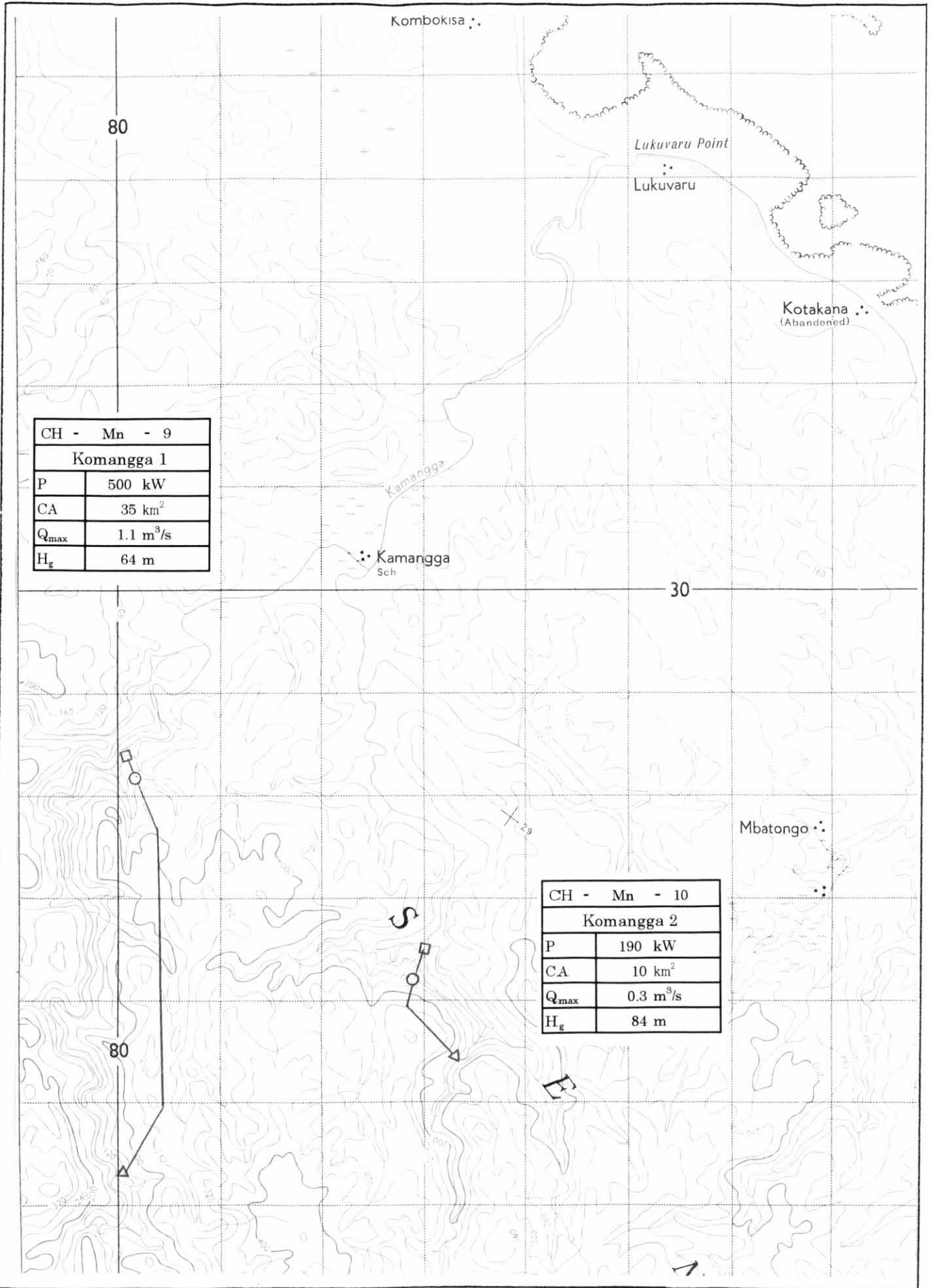
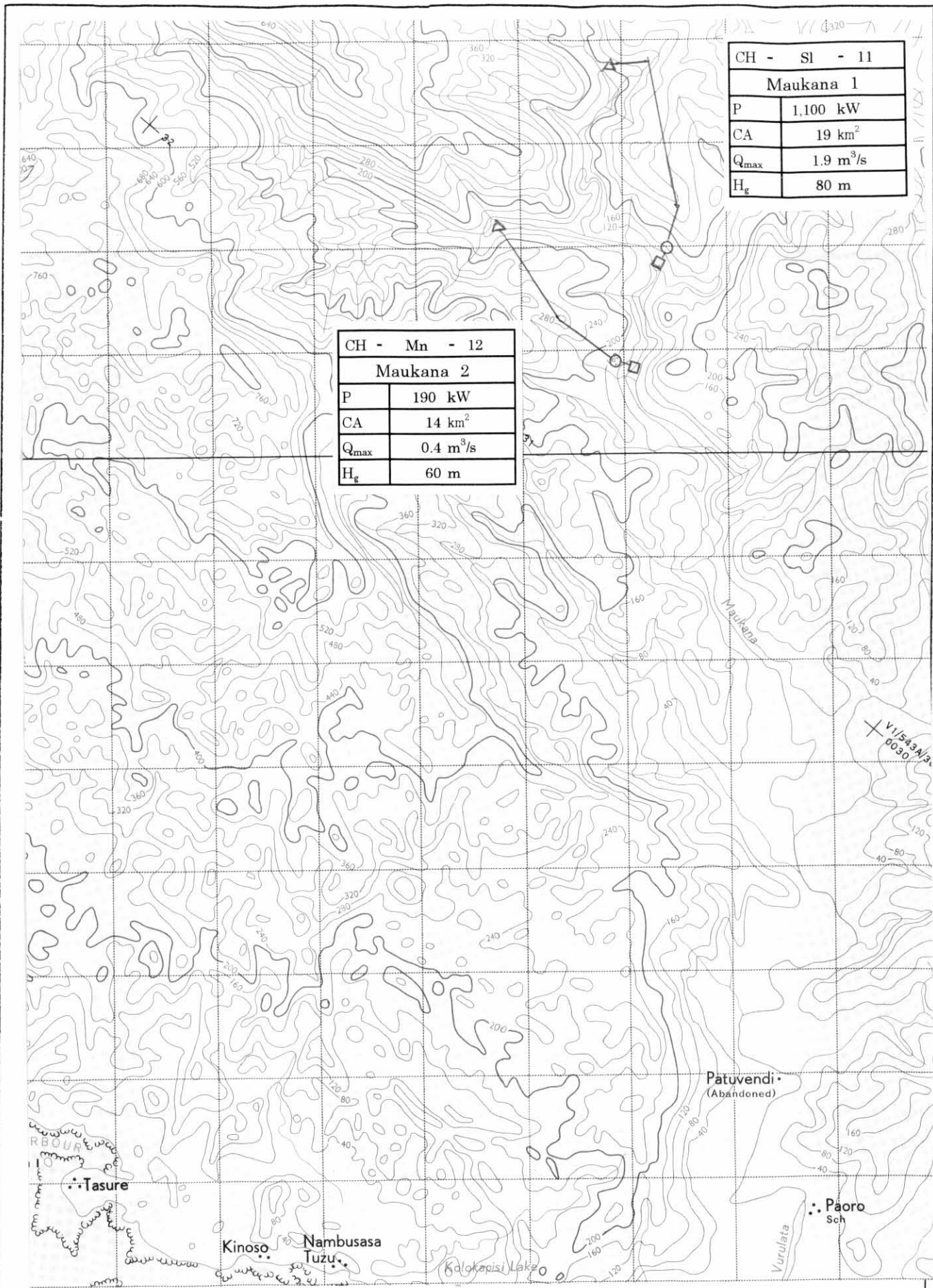


JAPAN INTERNATIONAL COOPERATION AGENCY	MASTER PLAN STUDY OF POWER	TITLE Appendix 5-1- 6 (6)
TOKYO ELECTRIC POWER SERVICES CO., LTD. IC NET CO., LTD	DEVELOPMENT IN SOLOMON ISLANDS	Hydro Potential Map Choiseul (6)



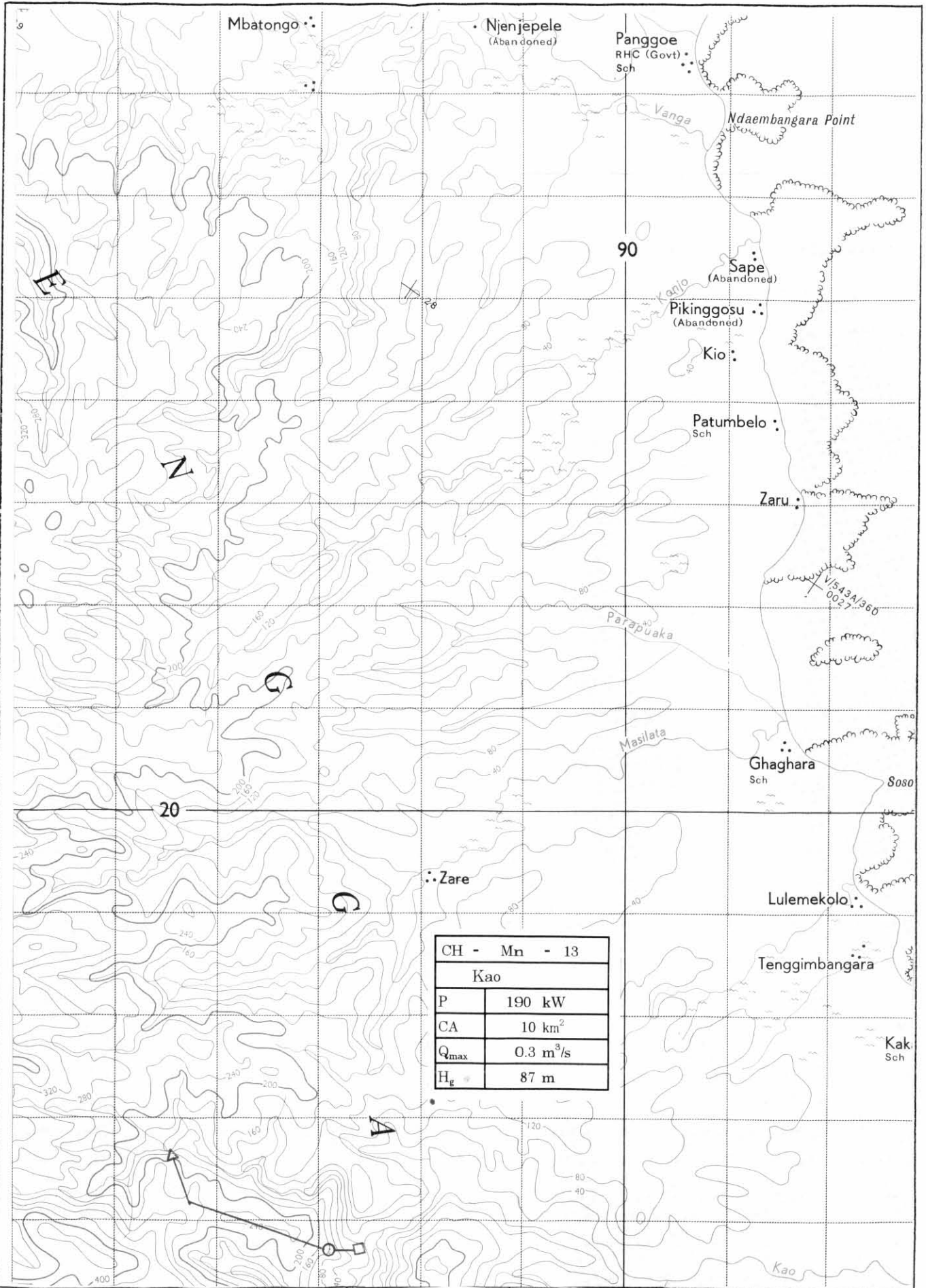
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TOKYO ELECTRIC POWER SERVICES CO., LTD. IC NET CO., LTD		Hydro Potential Map Choiseul (7)



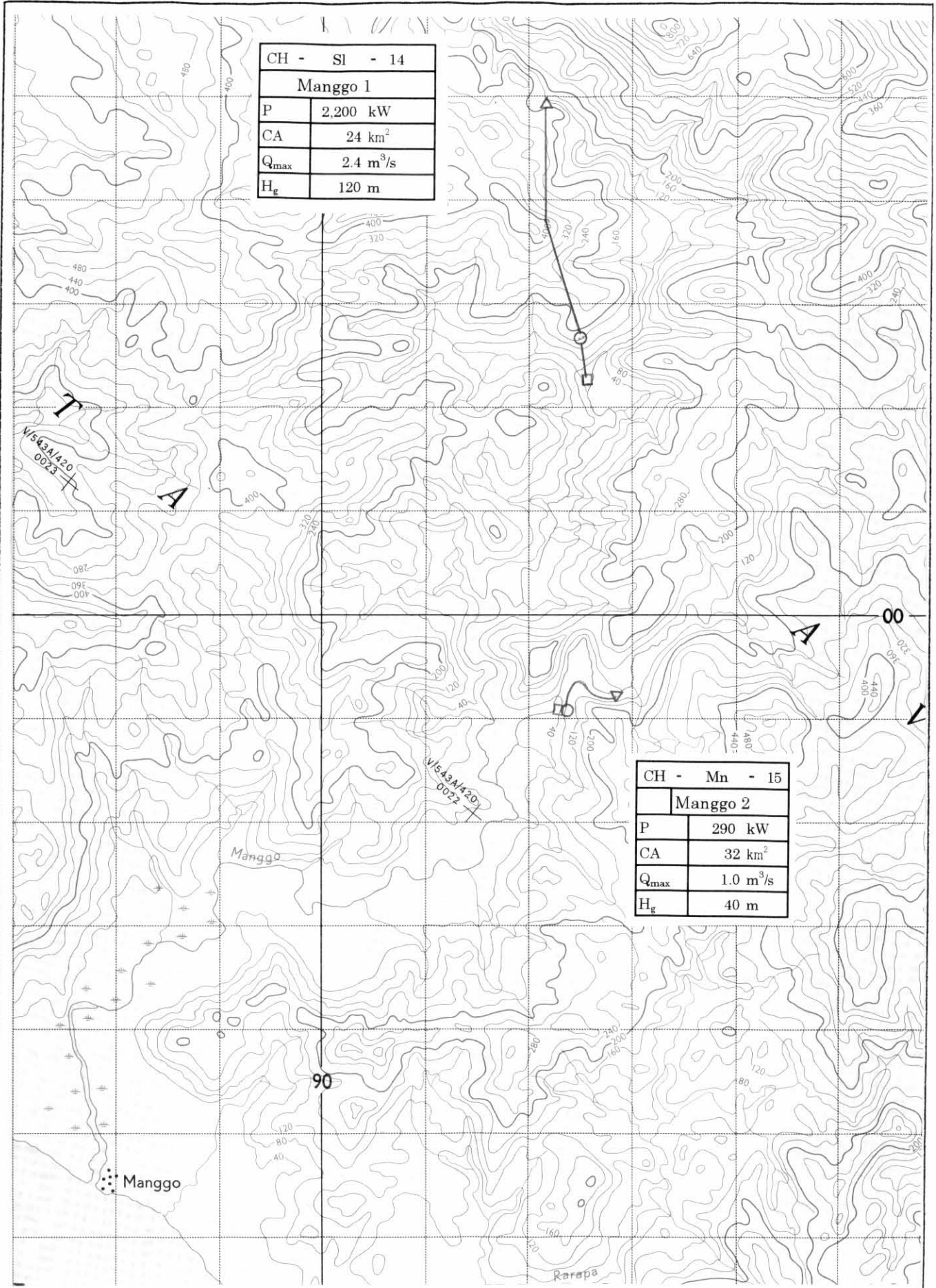
CH - SI - 11	
Maukana 1	
P	1,100 kW
CA	19 km ²
Q _{max}	1.9 m ³ /s
H _g	80 m

CH - Mn - 12	
Maukana 2	
P	190 kW
CA	14 km ²
Q _{max}	0.4 m ³ /s
H _g	60 m

JAPAN INTERNATIONAL COOPERATION AGENCY	MASTER PLAN STUDY OF POWER	TITLE
TOKYO ELECTRIC POWER SERVICES CO., LTD IC NET CO., LTD	DEVELOPMENT IN SOLOMON ISLANDS	Appendix 5-1- 6 (8) Hydro Potential Map Choiseul (8)



JAPAN INTERNATIONAL COOPERATION AGENCY	MASTER PLAN STUDY OF POWER DEVELOPMENT IN SOLOMON ISLANDS	TITLE Appendix 5-1- 6 (9) Hydro Potential Map Choiseul (9)
TOKYO ELECTRIC POWER SERVICES CO., LTD IC NET CO., LTD		



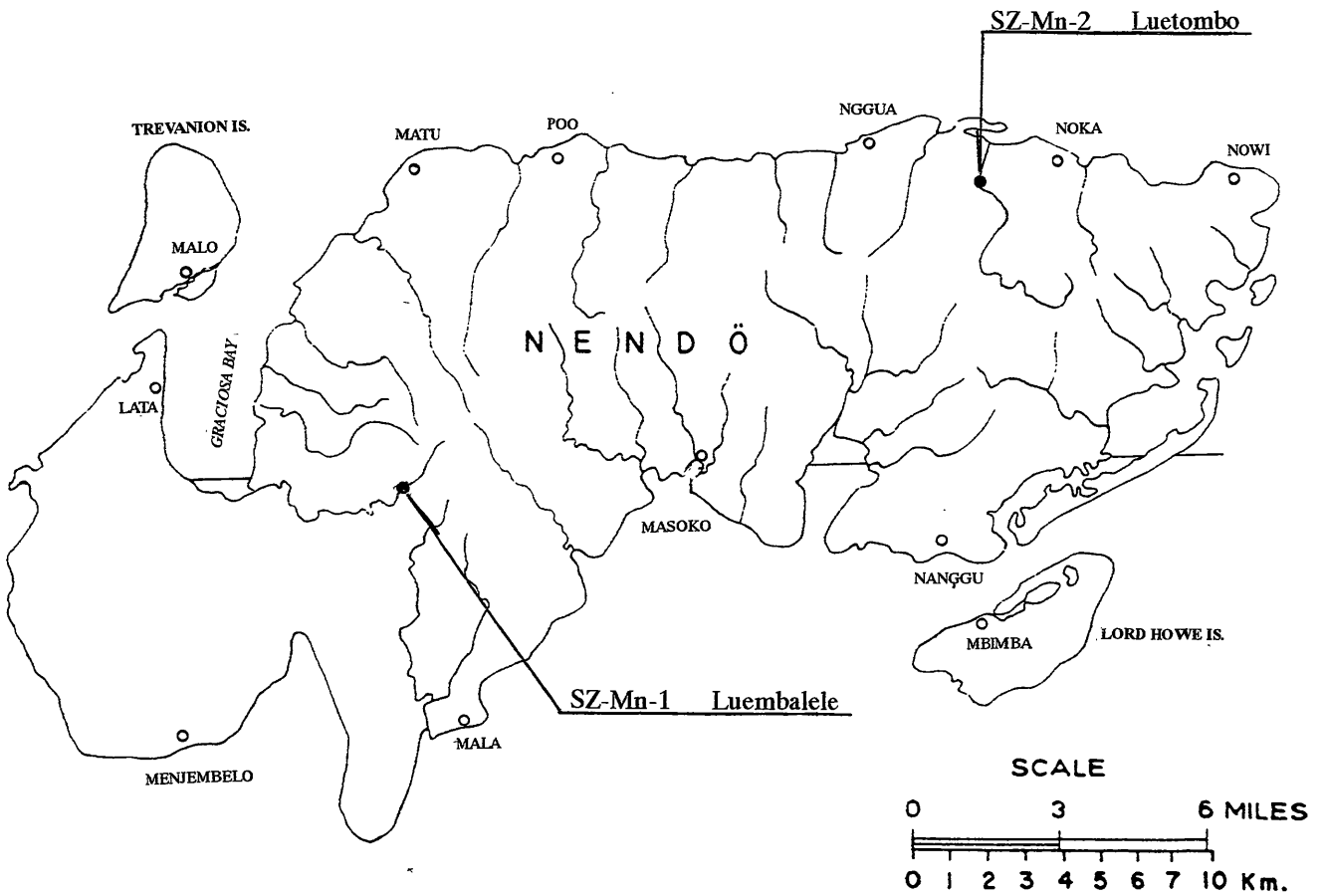
CH - SI - 14	
Manggo 1	
P	2,200 kW
CA	24 km ²
Q _{max}	2.4 m ³ /s
H _g	120 m

CH - Mn - 15	
Manggo 2	
P	290 kW
CA	32 km ²
Q _{max}	1.0 m ³ /s
H _g	40 m

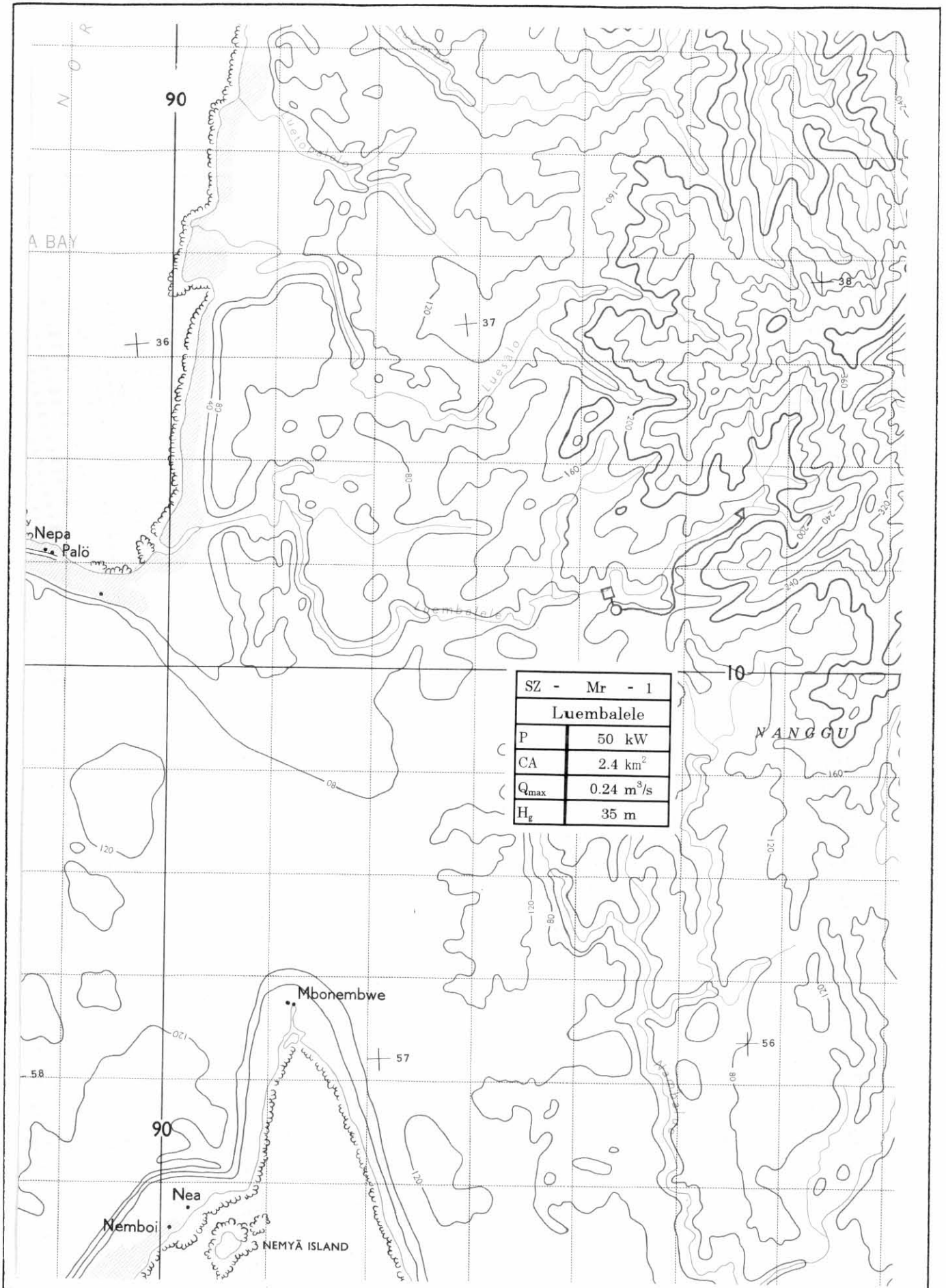
JAPAN INTERNATIONAL COOPERATION AGENCY TOKYO ELECTRIC POWER SERVICES CO., LTD IC NET CO., LTD	MASTER PLAN STUDY OF POWER DEVELOPMENT IN SOLOMON ISLANDS	TITLE
		Appendix 5-1+ 6 (10) Hydro Potential Map Choiseul (10)

Hydro Potential Map (Santa Cruz)

Identification No.	Site	P (kW)
SZ - Mr - 1	Luembalele	50
SZ - Mn - 2	Luetombo	260

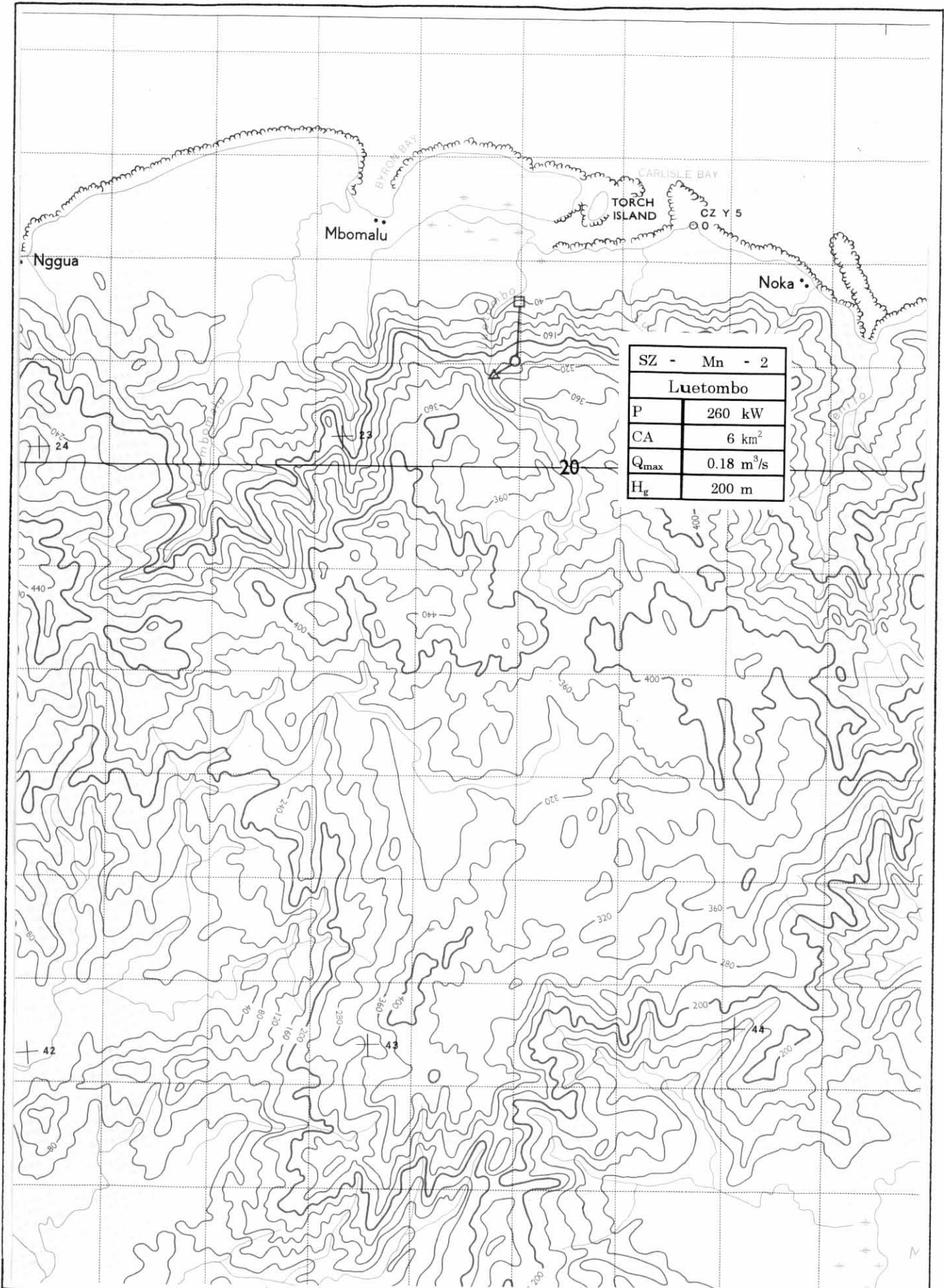


Appendix 5-1-7 Hydro Potential Map of Santa Cruz



SZ - Mr - 1	
Luembalele	
P	50 kW
CA	2.4 km ²
Q _{max}	0.24 m ³ /s
H _g	35 m

JAPAN INTERNATIONAL COOPERATION AGENCY	MASTER PLAN STUDY OF POWER DEVELOPMENT IN SOLOMON ISLANDS	TITLE
TOKYO ELECTRIC POWER SERVICES CO., LTD IC NET CO., LTD		Appendix 5-1-7 (1) Hydro Potential Map Santa Cruz (1)



JAPAN INTERNATIONAL COOPERATION AGENCY	MASTER PLAN STUDY OF POWER DEVELOPMENT IN SOLOMON ISLANDS	TITLE
TOKYO ELECTRIC POWER SERVICES CO., LTD IC NET CO., LTD		Appendix 5-1-7 (2) Hydro Potential Map Santa Cruz (2)

Appendix 5-2 Summary of Project Cost Estimate

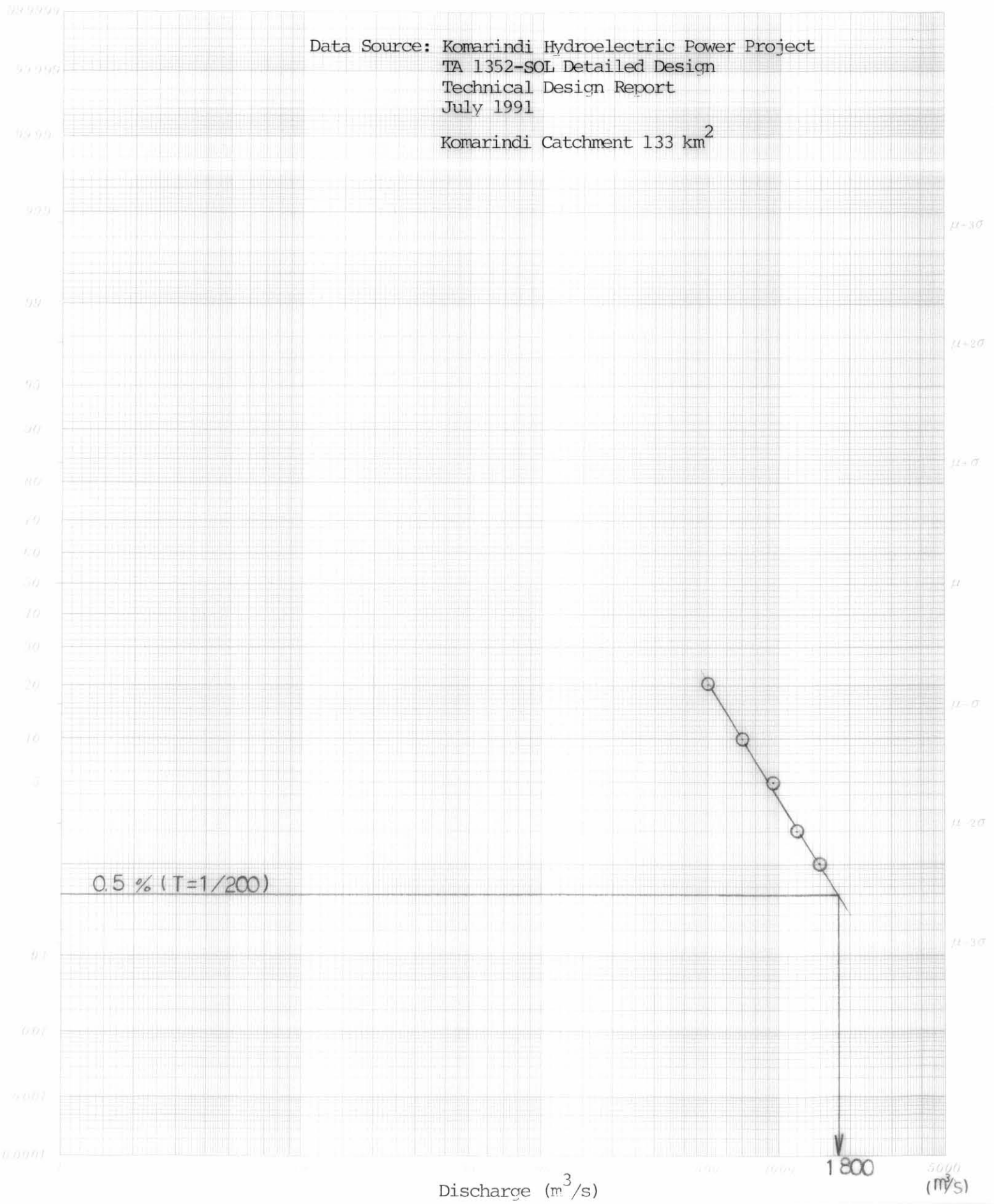
Islands						Guadalcanal						Malaita											
Site						Maotapuku 1			Maotapuku 2			Sasa			Silolo			Rori			Kwara'a		
	Facilities	Description	comments	unit		unit price (A)	Quantity (B)	Total (A) x (B)	Quantity (C)	Total (A) x (C)	Quantity (D)	Total (A) x (D)	unit price (E)	Quantity (F)	Total (E) x (F)	Quantity (G)	Total (E) x (G)	unit price (H)	Quantity (I)	Total (H) x (I)			
Civil Works	Direct Cost	Intake & Sand Trap	excavation concrete sub total	all materials,including backfill, disposal including fomrwork, reinforcement	m³	30	697.6	20,788	697.6	20,788	122.0	3,636	30	299.9	8,937	231.1	6,887	30	25,000.0	745,000			
		Headrace(A) Open Channel	excavation concrete sub total	all materials, including backfill and disposal including fomrwork, reinforcement	m³	16	518	8,288	331.9	5,199.3	11,444.5	187,690	16	2,688	42,816	384.8	36,080	374	19,833.9	7,417,879			
		Headrace(B) Tunnel	excavation,concrete	minimum cross section	m	6,600	1620.0	10,692,000	1400.0	9,240,000	6,600	1730.0	11,418,000	6,600	1730.0	11,418,000	6,600	1730.0	11,418,000				
		Head Tank	excavation concrete sub total	including backfill, disposal including fomrwork, reinforcement	m³	20	872.0	17,614	872.0	17,614	495.8	10,015	20	1394.9	28,177	662.0	13,372	662.0	13,372				
		Penstock	excavation concrete sub total	including backfill, disposal including fomrwork, reinforcement	m³	16	5568.9	89,102	566	1175.0	665,050	3627.2	58,035	76.8	1,229	16	7263.8	116,221	82.5	1,320			
		Powerhouse	powerhouse building		m²	180	784.0	141,120	784.0	141,120	490.0	88,200	180	784.0	141,120	490.0	88,200	180	784.0	141,120			
		Tailrace	excavation concrete sub total	including backfill, disposal including fomrwork, reinforcement	m³	16	37.7	603	374	5.6	2,094	117.3	1,877	391.3	6,261	16	150.6	2,410	30.7	491			
		Access road	all weather access road	including site clearance, earthwork, side drains	m	108	3500.0	378,000	5,800	626,400	1,700.0	183,600	108	6,300.0	680,400	900.0	97,200	108	1,100	118,800			
		Sub Total (A)							12,379,013		10,970,290		1,733,962		13,812,227		720,751		8,281,679				
		Indirect cost							3,713,704		3,291,087		520,189		4,143,668		216,225		2,484,504				
Total of Civil Works (A)							16,093,000		14,261,000		2,254,000		17,956,000		937,000		10,766,000						
Supply & Installation of Equipment	Metal Works	Penstock	including indirect cost	t	7,800	137.4	1,072,000	93.8	731,640	42.6	332,280	7,800	189.0	1,474,200	82.3	641,940	7,800	35.0	273,000				
		Gate	including indirect cost	t	13,260	9.5	125,970	15.4	204,204	10.3	136,578	11.3	149,838	6.5	86,190	10.4	137,904						
		Screen	including indirect cost	t	8,710	2.4	20,940	3.6	31,356	1.5	13,065	2.7	23,517	2.1	18,291	1.7	14,807						
		Sub Total					1,219,000		967,000		482,000		1,648,000		746,000		426,000						
		T/G					2,505,000		3,120,000		1,103,000		2,959,000		1,334,000		2,837,000						
T/L&D/L					737,000		3,988,000		910,000		792,000		1,532,000		1,000,000								
Total of Metal Works, T/G, T/L and D/L (B)							4,461,000		8,075,000		2,495,000		5,399,000		4,263,000								
Sub Total =(A)+(B)							20,554,000		22,336,000		4,749,000		23,355,000		4,549,000		15,029,000						
Other Expende	Land Acquisition and Compensation							206,000		223,000		47,000		234,000		45,000		150,000					
	Engineering Service							2,055,000		2,234,000		940,000		2,336,000		940,000		1,503,000					
	Contingency							2,055,000		2,234,000		475,000		2,336,000		455,000		1,503,000					
Total of other expence (C)							4,316,000		4,691,000		1,462,000		4,906,000		1,440,000		3,156,000						
Capital Cost	Total =(A)+(B)+(C)						24,870,000		27,027,000		6,211,000		28,261,000		5,989,000		18,185,000						

Islands						Santa Isabel			Sac Cristobal			Choiseul			Santa Cruz Islands		
Site						Kubolata			Waimapuru			Sorave			Luembalele		
	Facilities	Description	comments	unit		unit price (L)	Quantity (M)	Total (L) x (M)	unit price (N)	Quantity (O)	Total (N) x (O)	unit price (J)	Quantity (K)	Total (J) x (K)	unit price (P)	Quantity (Q)	Total (P) x (Q)
Civil Works	Direct Cost	Intake & Sand Trap	excavation concrete sub total	all materials,including backfill, disposal including fomrwork, reinforcement	m³	30	10.10	301	30	130.70	3,895	30	200.00	5,960	30	127.30	3,794
		Headrace(A) Open Channel	excavation concrete sub total	all materials, including backfill and disposal including fomrwork, reinforcement	m³	558	6.3	3,515	586	24.3	14,240	706	179.1	126,427	784	72.2	56,605
		Headrace(B) Tunnel	excavation,concrete	minimum cross section	m												
		Head Tank	excavation concrete sub total	including backfill, disposal including fomrwork, reinforcement	m³	20	11.6	235	606	15.1	9,146	754	105.9	79,837	832	31.5	26,208
		Penstock	excavation concrete sub total	including backfill, disposal including fomrwork, reinforcement	m³	16	244.6	3,914	654	127.8	83,581	16	64.0	1,024	16	54.0	864
		Powerhouse	powerhouse building		m²	180	209.4	37,692	180	209.4	37,692	180	299.0	53,820	180	209.4	37,692
		Tailrace	excavation concrete sub total	including backfill, disposal including fomrwork, reinforcement	m³	16	6.7	107	462	3.5	1,622	16	14.4	230	16	19.7	315
		Access road	all weather access road	including site clearance, earthwork, side drains	m	108	2,000	216,000	108	2,000	216,000	108	384.0	41,472	108	2,800	302,400
		Sub Total (A)						356,113		297,349		417,810		1,731,035			
		Indirect cost						106,834		89,205		125,343		519,311			
Total of Civil Works (A)							463,000		387,000		543,000		2,250,000				
Supply & Installation of Equipment	Metal Works	Penstock	including indirect cost	t	7,800	37.4	291,720	7,800	5.3	41,340	7,800	28.9	225,420	7,800	7.9	61,620	
		Gate	including indirect cost	t	13,260	0.6	7,956	13,260	2.4	31,824	13,260	6.9	91,944	13,260	3.6	47,736	
		Screen	including indirect cost	t	8,710	0.3	2,613	8,710	0.4	3,484	8,710	1.4	12,194	8,710	0.9	7,839	
		Sub Total					302,000		77,000		329,000		117,000				
		T/G					494,000		124,000		432,000		309,000				
T/L&D/L					160,000		101,000		323,000		1,186,000						
Total of Metal Works, T/G, T/L and D/L (B)							956,000		302,000		1,084,000		1,612,000				
Sub Total =(A)+(B)							1,419,000		689,000		1,627,000		3,862,000				
Other Expende	Land Acquisition and Compensation							14,000		7,000		16,000		39,000			
	Engineering Service							156,000		156,000		156,000		156,000			
	Contingency							60,000		60,000		60,000		60,000			
Total of other expence (C)							230,000		223,000		232,000		255,000				
Capital Cost	Total =(A)+(B)+(C)						1,649,000		912,000		1,859,000		4,117,000				

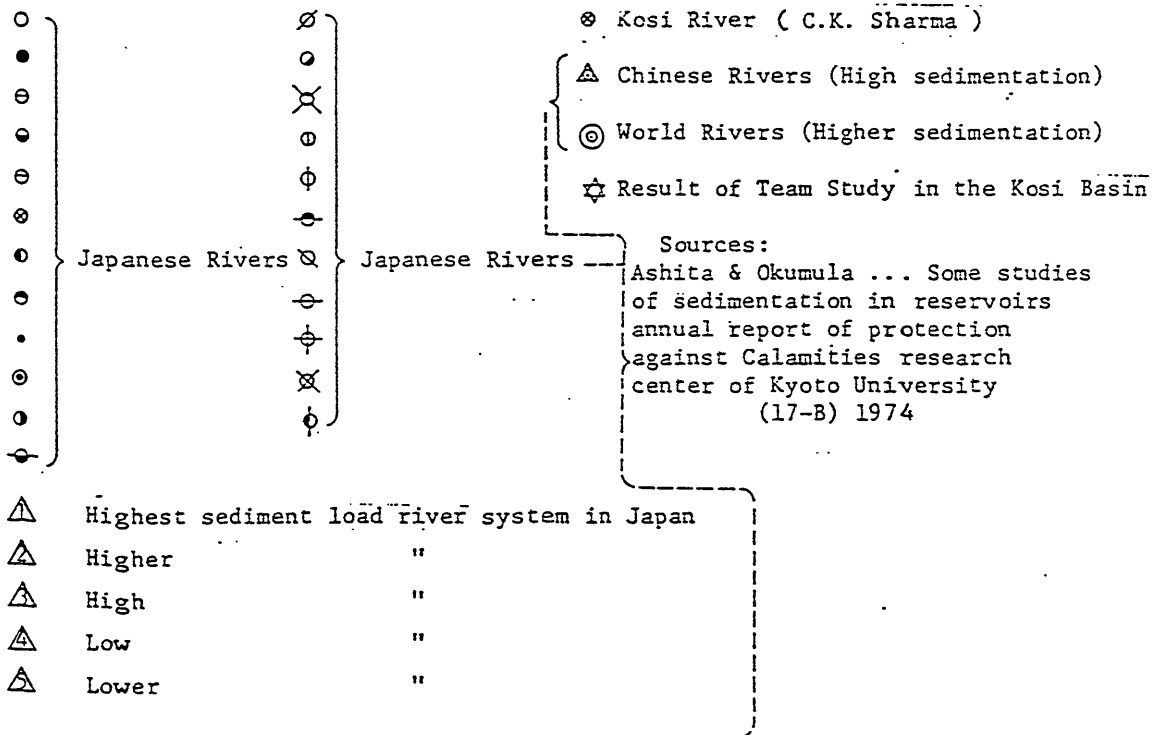
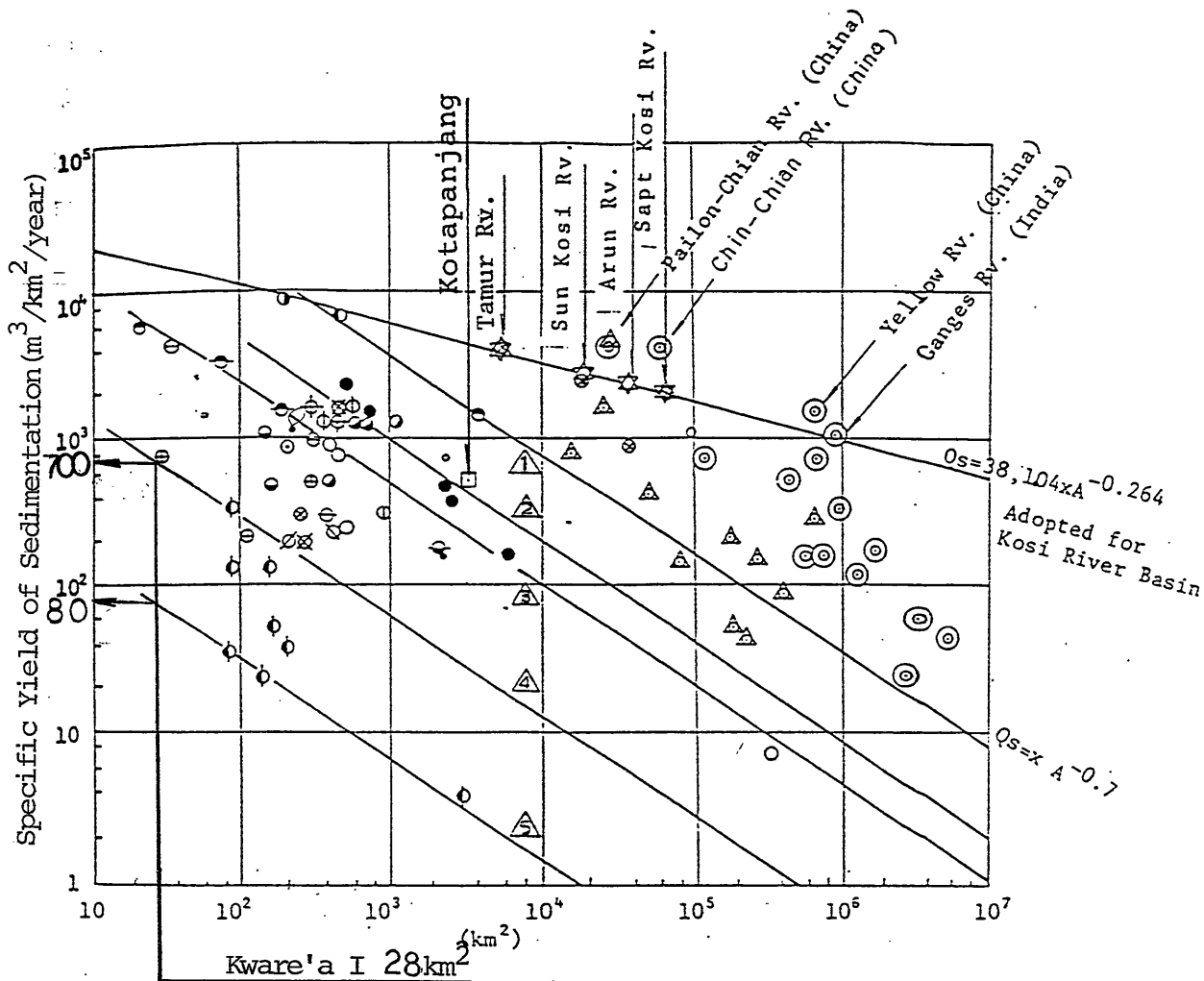
*Note : Exchange Rate, US\$1.00—SD\$5.00 in June 2000
The total and sub total cost are rounded off the fraction to the thousand.

Probability Analysis of Komarindi Design Flood

Data Source: Komarindi Hydroelectric Power Project
 TA 1352-SOL Detailed Design
 Technical Design Report
 July 1991
 Komarindi Catchment 133 km²

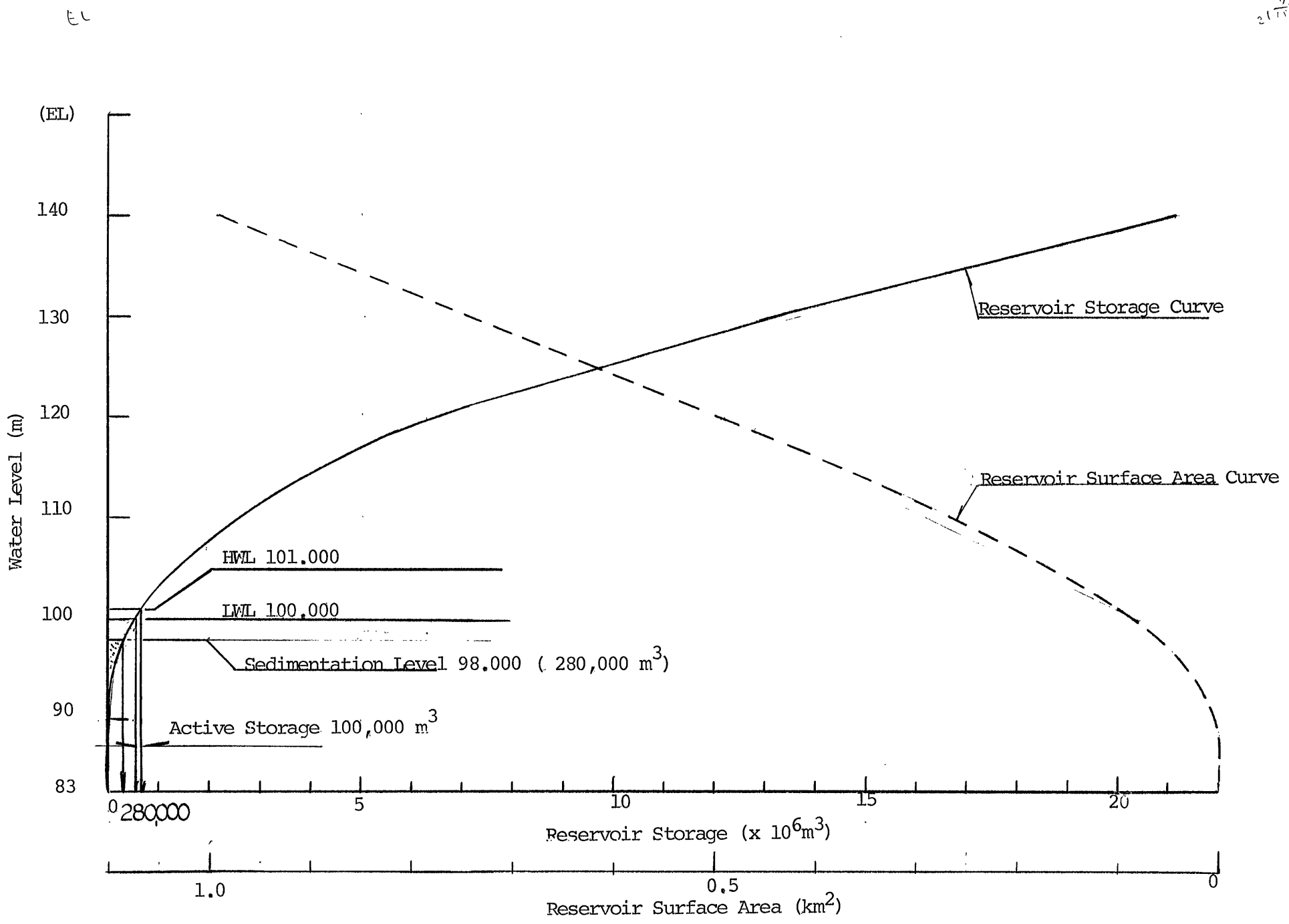


Appendix .5-3-1 Reference for Kware'a Flood Discharge



This figure is adopted from " Master Plan of the Kosi river Basin Master Paln" in Nepal.

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Appendix 5-3-3 Water Level and Storage Curve for Kware'a

21/11/13

Appendix 5-4 ポポロ水力の検討

(1) 概要

サントイザベル島のポポロ地点は、ポポロ川中流部に流込み式水力発電所として調査検討されてきた。(Fig.-1 参照)

第2次調査も実施したが、地形およびレイアウト検討から以下のとおり、ポポロ川の水力開発は可能性が無いとの結論である。

(2) 地質

サントイザベル島の 1:250,000 地質図(1991)¹⁾が基盤地質の文献である。地点の地質を Fig.-2 に示す。

(a) 地質

計画地点は、海岸より 2~4 km のポポロ川の中流部にあり、水系は緩やかに蛇行する不明瞭な格子状である。河床は礫質で幅 7~20m の水深 0.5~1.0m の川である。下流は 25~50 m の河原とココア林である広い後背湿地からなる。広くマルト石灰岩累層(Maruto Limestone Formation)が分布し、クアクラ砂岩累層(Kuakula Sandstone Formation)は断層ブロック内に限定される。地層は上流側に中程度の角度で傾斜する。

(b) 各構造物地点の状況

取水地点は、石灰岩の滝より下流で、両岸に露岩する河床幅は 7~8m であるが、左岸に幅 5m の低平地がある。クアクラ砂岩累層は、黒色で塊状または一部泥岩と密着成層する風化軟質な岩で、40 度ほどで上流側に傾斜する。節理は 0.5m 間隔である。

水路経過地は、中小の谷地形により凹凸のある左岸斜面にあり、比較的緩やかで大きな崖地はみられず、崖錐堆積物または風化岩が分布している。左岸断層は河川に沿い 100 m と離れていない。この断層より山側は石灰岩が分布する。川側の砂岩は、斜面では赤褐色の砂状風化の露頭がみられた。発電所地点は、斜面下部または河岸の崖錐堆積物または風化岩分布地である。

(3) 検討 1

地形図のみの検討では、Fig.-3 に示すとおり水压管路およびアクセスを最小にするため、左岸の開水路により利用可能な落差を開発するレイアウトで計画した。しかしながら、第2次調査において左岸の水槽地点上流の鞍部標高が 50m 以下であることを確認したことから、この計画を放棄した。開水路により標高 80m の等高線に沿った開水路の設置が不可能となったからである。(Photo-1 参照)

(4) 検討 2

第2次調査で、取水口地点をポポロ川とマリロンガ川の合流点の下流として選定した。

(a) レイアウトと設備出力

既存の 1:50,000 地形図では、マリロンガ川との合流点の河床標高は 180m となっていたが、高度計の示す値は 70m であった。一般に高度計の精度は高いものではないが、標高 180m に達するには河床勾配が明らかに緩い。第2次調査時の発電所サ

イトの標高は約 30m であり、導水路により得られる落差は 40m となる。

$$\begin{aligned} P &= 9.8 \times He \times Q_{\max} \times \quad (\text{kW}) \\ &= 9.8 \times 38 \times 1.3 \times 0.8 \\ &= 390 (\text{kW}) \end{aligned}$$

ただし、 P : 設備出力 (kW)

He : 有効落差 38m (総落差の 95%)

Q_{\max} : 最大使用水量 1.3m³/s (流量設備利用率 0.6)

: 水車・発電機合成効率(0.8)

(b) 導水路

-開水路

支流兩岸の谷は深いため、ポポロ川中流域での開水路建設は見込みが無い。

(Photo-2 参照)

-トンネル

390 kW 級の発電所に 1,440m のトンネルの建設は経済的でない。

(c) アクセスと送電線

工事用道路は、発電所からブアラまでの 7 km と水槽および取水口までの 3 km から総延長 10 km となる。送電線は、ブアラから発電所までの 7 km の建設が必要である。

(5) 結論

レイアウトの検討から判断すると、以上の結果はポポロ川の水力開発を魅力の無いものになっている。したがって、ポポロ地点は今後の検討から除外する。

¹ ditto SANTA ISABEL

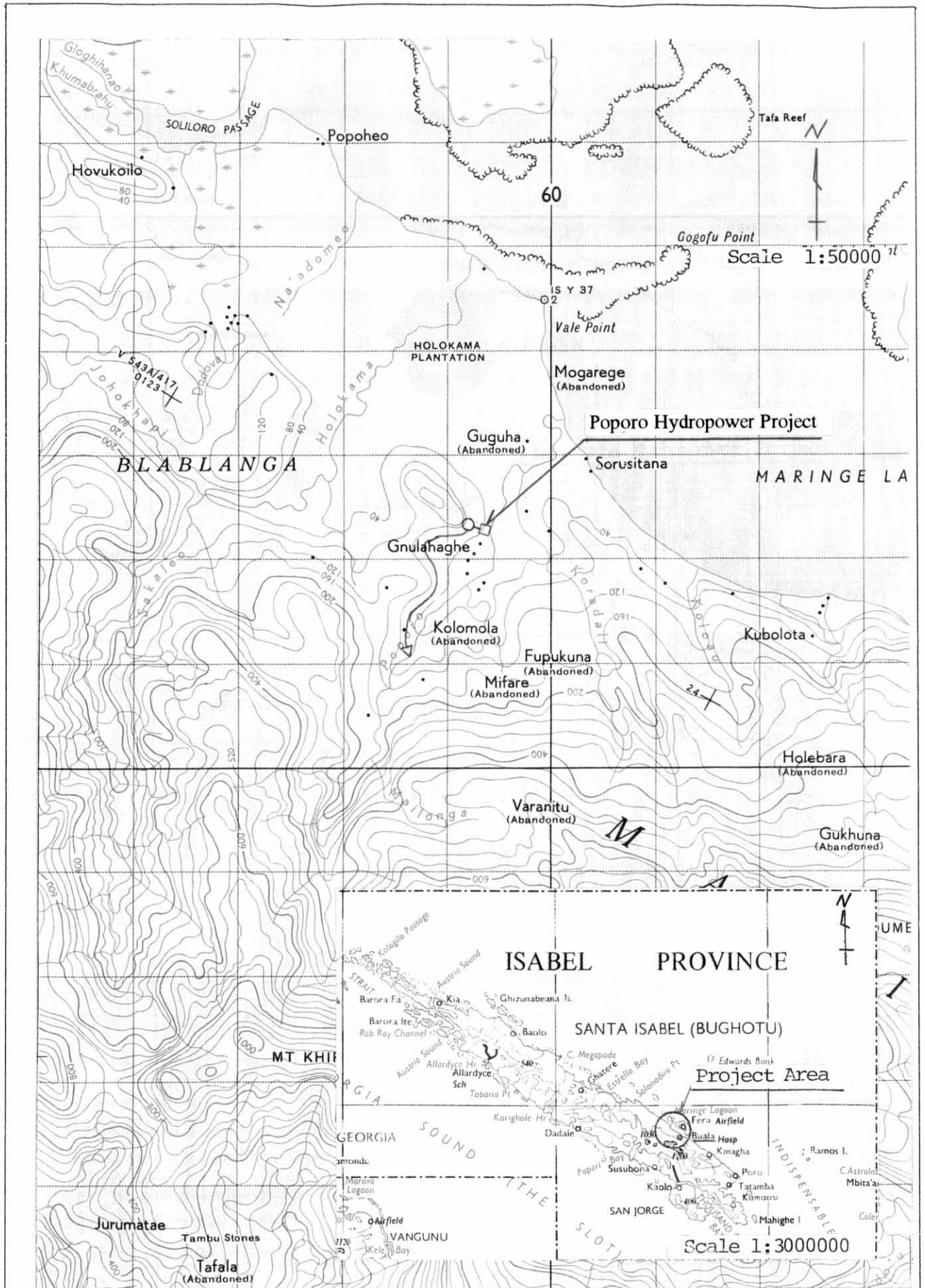
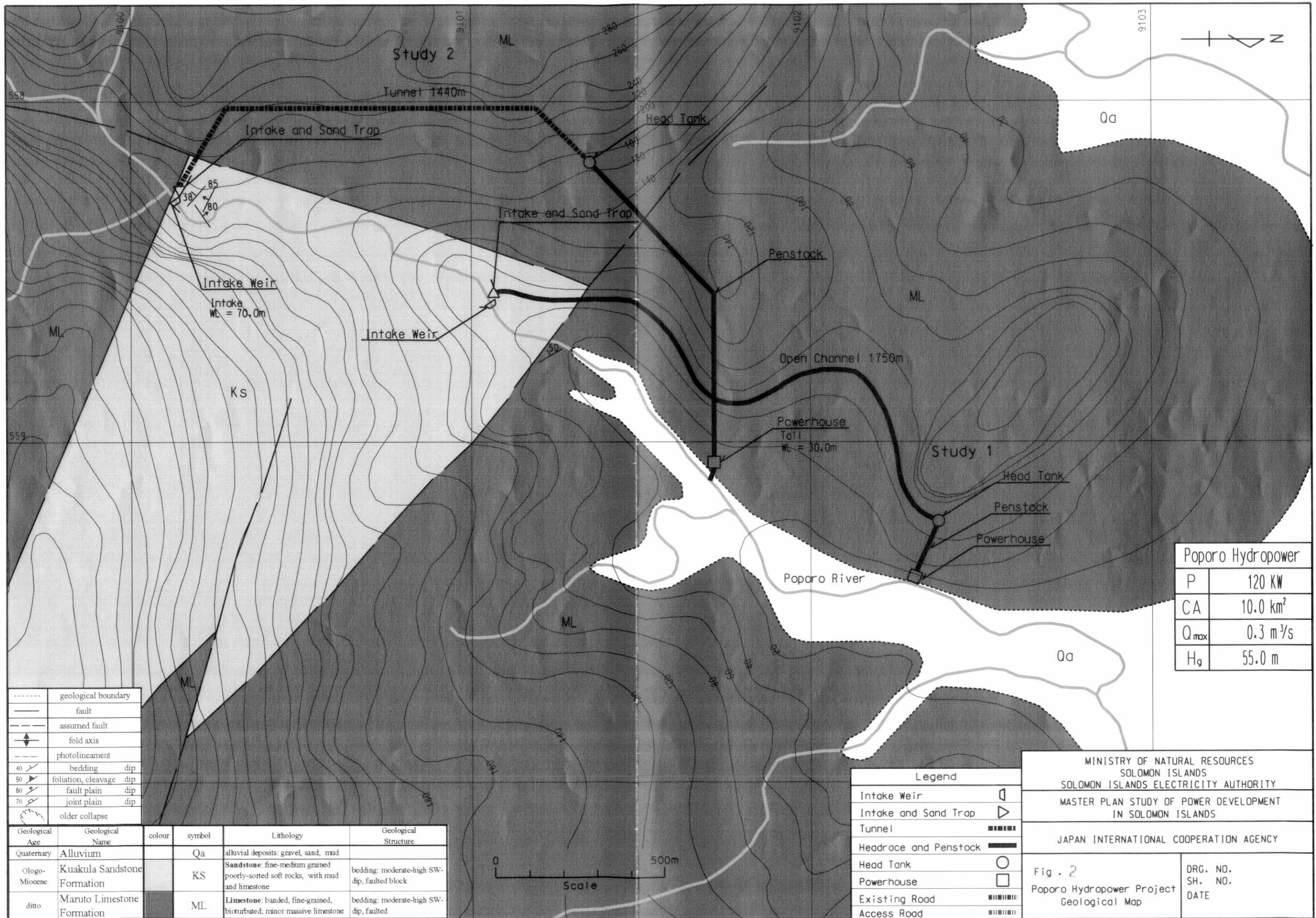


Fig. -1 Location Map of Poporo Hydropower



Poporo Hydropower	
P	120 KW
CA	10.0 km ²
Q _{max}	0.3 m ³ /s
H _g	55.0 m

-----	geological boundary
---	fault
- - -	assumed fault
◆	fold axis
---	photolineament
40 /	bedding dip
50 /	foliation, cleavage dip
60 /	fault plain dip
70 /	joint plain dip
○	older collapse

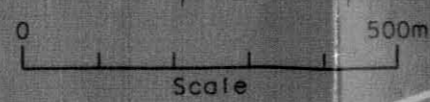
Geological Age	Geological Name	colour	symbol	Lithology	Geological Structure
Quaternary	Alluvium		Qa	alluvial deposits: gravel, sand, mud	
Oligo-Miocene	Kuakula Sandstone Formation		KS	Sandstone: fine-medium grained poorly-sorted soft rocks, with mud and limestone	bedding: moderate-high SW-dip, faulted block
ditto	Maruto Limestone Formation		ML	Limestone: banded, fine-grained, bioturbated; minor massive limestone	bedding: moderate-high SW-dip, faulted

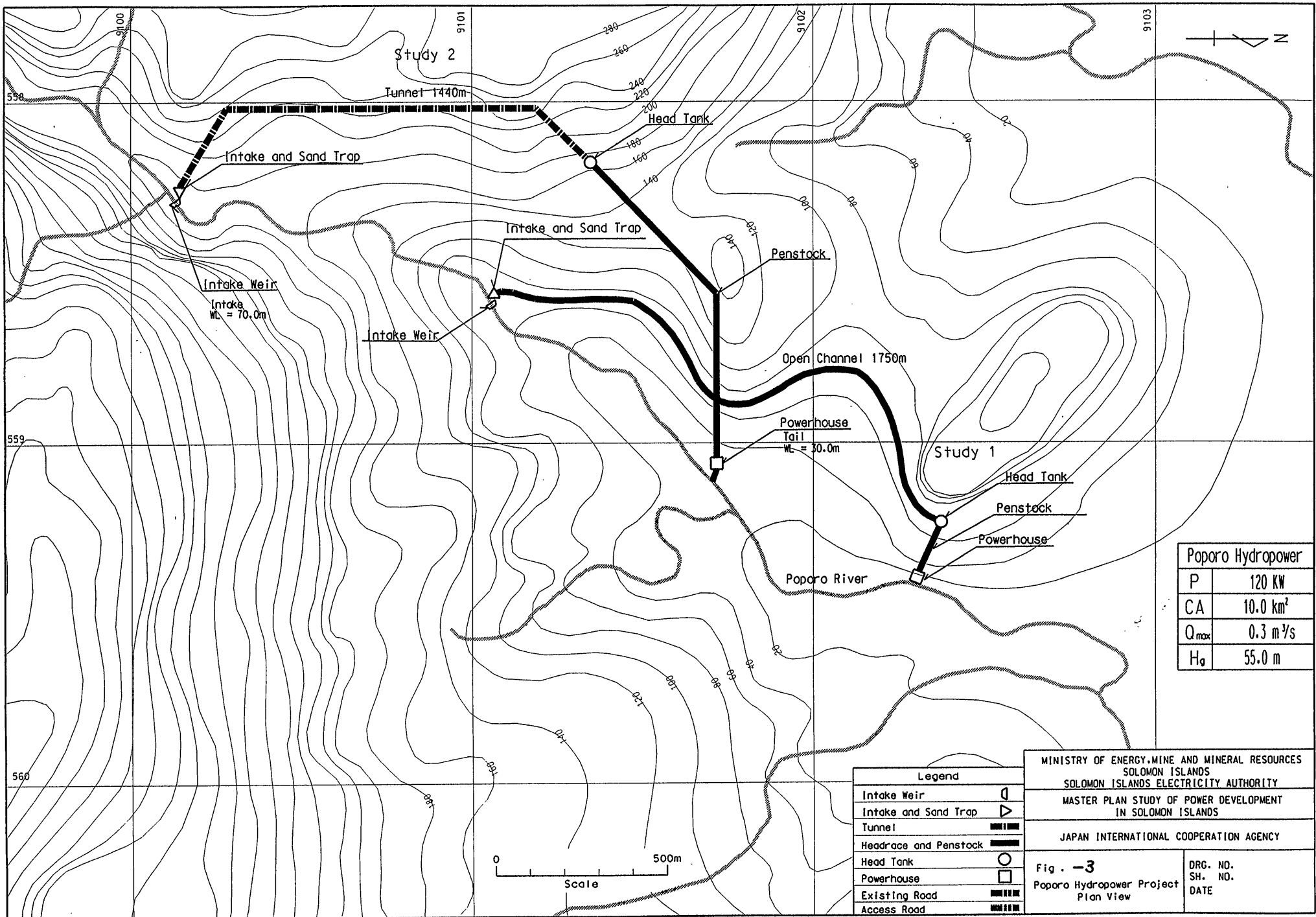
Legend	
Intake Weir	◁
Intake and Sand Trap	▷
Tunnel	▬▬▬▬▬
Headrace and Penstock	▬▬▬▬
Head Tank	○
Powerhouse	□
Existing Road	▬▬▬▬▬▬▬
Access Road	▬▬▬▬▬▬▬▬▬

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Fig. 2
 Poporo Hydropower Project
 Geological Map

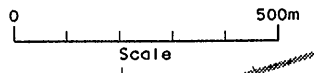
DRG. NO.
SH. NO.
DATE





Poporo Hydropower	
P	120 KW
CA	10.0 km ²
Q _{max}	0.3 m ³ /s
H _g	55.0 m

Legend	
Intake Weir	
Intake and Sand Trap	
Tunnel	
Headrace and Penstock	
Head Tank	
Powerhouse	
Existing Road	
Access Road	



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Fig. -3
Poporo Hydropower Project
Plan View

DRG. NO.
SH. NO.
DATE



Photo - 1 Left Bank of Poporo



Photo - 2 Left Bank Saddle