BASIN RAINFALL (MM/YR) : 2446. DENUDATION RATE (MM/YR) : 1.4 GAGE CAUGHTMENT (KM2) : 874.  
 AVERAGE DISCHARGE (M3/S) : 4.6 EVAPORATION RATE (MM/DAY) : 3.5 GAGE AVER. DISCHARGE (M3/S) : 54.8

SELECTED PLAN

TYPE OF DEVELOPMENT : RUN-OF-RIVER OUTPUT FACTOR : 0.65  
 PONDAGE FULL SUPPLY LEVEL (EL.M) : 400.8 PONDAGE STORAGE VOL. (1000M3) : 47.3  
 AVERAGE OPERATING LEVEL (EL.M) : 400.1 ACTIVE STORAGE VOL. (1000M3) : 16.0  
 MINIMUM OPERATING LEVEL (EL.M) : 399.5 DRAWDOWN DEPTH ( M ) : 1.3  
 MAIN DAM CREST ELEVATION (EL.M) : 400.8 CREST LENGTH ( M ) : 49.5  
 (WEIR) WEIR HEIGHT ( M ) : 6.8 WEIR CONCRETE VOL. (1000 M3) : 5.9  
 WATERWAY HEADRAGE : LENGTH ( M ) : 4150.0 DIAMETER (WIDTH) ( M ) : 1.9 NOS. : 1  
 PENSTOCK : HORIZONT. L ( M ) : 620.0 DIAMETER ( M ) : 1.4 NOS. : 1  
 EXCAVATION VOL TOTAL (1000 M3) : 12.5

DISCHARGE PLANT MAX. DISCHARGE (M3/S) : 4.6 AVERAGE NET HEAD ( M ) : 166.8  
 FIRM DISCHARGE (M3/S) : 0.6 TAILWATER LEVEL (EL.M) : 220.0  
 POWER INSATLLED CAPACITY (MW) : 6.3 ANNUAL TOTAL ENERGY (GWH) : 32.9  
 FIRM POWER (MW) : 0.8 FIRM ENERGY (GWH) : 6.7  
 MIN. GUARANTEED POWER (MW) : 0.7 SECONDARY ENERGY (GWH) : 26.2

TRANSMISSION LINE LENGTH (KM) : 48.0 TO : PIAT 69 K V SINGLE CIRCUIT NOS. OF CIRCUIT : 1  
 ACCESS ROAD LENGTH (KM) : 24.0 FROM : PINUKPUK

CONSTRUCTION COST

TOTAL COST (MIL USD) : 19.3 POWER COST (MIL USD) : 10.6  
 TOTAL COST/KW (USD/KW) : 3074.9 TRANSMISSION COST (MIL USD) : 1.8  
 TOTAL COST/KWH (USD/KWH) : 1.325 ACCESS ROAD COST (MIL USD) : 6.8

OTHER INFORMATION

LAND USE IN RESERVOIR AREA :  
 SUBMERGED ROAD :  
 MAP USED (1:50,000 SCALE) : 3272-IV  
 TECHNICAL COMMENT :