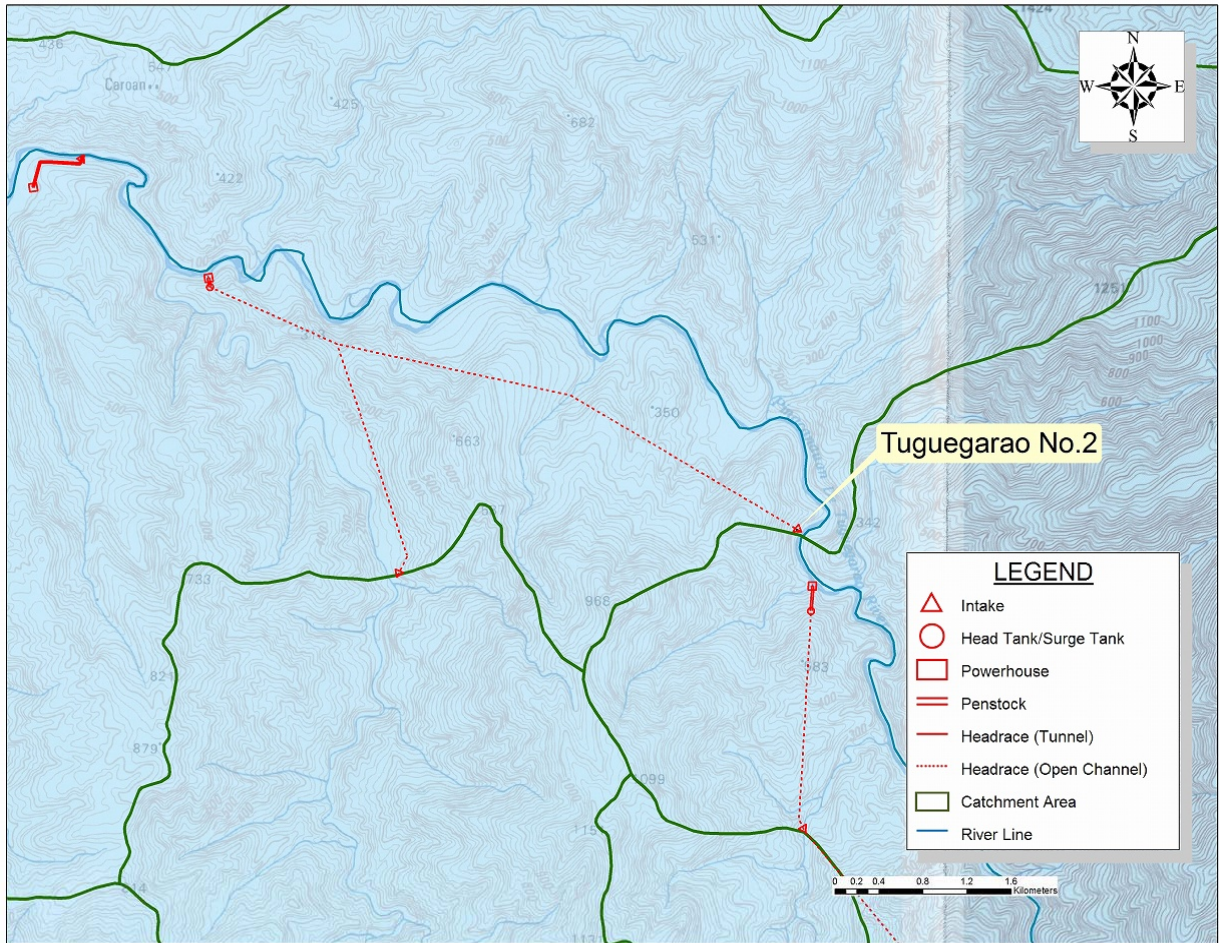


JICA POTENTIAL SITE WITH SITE RECONNAISSANCE (41 / 47)

PROJECT NAME Tuguegarao No.2



LOCATION

Island	Luzon
Region	CAGAYAN VALLEY
Province	CAGAYAN
Municipality	PEÑABLANCA

RIVER

River Basin	Cagayan
River	P. de Tuguegarao

RESERVOIR

Reservoir Volume	-	Mil m ³
Effective Volume	-	Mil m ³
High Water Level	-	m

Coordinate

	Latitude	Longitude
Weir/Dam	17°39'30"	121°59'19.17"
Intake1	17°39'17.79"	121°57'15"
Intake2	-	-
Powerhouse	17°40'41.22"	121°56'16"

Remark

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POWER GENERATION PLAN

Max Output	4.70 MW
Power Generation Type	Run of River
Annual Power Generation	23.997 GWh
Plant Factor	55%
Catchment Area	172.00 km ²
Maximum Discharge	11.77 m ³ /s
Gross Head	56.00 m
Effective Head	49.71 m
Intake Water Level	178.00 m
Tailrace Water level	122.00 m

PROJECT EVALUATION

Construction Cost	25.79 Mil USD 1,114.30 Mil PHP
Unit Cost / kW	5,493 USD 237,280 PHP
Unit Cost / kWh	0.99 USD 42.84 PHP
EIRR	7.2%
FIRR	3.7%

*1USD =43.2PHP (03/2012)

CIVIL WORKS

Main Weir	Height	5.0 m
	Crest Length	30.0 m
Headrace	Open Channel	- m
	Tunnel	3,320.0 m
Penstock		230.0 m
Tailrace		10.0 m
Access Road		7.3 km

EM / TL WORKS

Turbine	Type	Francis
	Number of Unit	two unit
Transmission	Line Voltage	- kV
	Length	24.9 km

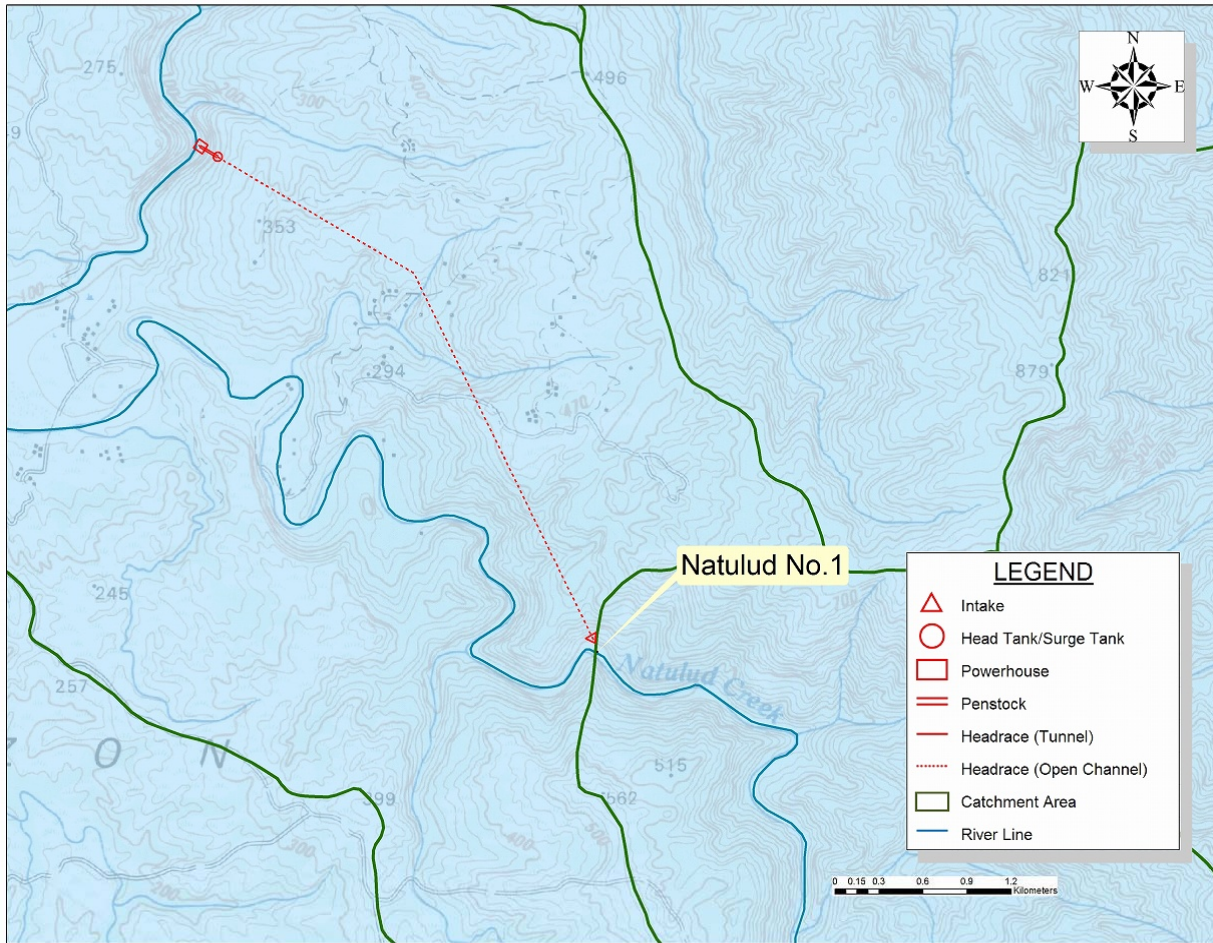
ENVIRONMENT ISSUE

Protected Area	Penablanca Protected Landscape and Seascape
Volcano	-

PROJECT STUDY

Study	Type	Map Study Site Reconnaissance
	Date	2012
	Sponsor	JICA

PROJECT NAME Natulud No.1



LOCATION

Island	Luzon
Region	CAGAYAN VALLEY
Province	CAGAYAN
Municipality	PELABLANCA

RIVER

River Basin	Cagayan
River	P. de Tuguegarao

RESERVOIR

Reservoir Volume	-	Mil m ³
Effective Volume	-	Mil m ³
High Water Level	-	m

Coordinate

	Latitude	Longitude
Weir/Dam	17°37'23.56"	121°54'19.23"
Intake1	-	-
Intake2	-	-
Powerhouse	17°39'7.7"	121°52'41.08"

Remark

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POWER GENERATION PLAN

Max Output	4.10 MW
Power Generation Type	Run of River
Annual Power Generation	18.949 GWh
Plant Factor	50%
Catchment Area	56.36 km ²
Maximum Discharge	4.45 m ³ /s
Gross Head	125.00 m
Effective Head	114.36 m
Intake Water Level	210.00 m
Tailrace Water level	85.00 m

PROJECT EVALUATION

Construction Cost	18.93 Mil USD 817.74 Mil PHP
Unit Cost / kW	4,620 USD 199,597 PHP
Unit Cost / kWh	0.92 USD 39.55 PHP
EIRR	8.6%
FIRR	4.6%

*1USD =43.2PHP (03/2012)

CIVIL WORKS

Main Weir	Height	5.0 m
	Crest Length	30.0 m
Headrace	Open Channel	- m
	Tunnel	4,300.0 m
Penstock		220.0 m
Tailrace		10.0 m
Access Road		1.0 km

EM / TL WORKS

Turbine	Type	Francis
	Number of Unit	two unit
Transmission	Line Voltage	- kV
	Length	19.0 km

ENVIRONMENT ISSUE

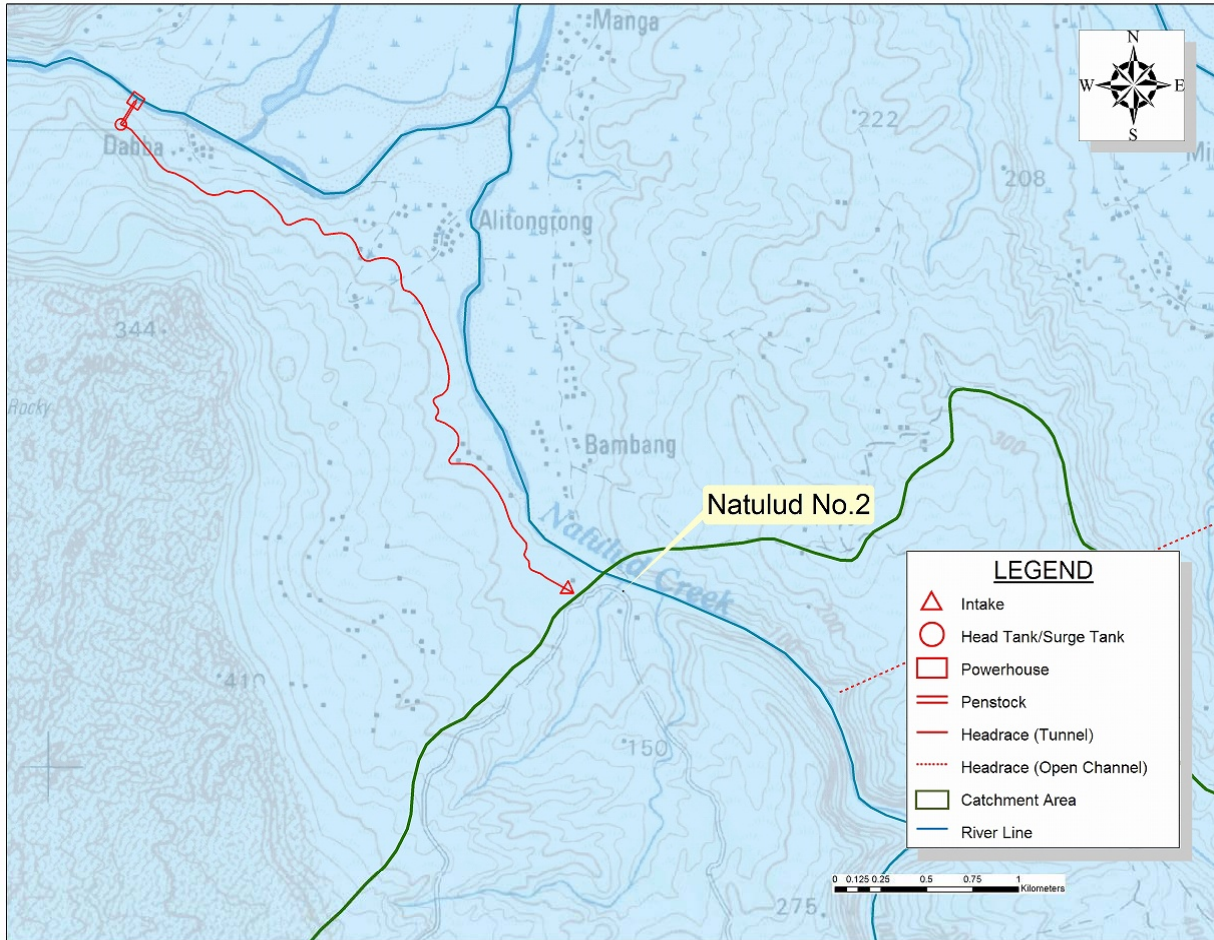
Protected Area	Penablanca Protected Landscape and Seascape
Volcano	-

PROJECT STUDY

Study	Type	Map Study Site Reconnaissance
	Date	2012
	Sponsor	JICA

JICA POTENTIAL SITE WITH SITE RECONNAISSANCE (43 / 47)

PROJECT NAME Natulud No.2



LOCATION

Island	Luzon
Region	CAGAYAN VALLEY
Province	CAGAYAN
Municipality	PEÑABLANCA

RIVER

River Basin	Cagayan
River	P. de Tuguegarao

RESERVOIR

Reservoir Volume	-	Mil m ³
Effective Volume	-	Mil m ³
High Water Level	-	m

Coordinate

	Latitude	Longitude
Weir/Dam	17°40'25.45"	121°51'51.37"
Intake1	17°40'56.4"	121°53'49"
Intake2	-	-
Powerhouse	17°40'52.41"	121°50'14.96"

Remark

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POWER GENERATION PLAN

Max Output	3.20 MW
Power Generation Type	Run of River
Annual Power Generation	23,998 GWh
Plant Factor	81%
Catchment Area	323.49 km ²
Maximum Discharge	10.55 m ³ /s
Gross Head	47.00 m
Effective Head	38.12 m
Intake Water Level	110.00 m
Tailrace Water level	63.00 m

PROJECT EVALUATION

Construction Cost	29.00 Mil USD 1,252.72 Mil PHP
Unit Cost / kW	5,824 USD 251,592 PHP
Unit Cost / kWh	0.72 USD 30.90 PHP
EIRR	11.8%
FIRR	7.9%

*1USD =43.2PHP (03/2012)

CIVIL WORKS

Main Weir	Height	5.0 m
	Crest Length	74.0 m
Headrace	Open Channel	6,370.0 m
	Tunnel	- m
Penstock		130.0 m
Tailrace		10.0 m
Access Road		4.2 km

EM / TL WORKS

Turbine	Type	Francis
	Number of Unit	one unit
Transmission	Line Voltage	- kV
	Length	- km

ENVIRONMENT ISSUE

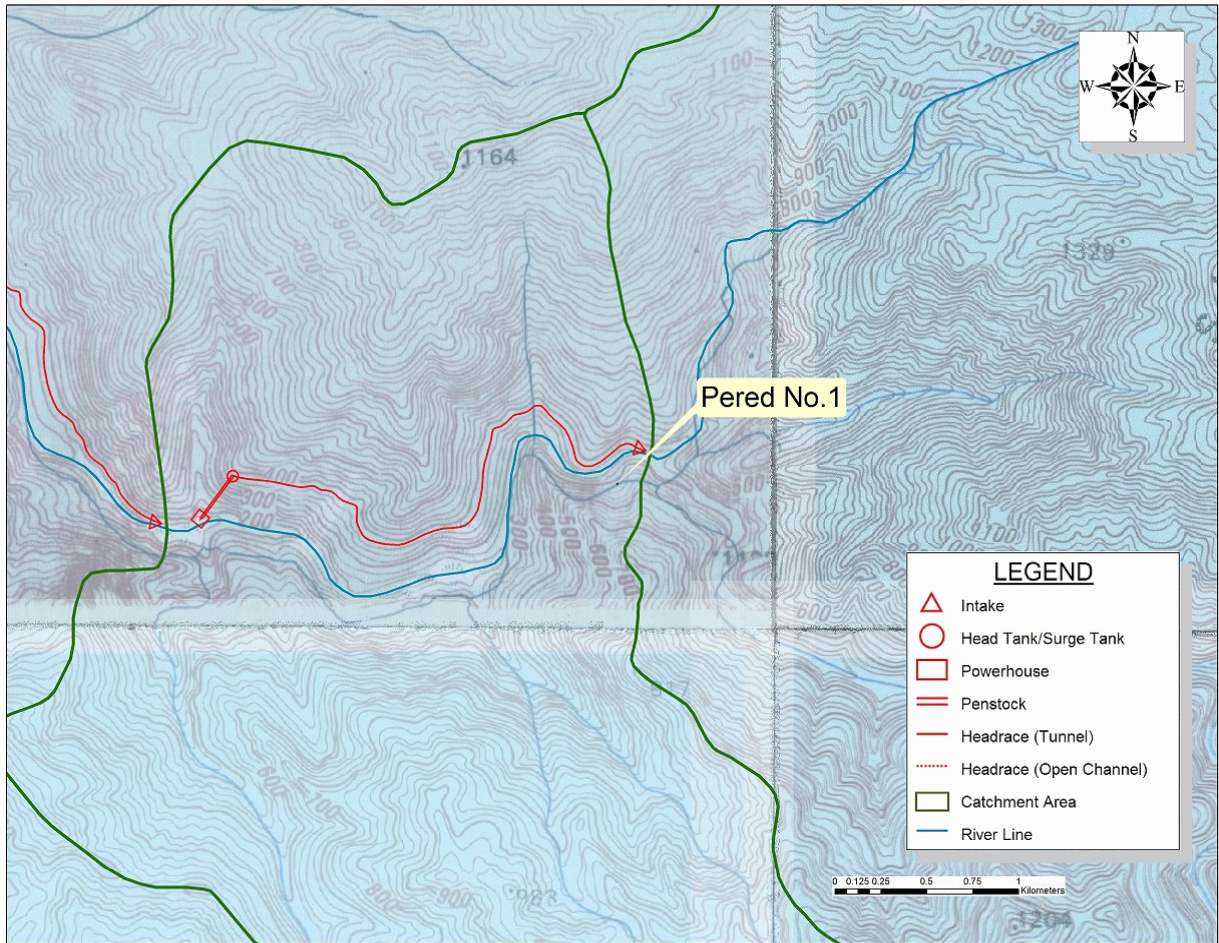
Protected Area	Penablanca Protected Landscape and Seascape
Volcano	-

PROJECT STUDY

Study	Type	Map Study Site Reconnaissance
	Date	2012
	Sponsor	JICA

JICA POTENTIAL SITE WITH SITE RECONNAISSANCE (44 / 47)

PROJECT NAME Pered No.1



LOCATION

Island	Luzon
Region	CAGAYAN VALLEY
Province	CAGAYAN
Municipality	PELABLANCA

RIVER

River Basin	Cagayan
River	Pered

RESERVOIR

Reservoir Volume	-	Mil m ³
Effective Volume	-	Mil m ³
High Water Level	-	m

Coordinate

	Latitude	Longitude
Weir/Dam	17°45'19"	121°59'36"
Intake1	-	-
Intake2	-	-
Powerhouse	17°45'9"	121°58'27"

Remark

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POWER GENERATION PLAN

Max Output	2.10 MW
Power Generation Type	Run of River
Annual Power Generation	10.714 GWh
Plant Factor	55%
Catchment Area	57.49 km ²
Maximum Discharge	3.94 m ³ /s
Gross Head	77.00 m
Effective Head	67.56 m
Intake Water Level	215.00 m
Tailrace Water level	138.00 m

PROJECT EVALUATION

Construction Cost	13.63 Mil USD 588.86 Mil PHP
Unit Cost / kW	6,554 USD 283,120 PHP
Unit Cost / kWh	1.21 USD 52.22 PHP
EIRR	4.6%
FIRR	1.5%

*1USD =43.2PHP (03/2012)

CIVIL WORKS

Main Weir	Height	10.0 m
	Crest Length	30.0 m
Headrace	Open Channel	3,050.0 m
	Tunnel	- m
Penstock		260.0 m
Tailrace		10.0 m
Access Road		11.0 km

EM / TL WORKS

Turbine	Type	Francis
	Number of Unit	two unit
Transmission	Line Voltage	- kV
	Length	27.8 km

ENVIRONMENT ISSUE

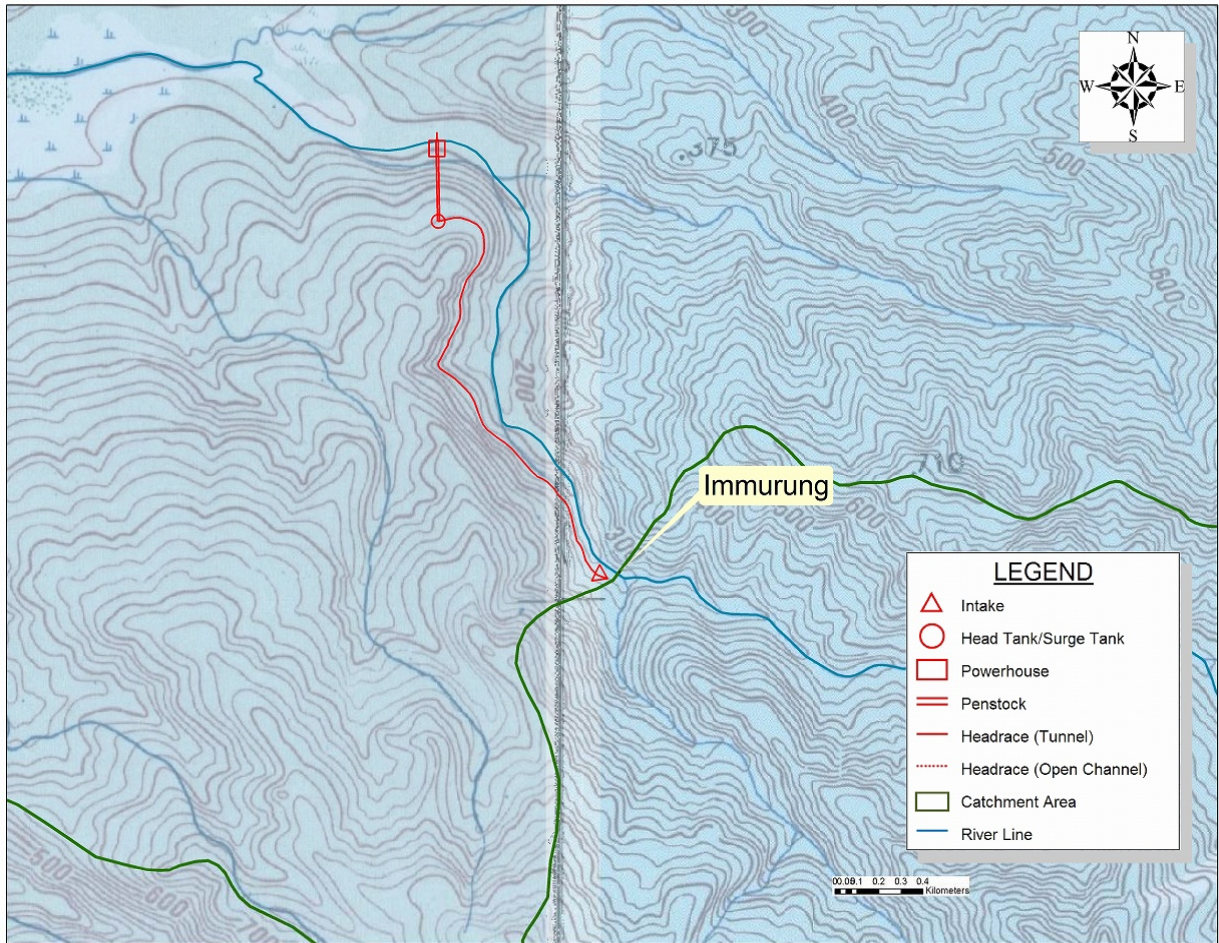
Protected Area	Penablanca Protected Landscape and Seascape
Volcano	-

PROJECT STUDY

Study	Type	Map Study Site Reconnaissance
	Date	2012
	Sponsor	JICA

JICA POTENTIAL SITE WITH SITE RECONNAISSANCE (45 / 47)

PROJECT NAME Immurung



LOCATION

Island	Luzon
Region	CAGAYAN VALLEY
Province	CAGAYAN
Municipality	BAGGAO

RIVER

River Basin	Cagayan
River	Pered

RESERVOIR

Reservoir Volume	-	Mil m ³
Effective Volume	-	Mil m ³
High Water Level	-	m

Coordinate

	Latitude	Longitude
Weir/Dam	17°49'58"	122°0'14"
Intake1	-	-
Intake2	-	-
Powerhouse	17°50'55"	121°59'38"

Remark

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POWER GENERATION PLAN

Max Output	4.10 MW
Power Generation Type	Run of River
Annual Power Generation	12.001 GWh
Plant Factor	32%
Catchment Area	23.29 km ²
Maximum Discharge	3.65 m ³ /s
Gross Head	145.00 m
Effective Head	136.53 m
Intake Water Level	245.00 m
Tailrace Water level	100.00 m

PROJECT EVALUATION

Construction Cost	8.65 Mil USD 373.81 Mil PHP
Unit Cost / kW	2,916 USD 125,990 PHP
Unit Cost / kWh	0.92 USD 39.53 PHP
EIRR	10.5%
FIRR	5.8%

*1USD =43.2PHP (03/2012)

CIVIL WORKS

Main Weir	Height	5.0 m
	Crest Length	25.0 m
Headrace	Open Channel	2,050.0 m
	Tunnel	- m
Penstock		370.0 m
Tailrace		30.0 m
Access Road		0.0 km

EM / TL WORKS

Turbine	Type	Cross Flow
	Number of Unit	two unit
Transmission	Line Voltage	- kV
	Length	28.8 km

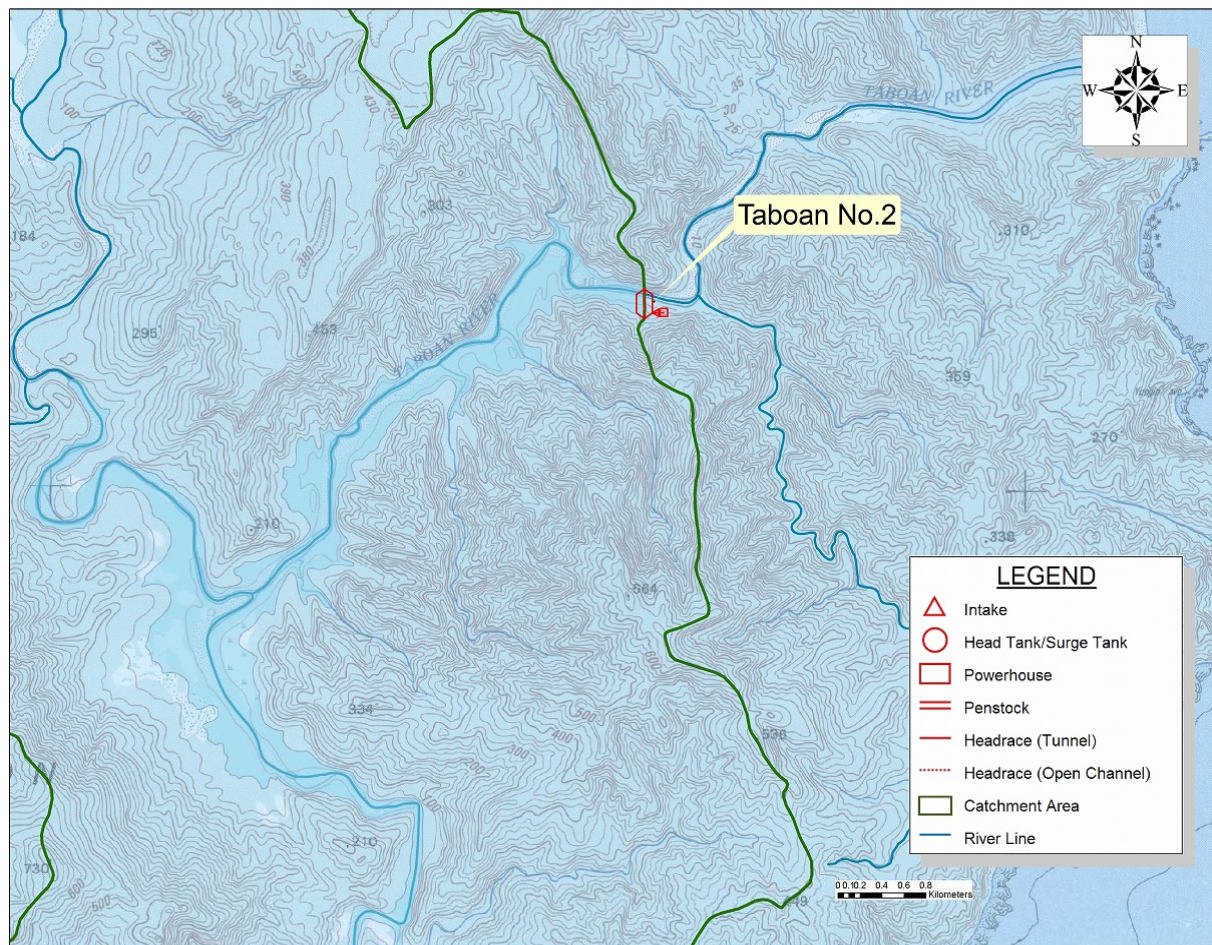
ENVIRONMENT ISSUE

Protected Area	-
Volcano	-

PROJECT STUDY

Study	Type	Map Study Site Reconnaissance
	Date	2012
	Sponsor	JICA

PROJECT NAME **Taboan No.2**



LOCATION

Island	Luzon
Region	CAGAYAN VALLEY
Province	CAGAYAN
Municipality	BAGGAO

RIVER

River Basin	Taboan
River	Taboan

RESERVOIR

Reservoir Volume	41.3 Mil m ³
Effective Volume	20.6 Mil m ³
High Water Level	25.0 m

Coordinate

	Latitude	Longitude
Weir/Dam	17°55'48.47"	122°8'11"
Intake1	-	-
Intake2	-	-
Powerhouse	17°55'48.47"	122°8'11"

Remark

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POWER GENERATION PLAN

Max Output	2.30 MW
Power Generation Type	Reserovir
Annual Power Generation	12.089 GWh
Plant Factor	57%
Catchment Area	313.00 km ²
Maximum Discharge	20.28 m ³ /s
Gross Head	20.00 m
Effective Head	14.30 m
Intake Water Level	25.00 m
Tailrace Water level	5.00 m

PROJECT EVALUATION

Construction Cost	19.01 Mil USD 821.15 Mil PHP
Unit Cost / kW	8,651 USD 373,723 PHP
Unit Cost / kWh	1.53 USD 65.93 PHP
EIRR	1.2%
FIRR	-1.4%

*1USD =43.2PHP (03/2012)

CIVIL WORKS

Main Weir	Height	15.0 m
	Crest Length	150.0 m
Headrace	Open Channel	- m
	Tunnel	- m
Penstock		40.0 m
Tailrace		30.0 m
Access Road		9.0 km

EM / TL WORKS

Turbine	Type	Francis
	Number of Unit	two unit
Transmission	Line Voltage	- kV
	Length	43.8 km

ENVIRONMENT ISSUE

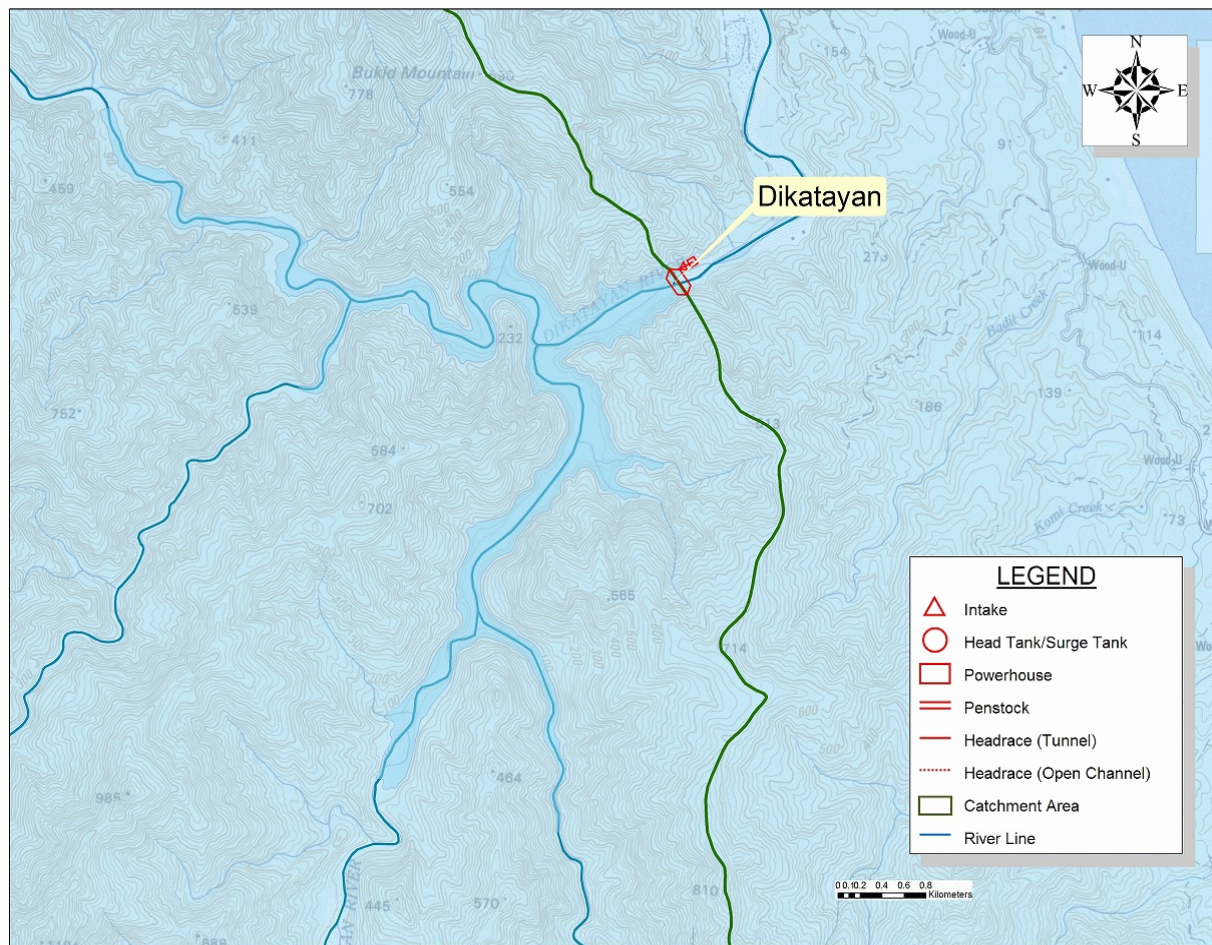
Protected Area	-
Volcano	-

PROJECT STUDY

Study	Type	Map Study Site Reconnaissance
	Date	2012
	Sponsor	JICA

JICA POTENTIAL SITE WITH SITE RECONNAISSANCE (47 / 47)

PROJECT NAME Dikatayan



LOCATION

Island	Luzon
Region	CAGAYAN VALLEY
Province	ISABELA
Municipality	SAN PABLO

RIVER

River Basin	Dikatayan
River	Dikatayan

RESERVOIR

Reservoir Volume	125.0 Mil m ³
Effective Volume	24.9 Mil m ³
High Water Level	75.0 m

Coordinate

	Latitude	Longitude
Weir/Dam	17°28'7"	122°9'59"
Intake1	-	-
Intake2	-	-
Powerhouse	17°28'7"	122°9'59"

Remark

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POWER GENERATION PLAN

Max Output	9.20 MW
Power Generation Type	Reserovir
Annual Power Generation	41.309 GWh
Plant Factor	49%
Catchment Area	219.98 km ²
Maximum Discharge	18.08 m ³ /s
Gross Head	68.00 m
Effective Head	62.04 m
Intake Water Level	121.00 m
Tailrace Water level	53.00 m

PROJECT EVALUATION

Construction Cost	62.85 Mil USD 2,715.15 Mil PHP
Unit Cost / kW	6,814 USD 294,376 PHP
Unit Cost / kWh	1.38 USD 59.74 PHP
EIRR	2.5%
FIRR	-0.4%

*1USD =43.2PHP (03/2012)

CIVIL WORKS

Main Weir	Height	70.0 m
	Crest Length	180.0 m
Headrace	Open Channel	- m
	Tunnel	- m
Penstock		120.0 m
Tailrace		50.0 m
Access Road		2.7 km

EM / TL WORKS

Turbine	Type	Francis
	Number of Unit	two unit
Transmission	Line Voltage	- kV
	Length	45.4 km

ENVIRONMENT ISSUE

Protected Area	-
Volcano	-

PROJECT STUDY

Study	Type	Map Study Site Reconnaissance
	Date	2012
	Sponsor	JICA