

表12.6.2 ムンダ水力のエネルギー単位分析 (kwh当たり)

Tariff (US\$/kWh):	1999	1	2	3	4	5	6	7	14	15	16	17	25
Water Charges		0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023
Variable O&M													
Escalable Component		0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023	0.0023
ROE at		0.0282	0.0282	0.0282	0.0282	0.0282	0.0282	0.0282	0.0282	0.0282	0.0282	0.0282	0.0282
F/O&M+Admn Cost+Insurance		0.0046	0.0046	0.0047	0.0047	0.0048	0.0049	0.0049	0.0054	0.0054	0.0055	0.0056	0.0061
Taxation, 1= Yes, 0= No		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Esc.		0.0327	0.0328	0.0328	0.0329	0.0330	0.0330	0.0331	0.0335	0.0336	0.0337	0.0337	0.0343
Non-Esc. Component													
Against F/loan		0.0514	0.0499	0.0484	0.0469	0.0454	0.0439	0.0424	0.0350	0.0334	0.0319	0.0303	0.0178
Against L/loan													
Total Non-Esc.		0.0514	0.0499	0.0484	0.0469	0.0454	0.0439	0.0424	0.0350	0.0334	0.0319	0.0303	0.0178
Total Tariff		\$0.0864	\$0.0850	\$0.0835	\$0.0821	\$0.0806	\$0.0792	\$0.0778	\$0.0708	\$0.0693	\$0.0679	\$0.0664	\$0.0544
Rs./kWh at \$= Rs.		4.32	4.25	4.18	4.10	4.03	3.96	3.89	3.54	3.47	3.39	3.32	2.72
Levelized Cost in 1999													
Total NPV of Generation at Discount Rate		\$0.0687											
Total NPV at Discount Rate		18762.18											
		\$1,289.86											

表12.6.3 ジョイント事業(公的+民間)モデルの財務評価

Project Name: Munda
 Start Year: 2002
 Commercial Operation Year: 2010
 Concession Term: 25
 End Year: 2034
 Unit: million current US\$

Installed Capacity (MW): 740
 Capacity Factor (Primary+Secondary Supply)(%): 37.14%
 Total Project Cost (Nominal): 1,092.69 million US\$ excluding interest during construction and price escalation
 Total Capital Cost Including IDC (Nominal): 1,259.25 million US\$ including interest during construction
 Share of Loans: 70.0% OBCF Loan, 1.8%, 30 Yrs, 75% of Cost, 10 Year Grace
 GOP Investment Share in Equity: 25.0%
 Developer's Share in Equity: 75.0% per year
 Interest Rate on Loans (weighted average): 75% commercial and 25% (Term Loan): 1.80% per year
 Loan Repayment Start: 10 years after commercial operation date
 Sponsor Grant: 0 million US\$
 Operation Cost: 1.0% of Capital Cost Excluding IDC
 Annual Insurance Costs and Fee (During Construction): 1.00% of Capital Cost
 O + M Escalation: 1.24%
 Auxiliary Rate & Line Loss: 1.30%
 Fuel Price \$/kWh: 0.00
 Fuel Escalation Rate: 0.0%
 Wheeling Fee \$/kWh: 0
 Levelized Primary Tariff in 2008: 0.992

CONCESSION TERMS

- Royalty Exemption Period: 0 years from commercial operations date
 - Water Charges: 0.0023 per kWh
 - Income tax in Pakistan: 0% of Total Revenue (Net Income)
 - Income Tax Exemption Period: 0 years from commercial operations date
 - Losses carried forward for Tax P: 1 0=No Crdwd, 1 = Carry Forward Losses
 Depreciation and Others:
 - Depreciation Rate Equipment: 25 years
 - Depreciation Rate Other: 25 years
 - Equity Grant: 0.000 US\$ million
 - Govt Negative cashflows carried: 0 0 = not carried forward, 1 = carry forward
 - Debt Service Reserve Period: 6 months
 - Minimum Maintained Cash Balance: 0.000 US\$ million
 - Interest on Cash Balance: 6.0% p.a.
 - Interest on Short Term Debtors: 10.25% p.a.
 - Debtors - Other: 1
 - Sundry Creditors, Average Level: 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2034	
Annual Investment Cost, MMUS\$	40.2	61.4	94.0	127.8	225.6	279.1	318.9	210.7																
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	82	83	84	85	86	87	88	88	89	90	91	92	104	105		
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	122	123	124	125	127	128	129	130	132	133	134	136	153	154		
Other Incomes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Revenue	0	0	0	0	0	0	0	0	204	206	208	210	212	214	217	219	221	223	225	228	256	259		
Annual Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Annual Wheeling Fee	0	0	0	0	0	0	0	0	11	11	11	11	11	12	12	12	12	12	12	12	14	15		
Annual O + M + Insurance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Land Leasing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	
Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total operating costs	0	0	0	0	0	0	0	0	16	17	17	17	17	17	17	17	18	18	18	18	20	20		
Net Operating Cashflow	0	0	0	0	0	0	0	0	188	190	191	193	195	197	199	201	203	205	208	210	237	239		
Financial Evaluation Based on Total Capital (million current US\$)																								
Capital Cost, exclude IDC	38.6	58.2	83.3	109.3	194.9	231.3	251.0	125.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Net Operating Cashflow	0	0	0	0	0	0	0	0	188	190	191	193	195	197	199	201	203	205	208	210	237	239		
Total Net Cashflow (including tax payment)	-39	-58	-83	-109	-195	-231	-251	-126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Cumulative Cashflow	-39	-97	-180	-290	-484	-716	-967	-1093	-805	-716	-524	-351	-135	62	261	463	666	872	1079	1289	1503	1722	1946	
IRR CALCULATION																								
IRR Calculation Excl IDC	39	58	83	109	195	231	251	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net after Tax on Profit excl. Depreciation, Interest and repayments	0	0	0	0	0	0	0	0	189	195	197	199	201	203	205	207	210	212	214	216	244	246		
Net Cash Flow	-39	-58	-83	-109	-195	-231	-251	-126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
IRR = 12.80% During the 25 Concession Years																								
Returns on Total Equity	12.07	19.03	28.20	38.28	67.67	85.73	95.68	63.21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Equity Input	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dividends Received	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net Cash Flows	-12	-19	-28	-38	-68	-84	-96	-63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
IRR = 15.180% During the 25 Concession Years																								
DEBT SERVICE COVERAGE RATIO									1.55	1.64	1.72	1.79	1.87	1.95	2.04	2.14	2.24	2.35	2.47	2.58	2.70	2.83	3.01	
DSCF Definition: 1 = (Net after tax profit excl. deprec. interest and repayments) / (Principal and interest payments)																								

表12.6.5 100%民間出資での財務評価

Project Name: Munda
 Start Year: 2002
 Commercial Operation Year: 2010
 Concession Term: 25
 End Year: 2034
 Unit: million current US\$

Installed Capacity (MW): 740
 Capacity Factor (Primary/Secondary Supply)(%): 37.14%
 Total Project Cost (Nominal): 1,092.69 million US\$ excluding interest during construction and price escalation
 Total Capital Cost including IDC (Nominal): 1,440.83 million US\$ including interest during construction
 Share of Loans: 30.0%
 Share of Loans: 70.0%
 O&M Loan: 1.4% 30 Yrs. 75% of Cost, 10 Year Grace
 COP Investment Share in Equity: 0.0%
 Developer's Share in Equity: 100.0%
 Interest Rate on Loans: 12.5% per year
 Interest Rate on Government Equity Loan: 0.00% per year
 Term Loan: 0 years
 Loan Repayment Start: 0 years after commercial operation date
 Sponsor Grant: 0 million US\$
 Operations Cost: 1.0% of Capital Cost Excluding IDC
 Annual O & M and Insurance Cost: 1.000% of Capital Cost
 Annual Insurance Costs and Fee (During Construction): 1.24%
 O & M Escalation: 1.20%
 Auxiliary Rat & Line Loss: 0.00
 Fuel Price \$/kWh: 0.00
 Fuel Escalation Rate: 0.0%
 Wheeling Fee \$/kWh: 0
 Levelized Primary Tariff in 2008: 0.092

CONCESSION TERMS

- Royalty Exemption Period: 0 years from commercial operations date
 0.0023 per kWh
 - Water Charges: 0% of Total Revenue (Net Income)
 0 years from commercial operations date
 - Income Tax Exemption Period: 1 (0=No C/Invd, 1 = Carry Forward Losses)
 Depreciation and Others: 25 years
 Depreciation Rate Equipment: 25 years
 Depreciation Rate Other: 0.000 US\$ million
 Equity Grant: 6 months
 Govt Negative cashflows carried: 0 (0 = not carried forward, 1 = carry forward)
 Debt Service Reserve Period: 0.000 US\$ million
 Minimum Maintained Cash Balan: 6.0% p.a.
 Interest on Cash Balances: 10.25% p.a.
 Debts - Electricity Average Level: 1
 Debts - Other: 0
 Sundry Creditors, Average Level: 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual Investment Cost, MMUS\$	40.8	64.8	64.9	132.7	234.4	243.3	339.8	238.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	82	83	84	85	86	87	88	88	89	90	91	92	104	105	106
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	122	123	124	125	127	128	129	130	132	133	134	136	153	154	154
Other Incomes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Revenue	0	0	0	0	0	0	0	0	204	206	208	210	212	214	217	219	221	223	225	228	256	256	259
Annual Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual Wheeling Fee	0	0	0	0	0	0	0	0	11	11	11	11	11	11	12	12	12	12	12	12	14	14	15
Annual O & M + Insurance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Leasing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total operating costs	0	0	0	0	0	0	0	0	16	17	17	17	17	17	17	17	18	18	18	18	18	20	20
Net Operating Cashflow	0	0	0	0	0	0	0	0	188	190	191	193	195	197	199	201	203	205	208	210	237	237	239
Financial Evaluation Based on Total Capital (million current US\$)																							
Capital Cost, exclude IDC	36.6	58.2	58.3	109.3	194.9	231.3	251.0	125.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Operating Cashflow	0	0	0	0	0	0	0	0	188	190	191	193	195	197	199	201	203	205	208	210	237	237	239
Total Net Cashflow (including tax payment)	-39	-58	-58	-109	-195	-231	-251	-126	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cumulative Cashflow	-39	-97	-180	-290	-484	-716	-967	-1093	-903	-716	-524	-331	-135	62	261	463	666	872	1079	1289	1500	1713	1928
IRR CALCULATION																							
Investment Expenditure Excl IDC	39	58	58	109	195	231	251	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net after Tax on Profit, excl. Depreciation, Interest and repayments	0	0	0	0	0	0	0	0	188	191	195	199	201	203	205	207	210	212	214	216	244	244	246
Net Cash Flow	-39	-58	-58	-109	-195	-231	-251	-126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRR= 12.76% During the 25 Concession Years																							
Returns on Total Equity	12.18	19.44	20.06	30.82	70.32	87.99	101.95	71.48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity Input	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dividends Received	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Cash Flows	-12	-19	-40	-70	-88	-102	-71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IRR= 11.44% During the 25 Concession Years																							
DEBT SERVICE COVERAGE RATIO									1.13	1.18	1.24	1.32	1.38	1.44	1.51	1.58	1.66	1.75	1.84	1.95	4.43	4.43	5.42
DSCR Definition: 1 = (Net after tax profit, excl. degn, interest and repayments) / (Principal and interest payments)																							

表12.6.6 100%公的所有的財務評価

Project Name: Munda
 Start Year: 2002
 Commercial Operation Year: 2010
 Concession Term: 25
 End Year: 2034
 Unit: million current US\$

Installed Capacity (MW): 740
 Capacity Factor (Primary+Secondary Supply)(%): 37.14%
 Total Project Cost (Nominal): 1,092.69 million US\$ excluding interest during construction and price escalation
 Total Capital Cost (Nominal): 1,143.58 million US\$ including interest during construction
 Share of Loans: 30.0%
 Share of Equity: 70.0%
 COP Investment Share in Equity: 100.0%
 Developer's Share in Equity: 0.0%
 Interest Rate on Loans: 1.5% per year
 Interest Rate on Government Equity Loan: 1.8% per year
 Term Loan: 30 years
 Loan Repayment Start: 10 years after commercial operation date
 Sponsor Grant: 0 million US\$
 Operator Cost: 0 million US\$
 Annual O & M and Insurance Cost: 1.0% of Capital Cost, Excluding IDC
 Annual Insurance Costs and Fee (During Construction): 1.00% of Capital Cost
 O + M Escalation: 1.24%
 Auxiliary Rate & Line Loss: 1.5%
 Fuel Escalation Rate: 0.0%
 Wheeling Fee \$/MWh: 0.00%
 Levelized Primary Tariff in 2008: 0.892

CONCESSION TERMS
 - Royalty Exemption Period: 0 years from commercial operations date
 - Water Charges: 0.0023 per kWh
 - Income Tax in Pakistan: 0% of Total Revenue (Net Income)
 - Income Tax Exemption Period: 0 years from commercial operations date
 - Losses carried forward (or Tax F. Debit) No C/Adv. 1 = Carry Forward Losses
 - Depreciation and Others:
 Depreciation Rate Equipment: 25 years
 Depreciation Rate Other: 25 years
 Equity Grant: 0.000 US\$ million
 Govt. Negative cashflows carried: 0 = not carried forward, 1 = carry forward
 Debt Service Reserve Period: 6 months
 Minimum Maintained Cash Bala: 0.000 US\$ million
 Interest on Cash Balances: 6.0% p.a.
 Interest on Short T. Debts: 10.25% p.a.
 Debts - Electricity Average Level: 1
 Debts - Other: 0
 Sundry Creditors, Average Level: 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2034	
Annual Investment Cost, MMUS\$	39.1	59.5	85.7	113.1	201.3	240.7	265.7	140.3																
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	82	83	84	85	86	87	88	89	90	91	92	92	104	105		
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	122	123	124	125	127	128	129	130	132	134	136	136	153	154		
Other Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Total Revenue	0	0	0	0	0	0	0	0	204	206	208	210	212	214	217	219	221	223	225	228	256	259		
Annual Operating Costs																								
Annual Wheeling Fee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Annual O + M + Insurance	0	0	0	0	0	0	0	0	11	11	11	11	11	11	12	12	12	12	12	12	12	14	15	
Land Leasing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54		
Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Total operating costs	0	0	0	0	0	0	0	0	16	17	17	17	17	17	17	17	18	18	18	18	20	20		
Net Operating Cashflow	0	0	0	0	0	0	0	0	188	190	191	193	195	197	199	201	203	205	208	210	237	239		
Financial Evaluation based on Total Capital (million current US\$)																								
Capital Cost, exclude IDC	34.6	54.2	83.3	109.3	194.9	231.3	251.0	125.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Net Operating Cashflow	0	0	0	0	0	0	0	0	188	190	191	193	195	197	199	201	203	205	208	210	237	239		
Net after Tax on Profit excl. Depreciation, Interest, and repayments	-39	-58	-83	-109	-195	-231	-251	-126	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Cumulative Cashflow	-39	-97	-180	-290	-484	-716	-867	-1093	-905	-716	-524	-331	-135	62	261	463	666	872	1079	1288	1493	1693		
IRR CALCULATION																								
Investment Expenditure Excl IDC	39	58	83	109	195	231	251	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Net after Tax on Profit excl. Depreciation, Interest, and repayments	0	0	0	0	0	0	0	0	192	195	197	199	201	203	205	207	210	212	214	216	244	246		
Net Cash Flow	-39	-58	-83	-109	-195	-231	-126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
IRR = 12.82% During the 25 Concession Years																								
Return on Total Equity																								
Equity Input	11.74	17.45	25.71	33.94	60.39	72.22	79.12	42.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Dividends Received	0	0	0	0	0	0	0	0	155	181	183	185	187	189	191	193	195	196	198	200	209	212		
Net Cash Flows	-12	-18	-26	-34	-60	-72	-79	-42	155	181	183	185	187	189	191	193	195	196	198	200	209	212		
DEBT SERVICE COVERAGE RATIO																								
IRR = 26.197% During the 25 Concession Years																								
DCSR Definition 1:									13.35	13.55	13.69	13.82	13.96	14.11	14.25	14.39	14.54	14.69	5.20	5.32	6.99	7.16		
NOTE: Definition 1 = (Net after tax profit excl. deprec. interest and repayments) / (Principal and interest payments)																								

表12.6.7 政府収入の財務評価 (公的モデル)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Loan to Finance Govt Equity																									
Amount Expended	11.7	17.9	25.7	33.9	60.4	72.2	79.1	42.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Equity Input	11.7	29.6	55.3	89.2	149.6	221.9	301.0	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	343.1	
Equity Subsidy	0.1	0.4	0.8	1.3	2.2	3.4	4.8	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Interest on Equity Loan During Construction	11.8	30.1	58.1	91.3	159.9	229.6	313.3	391.6																	
Loan Balance During Construction																									
Opening Balance of Govt Equity Loan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	361.6	
Loan Interest	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	
Loan Principal Repayments	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Dividend Received by Govt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	
Cash Flows for IRR calculation (equity)	-11.7	-17.9	-25.7	-33.9	-60.4	-72.2	-79.1	-42.1	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	
Net Cash Flow from Equity Investment	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	148.5	174.1	178.1	180.1	182.2	182.2	184.2	186.3	188.4	188.4	177.2	154.2	154.2	157.0	193.1	211.4	
NET																									
Nominal Total =	4,348.3																								
Govt IRR =	0.27																								
Govt NPV =	545.2																								
Royalties Received	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Taxation Received	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Total Royalties	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Net Benefit to Govt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.1	179.7	181.7	183.7	185.7	187.7	189.8	191.9	194.0	194.0	182.7	159.7	159.7	162.6	198.6	217.0	
Losses carried forward (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Interest on Losses (0)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net Benefit to Govt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.1	179.7	181.7	183.7	185.7	187.7	189.8	191.9	194.0	194.0	182.7	159.7	159.7	162.6	198.6	217.0	
Total Cash Benefit to Govt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.1	179.7	181.7	183.7	185.7	187.7	189.8	191.9	194.0	194.0	182.7	159.7	159.7	162.6	198.6	217.0	
Cash Available to Govt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	154.1	179.7	181.7	183.7	185.7	187.7	189.8	191.9	194.0	194.0	182.7	159.7	159.7	162.6	198.6	217.0	
After allowing for interest on Losses																									
Nominal Value - Millions USD	4,490.7																								
Discount Rate	12%																								
Base Year	2002																								
Net Present Value - Millions USD	562.7																								
IRR Calculation																									
Govt Equity Return - Period Modelled	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Govt Equity Return - Concession Period	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Government's Receipts (Millions USD)																									
Nominal	138.4	0.0	4,660.1	4,807.5																					
NPV at 12%	17.5	0.0	575.5	580.1																					
Total GOL Receipts as IRR on GOL Equity	26.66%																								
Dividends as IRR on GOL Equity	29.18%																								
Developer's Receipts (Millions USD)																									
Dividends Received	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Equity Invested	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Net Cash Flow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Developer's IRR on Equity Invested	-11.7	-17.9	-25.7	-33.9	-60.4	-72.2	-79.1	-42.1	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	

表12.6.8 感度分析 (運営・維持コスト20%上昇)

Project Name:	Musdis
Start Year:	2002
Commercial Operation Year:	2010
Concession Term:	25
End Year:	2034
Unit:	million current US\$
Installed Capacity (MW):	740
Capacity Factor (Primary+Secondary Supply)(%):	37.14%
Total Project Cost (Nominal):	1,092.69 million US\$ excluding interest during construction and price escalation
Total Capital Cost including IDC (Nominal):	1,743.58 million US\$ including interest during construction
Share Equity:	30.0%
Share of Loans:	70.0%
GOP Investment, Share in Equity:	100.0%
Developer's Share in Equity:	0.0%
Interest Rate on Loans:	1.80% per year
Interest Rate on Government Equity Loan:	1.80% per year
Term Loan:	30 years
Loan Repayment Start:	10 years after commercial operation date
Sponsor Grant:	0 million US\$
Operations Cost:	1.2% of Capital Cost Excluding IDC
Annual O & M and Insurance Cost:	1.000%
Annual Insurance Costs and Fee (During Construction):	1.25%
O + M Escalation:	1.30%
Auxiliary Rate & Line Loss:	0.00
Fuel Price \$/kWh:	0.00
Fuel Escalation Rate:	0.0%
Wheeling Fee \$/kWh:	0
Levelized Primary Tariff in 2008:	0.492

CONCESSION TERMS
 - Royalty, Exemption Period
 - Water Charges
 - Income tax in Pakistan
 - Income Tax Exemption Period
 - Losses carried forward for Tax P.
Depreciation and Others
 - Depreciation Rate Equipment:
 - Depreciation Rate Other:
 - Equity Grant:
 - Govt Negative cash flows carried
 - Debt Service Reserve Period
 - Minimum Maintained Cash Balan
 - Interest on Cash Balances
 - Interest on Short
 - Electricity Average Lev
 Debtors - Other
 Sundry Creditors, Average Level

0 years from commercial operations date
 0.0023 per kWh
 0% of Total Revenue (Net Income)
 0 years from commercial operations date
 1.0=No C/Inv, 1 = Carry Forward Losses

25 years
 25 years
 0.000- US\$ million
 0 = not carried forward, 1 = carry forward
 6 months
 0.000 US\$ million
 6.0% p.a.
 10.25% p.a.
 1
 0
 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2034
Annual Investment Cost, MMUS\$	30.1	59.3	85.7	113.1	203.3	240.7	240.7	240.7	140.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	82	83	84	85	86	87	88	89	90	91	92	93	94	95	105
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	122	123	124	125	127	128	129	130	132	133	134	136	138	153	154
Other Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Revenue	0	0	0	0	0	0	0	0	204	206	208	210	212	214	217	219	221	223	225	228	230	236	269
Annual Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual Wheeling Fee	0	0	0	0	0	0	0	0	13	11	11	11	11	12	12	12	12	12	12	12	12	14	15
Annual O + M + Insurance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Land Leasing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total operating costs	0	0	0	0	0	0	0	0	19	17	17	17	17	17	17	17	18	18	18	18	18	20	20
Net Operating Cashflow	0	0	0	0	0	0	0	0	185	190	191	193	195	197	199	201	203	205	208	210	210	237	239
Financial Evaluation, Based on Total Capital (million current US\$)																							
Capital Cost, exclude IDC	36.6	58.2	83.3	109.3	194.9	231.3	231.0	231.0	125.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Operating Cashflow	0	0	0	0	0	0	0	0	185	190	191	193	195	197	199	201	203	205	208	210	210	237	239
Total Net Cashflow (including tax payment)	-39	-39	-83	-109	-195	-231	-231	-231	-126	185	190	191	193	195	197	199	201	203	205	208	210	237	239
Cumulative Cashflow	-39	-77	-160	-250	-444	-676	-907	-1093	-807	-528	-333	-138	61	259	460	664	869	1077	1287	1497	1707	1917	2127
IRR CALCULATION																							
Investment Expenditure Excl IDC:	39	58	83	109	195	231	231	231	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net after Tax on Profit excl. Depreciation, Interest and repayments	0	0	0	0	0	0	0	0	190	195	197	199	201	203	205	207	210	212	214	216	216	244	246
Net Cash Flow	-39	-58	-83	-109	-195	-231	-231	-231	-126	190	195	197	199	201	203	205	207	210	212	214	216	244	246
IRR= 12.81% During the 25 Concession Years																							
Return on Total Equity	11.74	17.85	25.71	33.94	60.39	72.22	79.12	42.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equity Input	0	0	0	0	0	0	0	0	153	180	183	185	187	189	191	193	195	198	199	201	203	209	212
Dividends Received	-12	-18	-25	-34	-60	-72	-79	-42	153	190	193	195	197	199	201	203	205	207	210	212	214	244	246
Net Cash Flows	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEBT SERVICE COVERAGE RATIO																							
DSCR Definition 1:									13.19	13.55	13.69	13.82	13.96	14.11	14.25	14.39	14.54	14.69	14.84	14.99	15.14	15.29	15.44
DSCR Definition 1:									13.19	13.55	13.69	13.82	13.96	14.11	14.25	14.39	14.54	14.69	14.84	14.99	15.14	15.29	15.44
NOTE: Definition 1 = (Net after tax profit excl. deprec., interest and repayments) / (Principal and interest payments)																							

表12.6.9 感度分析 (水料金 20%上昇)

Project Name: Munda
 Start Year: 2002
 Commercial Operation Year: 2010
 Concession Term: 25
 End Year: 2034
 Unit: million current US\$

Installed Capacity (MW): 740
 Capacity Factor (Primary+Secondary Supply)(%): 37.14%
 Total Project Cost (Nominal): 1,092.69 million US\$ excluding interest during construction and price escalation
 Total Capital Cost including IDC (Nominal): 1,143.58 million US\$ including interest during construction
 Share of Loans: 30.0%
 Share of Loans: 30.0%
 OECF Loan: 1.8% 30 Yrs, 75% of Cost, 10 Year Grace
 100.0%
 0.0%
 1.8% per year
 1.80% per year
 30 years
 10 years after commercial operation date
 0 million US\$
 1.0% of Capital Cost Excluding IDC
 1.000% of Capital Cost
 1.24%
 1.30%
 0.00
 0.0%
 0.0%
 0.99%

CONCESSION TERMS:
 - Royalty Exemption Period: 0 years from commercial operations date
 - Water Charges: 0.0028 per kWh
 - Income tax in Pakistan: 0% of Total Revenue (Net Income)
 - Losses carried forward for Tax P: 0 years from commercial operations date
 1.0% No C/NoD, 1 = Carry Forward Losses
 Depreciation and Others:
 - Depreciation Rate Equipment: 25 years
 - Depreciation Rate Other: 25 years
 - Equity Grant: 0.000 US\$ million
 - Govt Negative cashflows carried: 0 = not carried forward, 1 = carry forward
 - Debt Service Reserve Period: 6 months
 - Minimum Maintained Cash Bal: 0.000 US\$ million
 - Interest on Cash Balances: 6.00% p.a.
 - Interest on Short: 10.25% p.a.
 Debtors - Electricity: Average Level
 Debtors - Other: 1
 Sundry Creditors: Average Level: 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2034	
Annual Investment Cost, MMUS\$	39.1	59.5	85.7	113.1	201.3	240.7	263.7	140.3																
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	82	83	84	85	86	87	88	88	89	90	91	92	92	104	105	
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	122	123	124	125	127	128	129	130	132	133	134	136	136	153	154	
Other Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Revenue	0	0	0	0	0	0	0	0	204	206	208	210	212	214	217	219	221	223	225	228	228	256	259	
Annual Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Annual Wheeling Fee	0	0	0	0	0	0	0	0	11	11	11	11	11	12	12	12	12	12	12	12	12	14	15	
Annual O + M + Insurance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Land Leasing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	6.64	
Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total operating costs	0	0	0	0	0	0	0	0	18	18	18	18	18	18	18	18	19	19	19	19	19	21	21	
Net Operating Cashflow	0	0	0	0	0	0	0	0	186	188	190	192	194	196	198	200	202	204	206	209	209	235	238	
Financial Evaluation Based on Total Capital (million current US\$)																								
Capital Cost, exclude IDC	34.6	58.2	83.3	109.3	194.9	231.3	251.0	125.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Net Operating Cashflow	-39	-58	-83	-109	-195	-231	-251	-126	186	188	190	192	194	196	198	200	202	204	206	209	209	235	238	
Total Net Cashflow (including tax payment)	-39	-58	-83	-109	-195	-231	-251	-126	186	188	190	192	194	196	198	200	202	204	206	209	209	235	238	
Cumulative Cashflow	-39	-97	-180	-290	-484	-716	-967	-1093	-906	-718	-527	-335	-141	55	244	454	655	860	1067	1275	1475	1675	1875	
IRR CALCULATION																								
Investment Expenditure Excl IDC	39	58	83	109	195	231	251	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net after Tax on Profit excl. Depreciation, Interest and repayments	-39	-58	-83	-109	-195	-231	-251	-126	191	194	196	198	200	202	204	206	208	210	213	215	215	242	245	
Net Cash Flow	-39	-58	-83	-109	-195	-231	-251	-126	191	194	196	198	200	202	204	206	208	210	213	215	215	242	245	
IRR= 12.77% During the 25 Concession Year																								
Return on Total Equity	11.74	17.85	25.71	35.94	60.59	72.22	79.12	42.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Equity Input	0	0	0	0	0	0	0	0	154	179	181	183	186	188	190	192	194	193	192	192	174	204	211	
Dividends Received	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net Cash Flows	-12	-18	-26	-34	-60	-72	-79	-42	154	179	181	183	186	188	190	192	194	193	192	192	174	204	211	
IRR= 26.181% During the 25 Concession Year																								
DEBT SERVICE COVERAGE RATIO																								
DSR: Definition 1: (Net after tax profit excl. debt, interest and repayments) / (Principal and interest payments)									13.27	13.47	13.61	13.75	13.89	14.03	14.17	14.31	14.46	14.61	5.17	5.29	5.29	6.96	7.13	

表12.6.10 敏感度分析 (Investment Cost 20%上升)

Project Name: Munda
 Start Year: 2002
 Commercial Operation Year: 2010
 Concession Term: 25
 End Year: 2034
 Unit: million current US\$

Installed Capacity (MW): 740
 Capacity Factor (Primary+Secondary Supply)(%): 37.14%
 Total Project Cost (Nominal): 1,311.23 million US\$ excluding interest during construction and price escalation
 Total Capital Cost Including IDC (Nominal): 1,372.29 million US\$ including interest during construction
 Share Equity: 50.0%
 Share of Loans: 70.0%
 GOP Investment Share in Equity: 100.0%
 Developer's Share in Equity: 0.0%
 Interest Rate on Loans: 1.8% per year
 Interest Rate on Government Equity Loan: 1.80% per year
 Term Loan: 30 years
 Loan Repayment Start: 10 years after commercial operation date
 Sponsor Grant: 0 million US\$
 Operation Cost:
 Annual O & M and Insurance Cost: 1.0% of Capital Cost Excluding IDC
 Annual Insurance Costs and Fee (During Construction): 1.000% of Capital Cost
 O & M Escalation: 1.24%
 Auxiliary Rate & Line Loss: 1.30%
 Fuel Price \$/kWh: 0.00
 Fuel Escalation Rate: 0.0%
 Wheeling Fee \$/kWh: 0.0%
 Levilized Primary Tariff in 2008: 0.092

CONCESSION TERMS:
 - Royalty Exemption Period: 0 years from commercial operations date
 - Water Charges: 0.0023 per kWh
 - Income Tax in Pakistan: 0% of Total Revenue (Net Income)
 - Income Tax Exemption Period: 0 years from commercial operations date
 - Losses carried forward for Tax P: 1 On No Chwd, 1 = Carry Forward Losses

Depreciations and Others:
 - Depreciation Rate Equipment: 25 years
 - Equity Grant: 0.000 US\$ million
 - Govt Negative cashflows carried: 0 = not carried forward, 1 = carry forward
 - Debt Service Reserve Period: 6 months
 - Minimum Maintained Cash Balance: 0.000 US\$ million
 - Interest on Short Term Debtors: 6.0% p.a.
 - Debtors - Other: 10.25% p.a.
 - Sundry Creditors: Average Level: 1
 - Debtors - Other: 0
 - Sundry Creditors: Average Level: 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2033	2034	
Annual Investment Cost, MMUS\$	47.0	71.4	102.8	135.8	241.6	288.9	316.5	168.4															
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	82	83	84	85	86	87	88	88	89	90	91	92	104	105	
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	122	123	124	125	127	128	129	130	132	133	134	136	153	154	
Other Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Revenue	0	0	0	0	0	0	0	0	204	206	208	210	212	214	217	219	221	223	225	228	256	259	
Annual Operating Costs	0	0	0	0	0	0	0	0	13	11	11	11	11	12	12	12	12	12	12	12	14	15	
Annual Wheeling Fee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Annual O & M - Insurance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Land Leasing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	
Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Total operating costs	0	0	0	0	0	0	0	0	19	17	17	17	17	17	17	17	18	18	18	18	20	20	
Net Operating Cashflow	0	0	0	0	0	0	0	0	185	190	191	193	195	197	199	201	203	205	208	210	237	239	
Financial Evaluation Based on Total Capital (million current US\$)																							
Capital Cost, exclude IDC	46.4	69.9	100.0	131.2	235.9	277.6	301.2	151.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Net Operating Cashflow	0	0	0	0	0	0	0	0	185	190	191	193	195	197	199	201	203	205	208	210	237	239	
Total Net Cashflow (including tax payment)	-46	-70	-100	-131	-234	-278	-301	-151	185	190	191	193	195	197	199	201	203	205	208	210	237	239	
Cumulative Cashflow	-46	-116	-216	-347	-581	-859	-1190	-1311	-1126	-836	-745	-651	-556	-459	-41	242	485	651	838	1048	1362	1691	
IRR CALCULATION																							
Investment Expenditure Excl IDC	46	70	100	131	234	278	301	151	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net after Tax on Profit, incl. Depreciation, Interest and repayments	0	0	0	0	0	0	0	0	190	195	197	199	201	203	205	207	210	212	214	216	244	246	
Net Cash Flow	-46	-70	-100	-131	-234	-278	-301	-151	190	195	197	199	201	203	205	207	210	212	214	216	244	246	
IRR= 10.97% During the 25 Concession Years																							
Returns on Total Equity	14.09	21.42	30.85	40.73	72.47	86.67	94.95	50.51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Equity Input	0	0	0	0	0	0	0	0	149	178	180	182	184	186	188	190	192	178	165	167	202	205	
Dividends Received	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net Cash Flows	-14	-21	-51	-41	-72	-87	-95	-51	149	178	180	182	184	186	188	190	192	178	165	167	202	205	
IRR= 23.14% During the 25 Concession Years																							
DEBT SERVICE COVERAGE RATIO																							
DSCR Definition 1:									10.99	11.39	11.40	11.52	11.64	11.76	11.87	11.99	12.12	12.24	4.34	4.43	5.93	5.97	
DSCR Definition 1:																							
NOTE: Definition 1 = (Net after tax profit excl. deprin, interest and repayments) / (Principal and interest payments)																							

表12.6.11 感度分析 (Energy Sales 10%減少)

Project Name: Munda
 Start Year: 2002
 Commercial Operation Year: 2010
 Concession Term: 25
 End Year: 2034
 Unit: million current US\$

Installed Capacity (MW): 740
 Capacity Factor (Primary+Secondary Supply)(%): 37.14%
 Total Project Cost (Nominal): 1,092.69 million US\$ excluding interest during construction and price escalation
 Total Capital Cost Including IDC (Nominal): 1,143.58 million US\$ including interest during construction
 Share of Loans: 70.0% OECF Loan, 1.8%, 30 Yrs, 75% of Cost, 10 Year Grace
 100.0%
 0.0%
 1.8% per year
 1.80% per year
 30 year
 10 years after commercial operation date
 0 million US\$
 1.0% of Capital Cost Excluding IDC
 1.000% of Capital Cost
 1.24%
 1.30%
 0.00
 0.0%
 0
 0.002

CONCESSION TERMS
 - Royalty Exemption Period: 0 years from commercial operations date
 - Water Charges: 0.0023 per kWh
 - Income tax in Pakistan: 0% of Total Revenue (Net Income)
 - Income Tax Exemption Period: 0 years from commercial operations date
 - Losses carried forward for Tax Pt: 1. 0=No C/fwd, 1 = Carry Forward Losses
 Depreciation and Others
 Depreciation Rate Equipment: 25 years
 Depreciation Rate Other: 25 years
 Equity Grant: 0.000 US\$ million
 Debt Service Reserve Period: 0 = not carried forward, 1 = carry forward
 Minimum Maintained Cash Balance: 6 months
 Interest on Cash Balance: 0.000 US\$ million
 Interest on Short Term Debt: 6.00% p.a.
 Debtors - Electricity Average Level: 10.25% p.a.
 Debtors - Other: 1
 Sundry Creditors, Average Level: 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Annual Investment Cost, MMUS\$	39.1	59.5	85.7	113.1	201.3	240.7	263.7	140.3																
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	74	75	76	76	77	78	79	80	80	81	82	83	83	93	94	
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	109	111	112	113	114	115	116	117	119	120	121	122	122	138	139	
Other Income	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total Revenue	0	0	0	0	0	0	0	0	184	185	187	189	191	193	195	197	199	201	203	205	205	231	233	
Annual Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Annual Wheeling Fee	0	0	0	0	0	0	0	0	11	11	11	11	11	12	12	12	12	12	12	12	12	14	15	
Annual O & M - Insurance	0	0	0	0	0	0	0	0	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	
Land Leasing	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	16	17	17	17	17	17	17	17	18	18	18	18	18	20	20	
Insurance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Total operating costs	0	0	0	0	0	0	0	0	16	17	17	17	17	17	17	17	18	18	18	18	18	20	20	
Net Operating Cashflow	0	0	0	0	0	0	0	0	167	169	171	172	174	176	178	179	181	183	185	187	187	211	213	
Financial Evaluation Based on Total Capital (million current US\$)																								
Capital Cost, exclude IDC	38.6	58.2	83.3	109.3	194.9	231.3	251.0	125.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Net Operating Cashflow	0	0	0	0	0	0	0	0	167	169	171	172	174	176	178	179	181	183	185	187	187	211	213	
Total Net Cashflow (including tax payment)	-39	-58	-83	-109	-195	-231	-251	-126	167	169	171	172	174	176	178	179	181	183	185	187	187	211	213	
Cumulative Cashflow	-39	-97	-180	-290	-484	-716	-967	-1093	-926	-757	-586	-414	-239	-64	114	294	475	658	843	1030	1030	3369	3562	
IRR CALCULATION																								
Investment Expenditure Excl IDC	39	58	83	109	195	231	251	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Net After Tax on Profit excl. Depreciation, Interest and repayments	-39	-58	-83	-109	-195	-231	-251	-126	171	174	176	178	179	181	183	185	187	189	191	192	192	217	219	
Net Cash Flow									171	174	176	178	179	181	183	185	187	189	191	192	192	217	219	
IRR = 11.65% During the 25 Concession Years																								
Returns on Total Equity																								
Equity Input	11.74	17.85	25.71	33.94	60.59	72.22	79.12	42.09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Dividends Received	0	0	0	0	0	0	0	0	136	159	161	163	165	167	168	170	172	172	172	172	172	182	185	
Net Cash Flows	-12	-18	-26	-34	-60	-72	-79	-42	136	159	161	163	165	167	168	170	172	172	172	172	172	182	185	
IRR = 24.28% During the 25 Concession Years																								
DEBT SERVICE COVERAGE RATIO																								
DSR Definition 1: (Net after tax profit excl. deprec. interest and repayments) / (Principal and interest payments)									11.89	12.07	12.20	12.32	12.45	12.57	12.70	12.83	12.96	13.09	13.21	13.33	13.45	13.57	13.69	
DSR Definition 2: (Net after tax profit excl. deprec. interest and repayments) / (Principal and interest payments)									11.89	12.07	12.20	12.32	12.45	12.57	12.70	12.83	12.96	13.09	13.21	13.33	13.45	13.57	13.69	

表12.6.12 感度分析(完工が1年遅れた場合)

Project Name: Munda
 Start Year: 2002
 Commercial Operation Year: 2010
 Concession Term: 25
 End Year: 2034
 Unit: million current US\$

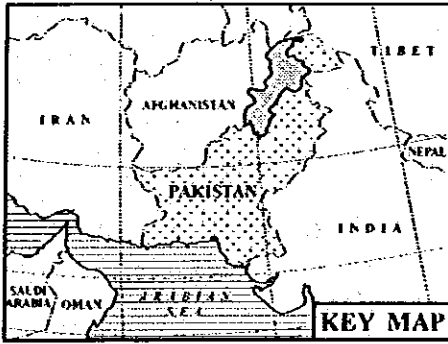
Installed Capacity (MW): 740
 Capacity Factor (Primary-Secondary Supply %): 37.14%
 Total Project Cost (Nominal): 1,092.69 million US\$ excluding interest during construction and price escalation.
 Total Capital Cost (including IDC (Nominal)): 1,143.58 million US\$ including interest during construction.
 Share of Loans: 30.0% OBCF Loan, 1.4% 30 Yrs, 75% of Cost, 10 Year Grace
 Share of Loans: 70.0%
 COF Investment/Share in Equity: 100.0%
 Developer's Share in Equity: 0.0%
 Interest Rate on Loans: 1.8% per year
 Interest Rate on Government Equity Loan: 1.80% per year
 Term Loan: 30 years
 Loan Repayment Start: 10 years after commercial operation date
 Sponsor Grant: 0 million US\$
 Operation Cost: 0 million US\$
 Annual O & M and Insurance Cost: 1.0% of Capital Cost Excluding IDC
 Annual Insurance Costs and Fee (During Construction): 1.000% of Capital Cost
 O + M Escalation: 1.24%
 Auxiliary Rate & Line Loss: 1.30%
 Fuel Price \$/kWh: 0.00
 Fuel Escalation Rate: 0.0%
 Wheeling Fee \$/kWh: 0
 Levelized Primary Tariff in 2008: 0.092

CONCESSION TERMS
 - Royalty Exemption Period: 0 years from commercial operations date
 - Water Charges: 0.0023 per kWh
 - Income tax in Pakistan: 0% of Total Revenue (Net Income)
 - Income Tax Exemption Period: 0 years from commercial operations date
 - Losses carried forward for Tax P: 1 0=No CFwd, 1 = Carry Forward Losses
Depreciation and Others
 - Depreciation Rate Equipment: 25 years
 - Depreciation Rate Other: 25 years
 - Equity Grant: 0.000 US\$ million
 - Gov. Negative cashflows carried: 0 0 = not carried forward, 1 = carry forward
 - Debt Service Reserve Period: 6 months
 - Minimum Maintained Cash Bal: 0.000 US\$ million
 - Interest on Cash Balanc: 6.00% p.a.
 - Interest on Short: 10.25% p.a.
 Debtors - Other: 1
 Sundry Creditors, Average Level: 1

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Annual Investment Cost, MMUS\$	39.1	30.5	85.7	113.1	201.3	240.7	263.7	140.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Primary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	0	83	84	85	86	87	88	88	89	90	91	92	104	105	105
Secondary Energy Sales, MMUS\$	0	0	0	0	0	0	0	0	0	123	124	125	127	128	129	130	132	133	134	136	153	154	154
Other Incomes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Revenue	0	0	0	0	0	0	0	0	0	206	208	210	212	214	217	219	221	223	225	228	246	246	249
Annual Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual Wheeling Fee	0	0	0	0	0	0	0	0	0	11	11	11	11	12	12	12	12	12	12	12	14	14	15
Land Leasing	0	0	0	0	0	0	0	0	0	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54	5.54
Water Charges on Electricity	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Insurance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total operating costs	0	0	0	0	0	0	0	0	0	17	17	17	17	17	17	17	18	18	18	18	20	20	20
Net Operating Cashflow	0	0	0	0	0	0	0	0	0	190	191	193	195	197	199	201	203	205	208	210	237	237	237
Financial Evaluation Based on Total Capital (million current US\$)																							
Capital Cost, exclude IDC	38.6	58.2	80.3	109.3	194.9	231.3	251.0	125.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Net Operating Cashflow	0	0	0	0	0	0	0	0	0	190	191	193	195	197	199	201	203	205	208	210	237	237	237
Total Net Cashflow (including tax payment)	-39	-58	-83	-109	-195	-231	-251	-126	-1	193	197	199	195	197	199	201	203	205	208	210	237	239	239
Cumulative Cashflow	-39	-97	-180	-290	-484	-716	-987	-1093	-1093	-903	-712	-518	-323	-126	74	275	479	684	892	1101	1375	1664	1964
IRR CALCULATION																							
Investment Expenditure Excl IDC	39	58	83	109	195	231	251	126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net after Tax on Profit excl. Depreciation, Interest and repayments	0	0	0	0	0	0	0	0	-1	193	197	199	201	203	205	207	210	212	214	216	244	244	246
Net Cash Flow	-39	-58	-83	-109	-195	-231	-251	-126	-1	193	197	199	201	203	205	207	210	212	214	216	244	244	246
IRR = 11.68% During the 25 Concession Years																							
Return on Total Equity																							
Equity Input	11,7425	17,852,728	25,7111	33,942	60,3913	72,2242	79,121	42,0884	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dividends Received	0	0	0	0	0	0	0	0	0	141	143	145	147	149	151	153	155	157	159	161	189	189	191
Net Cash Flows	-12	-18	-26	-34	-60	-72	-79	-42	0	141	143	145	147	149	151	153	155	157	159	161	189	189	191
IRR = 22.96% During the 25 Concession Years																							
DEBT SERVICE COVERAGE RATIO																							
									-0.05	13.42	13.69	13.82	13.96	14.11	14.25	14.39	14.54	14.69	5.20	5.52	6.99	7.16	7.16

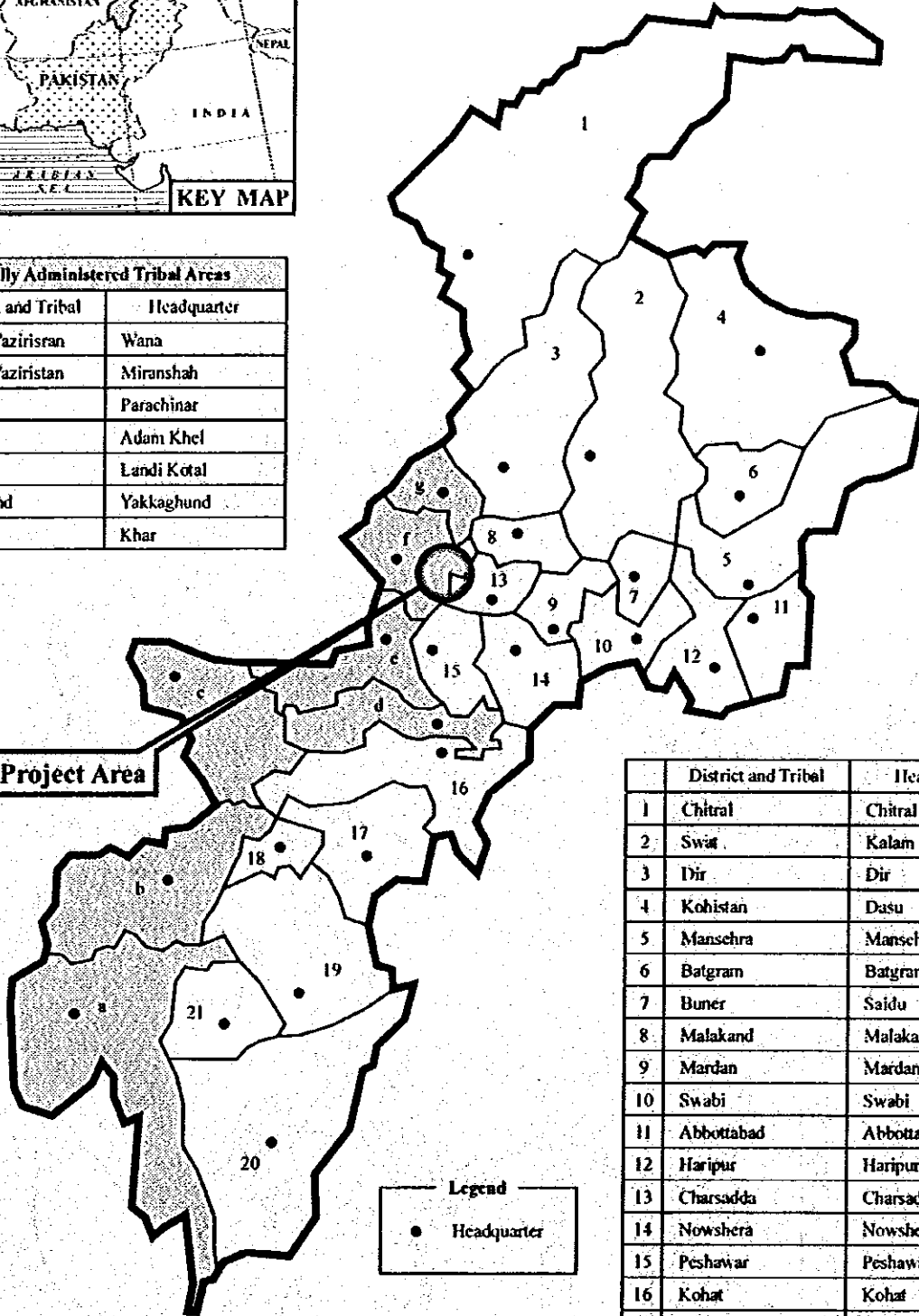
NOTE: Definition 1 = (Net after tax profit excl. deprec. interest and repayments) / (Principal and interest payments)

付 図



Federally Administered Tribal Areas		
	District and Tribal	Headquarter
a	South Waziristan	Wana
b	North Waziristan	Miranshah
c	Kurram	Parachinar
d	Orakzai	Adam Khel
e	Khyber	Landi Kotal
f	Mohmand	Yakkaghund
g	Bajaur	Khar

Munda Project Area



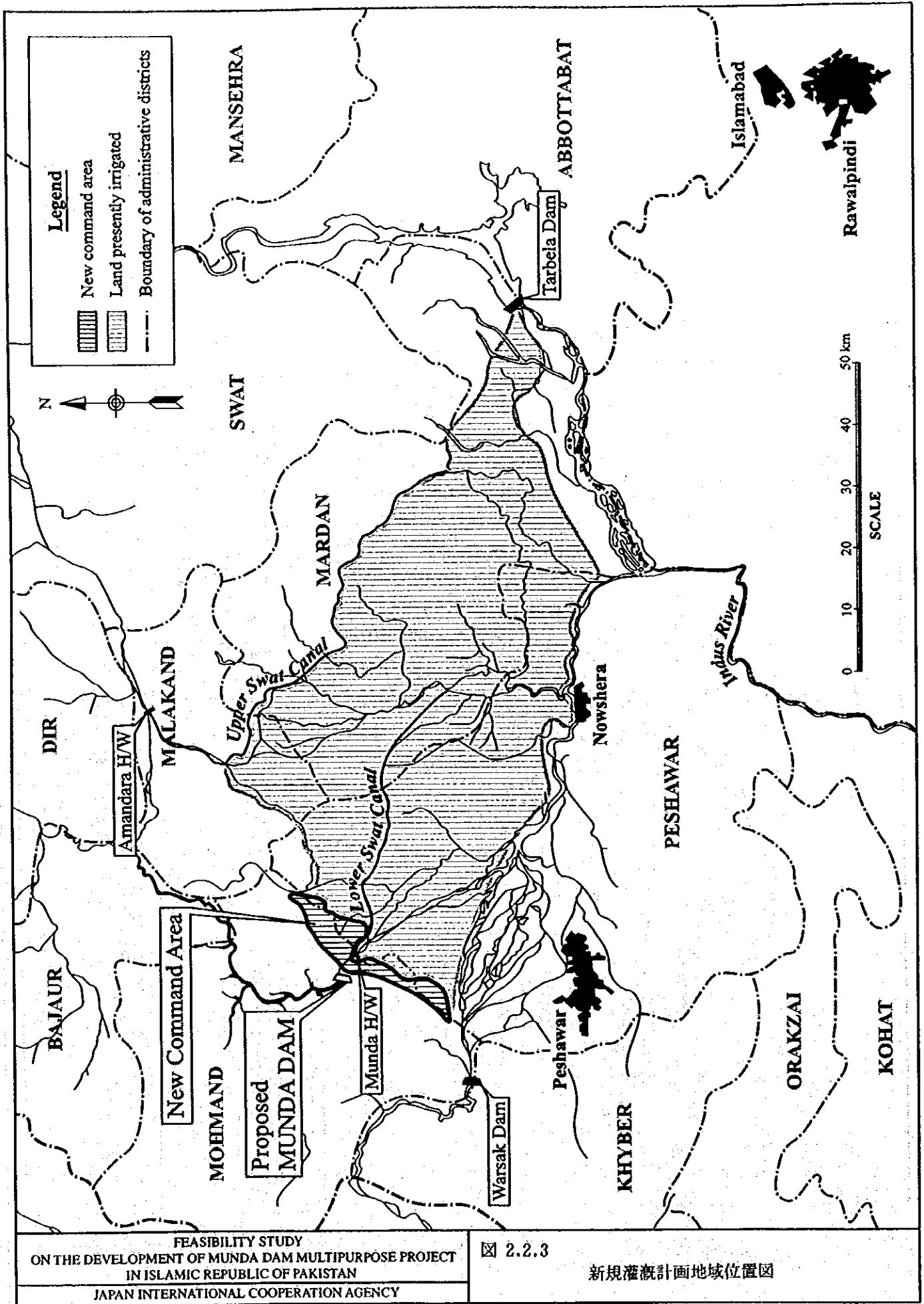
	District and Tribal	Headquarter
1	Chitral	Chitral
2	Swat	Kalam
3	Dir	Dir
4	Kohistan	Dasu
5	Manshara	Manshara
6	Batgram	Batgram
7	Buner	Saidu
8	Malakand	Malakand
9	Mardan	Mardan
10	Swabi	Swabi
11	Abbottabad	Abbottabad
12	Haripur	Haripur
13	Charsadda	Charsadda
14	Nowshera	Nowshera
15	Peshawar	Peshawar
16	Kohat	Kohat
17	Karak	Karak
18	Bannu	Bannu
19	Lakki Marwat	Lakki Marwat
20	Dera Ismail Khan	Dera Ismail Khan
21	Tank	Tank

Note: The boundaries of some new districts and the locations of some headquarters are approximate.

FEASIBILITY STUDY
ON THE DEVELOPMENT OF MUNDA DAM MULTIPURPOSE PROJECT
IN ISLAMIC REPUBLIC OF PAKISTAN
JAPAN INTERNATIONAL COOPERATION AGENCY

図 2.2.2

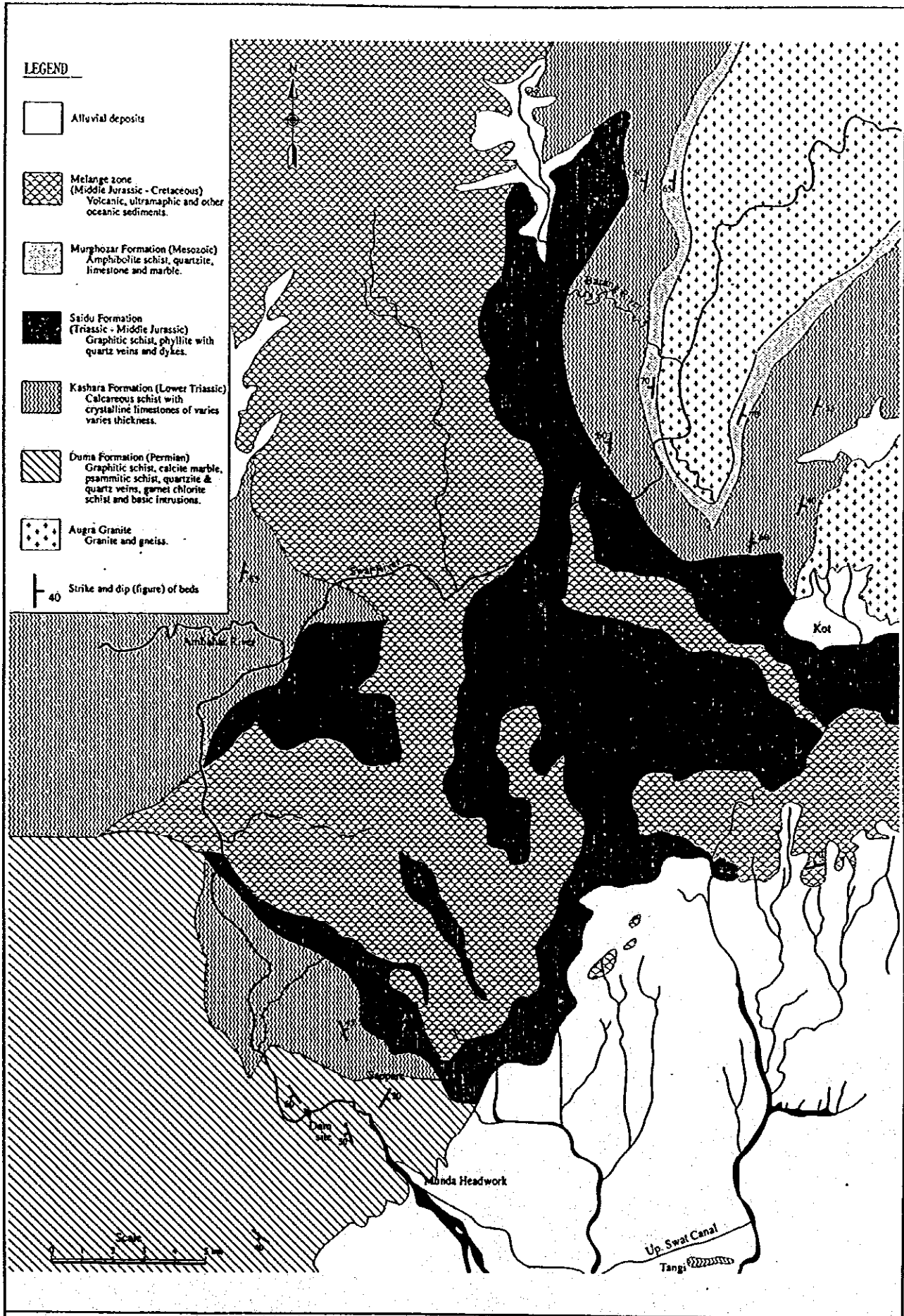
北西辺境州の行政区分と連邦直轄部族地域



FEASIBILITY STUDY
 ON THE DEVELOPMENT OF MUNDA DAM MULTIPURPOSE PROJECT
 IN ISLAMIC REPUBLIC OF PAKISTAN
 JAPAN INTERNATIONAL COOPERATION AGENCY

図 2.2.3

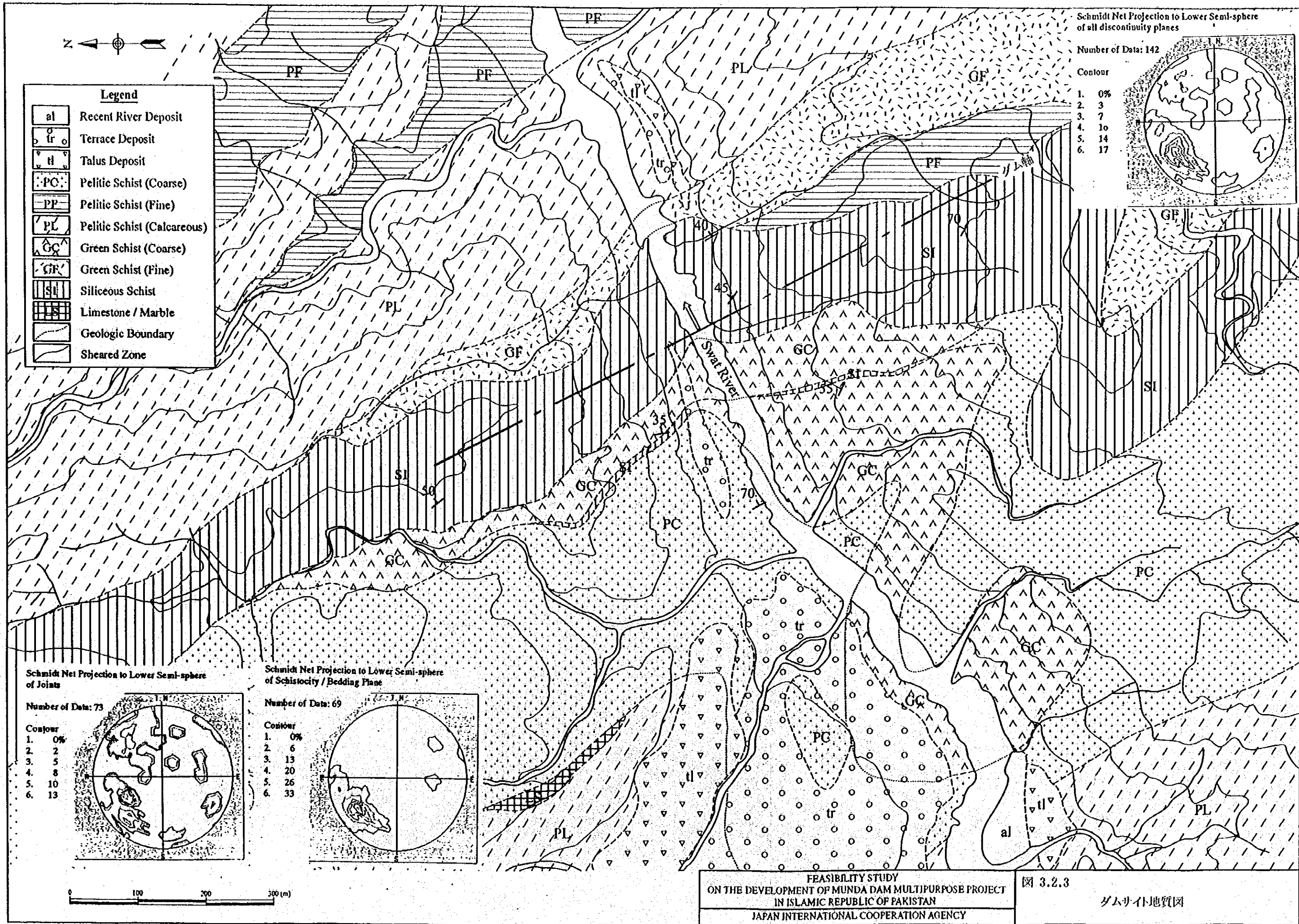
新規灌溉計画地域位置図

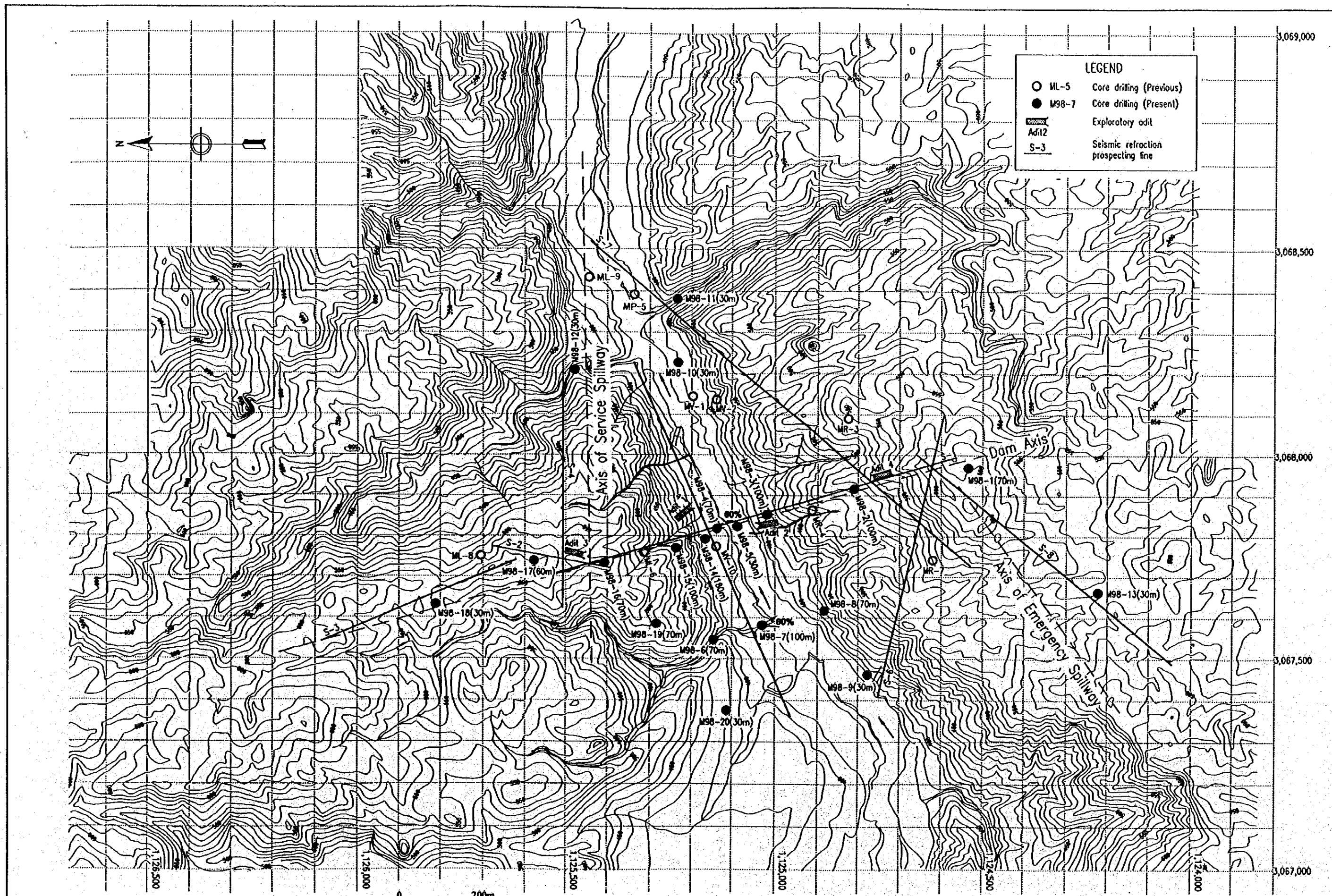


FEASIBILITY STUDY
ON THE DEVELOPMENT OF MUNDA DAM MULTIPURPOSE PROJECT
IN ISLAMIC REPUBLIC OF PAKISTAN
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図 3.2.2

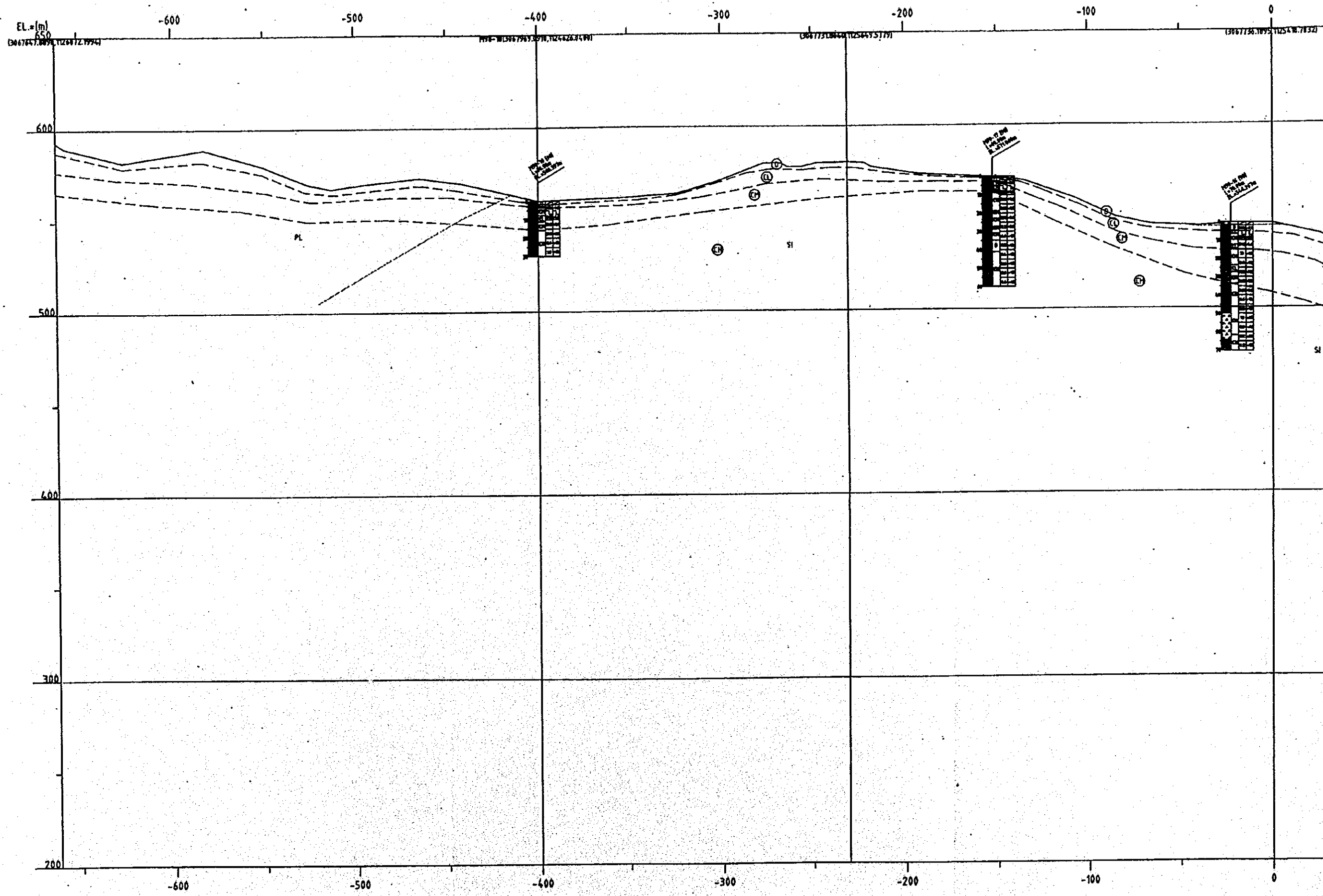
ダム・貯水池地域地質図



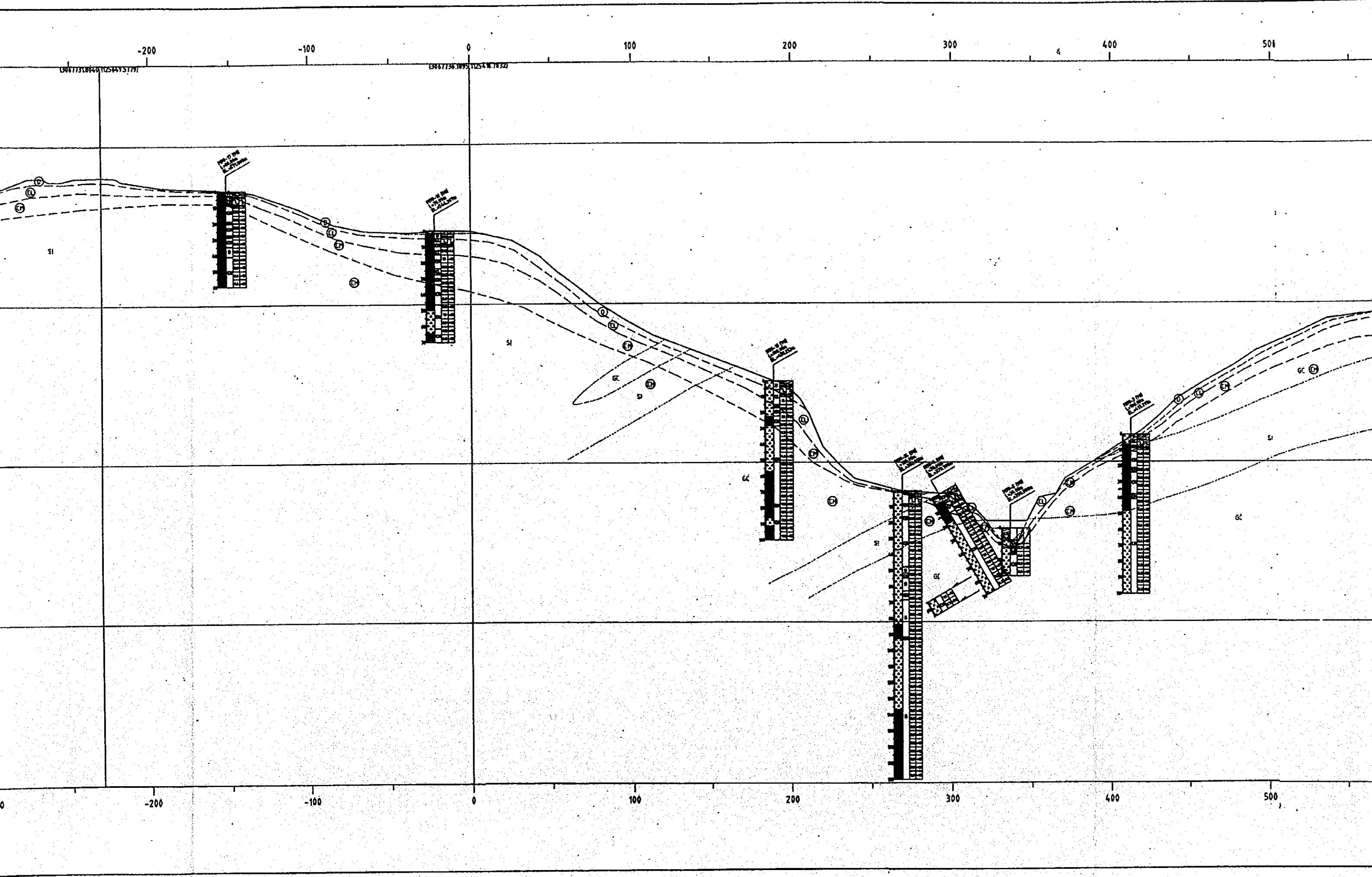


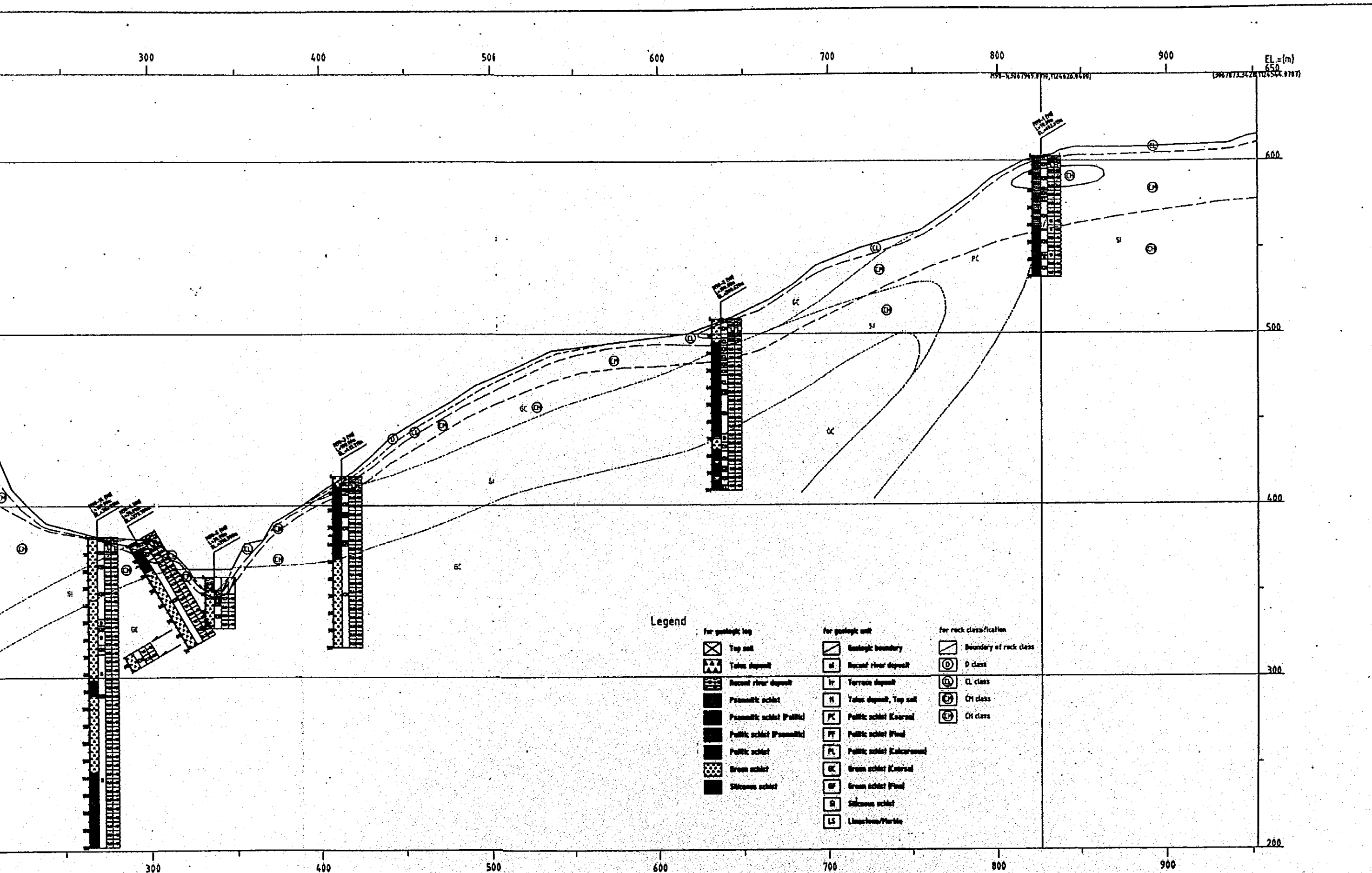
FEASIBILITY STUDY
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図 3.2.4 ゴムサイトの地質調査位置図



B3.3-1

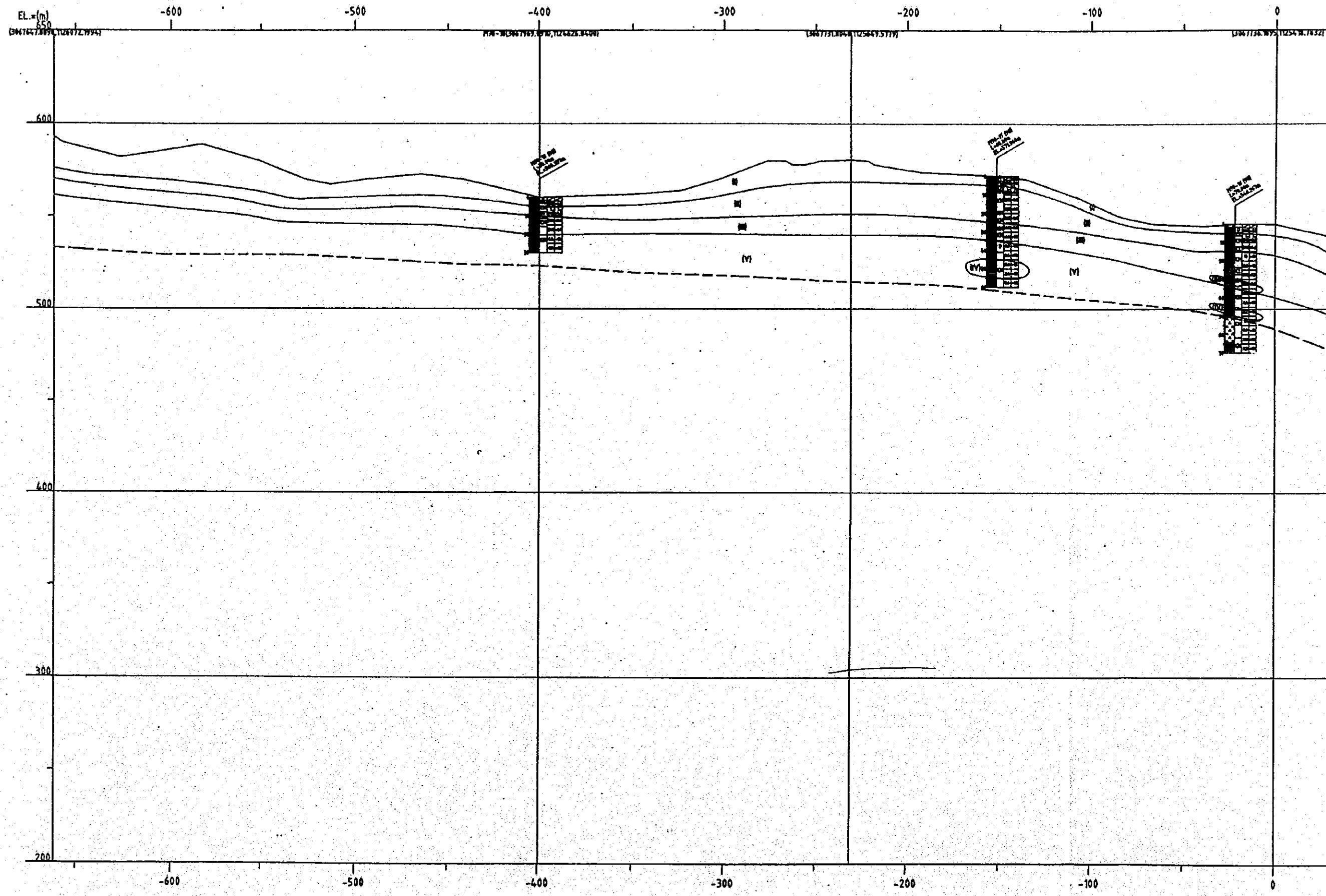




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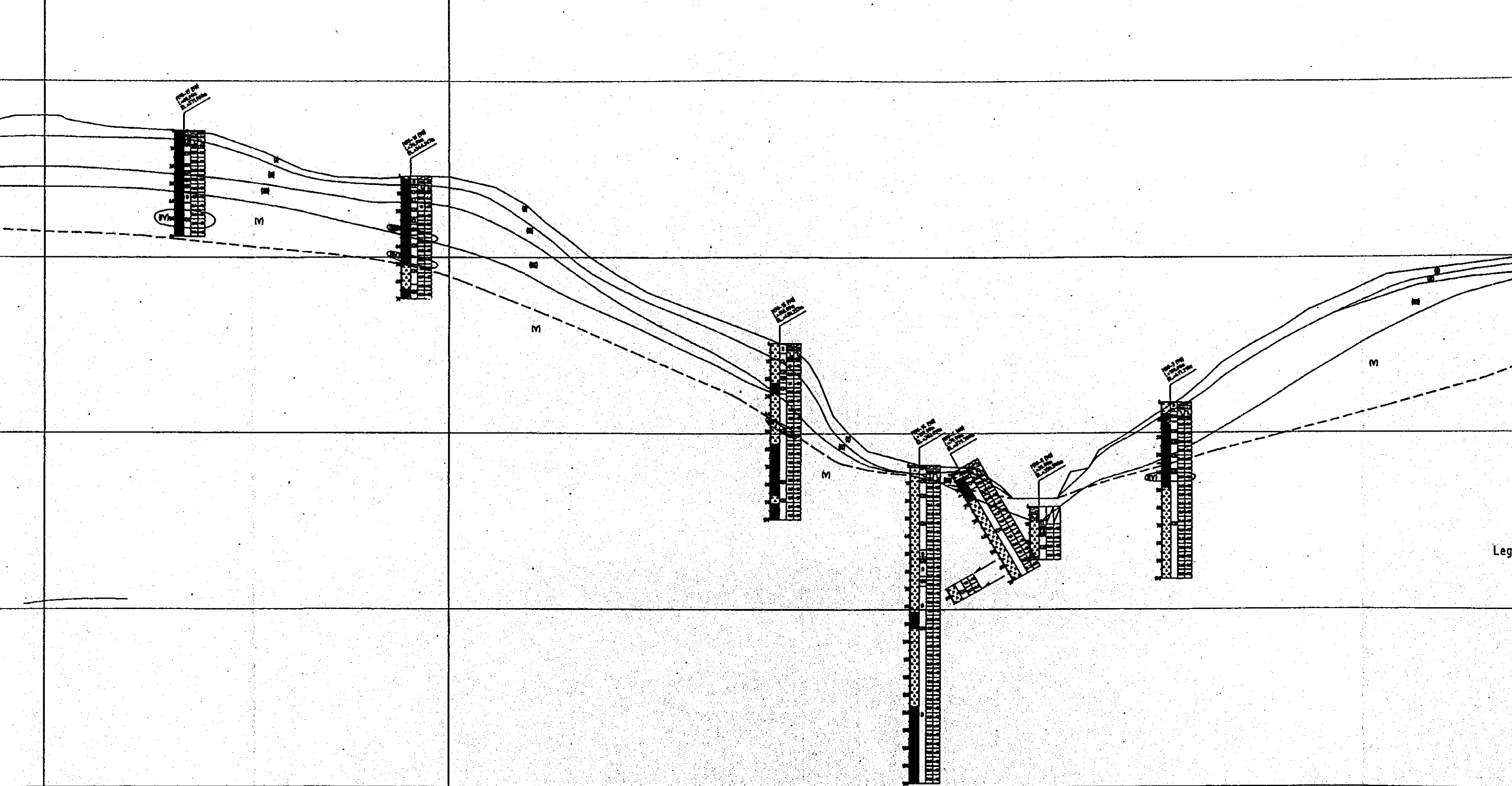
図 3.2.5

ダムサイト岩級区分図

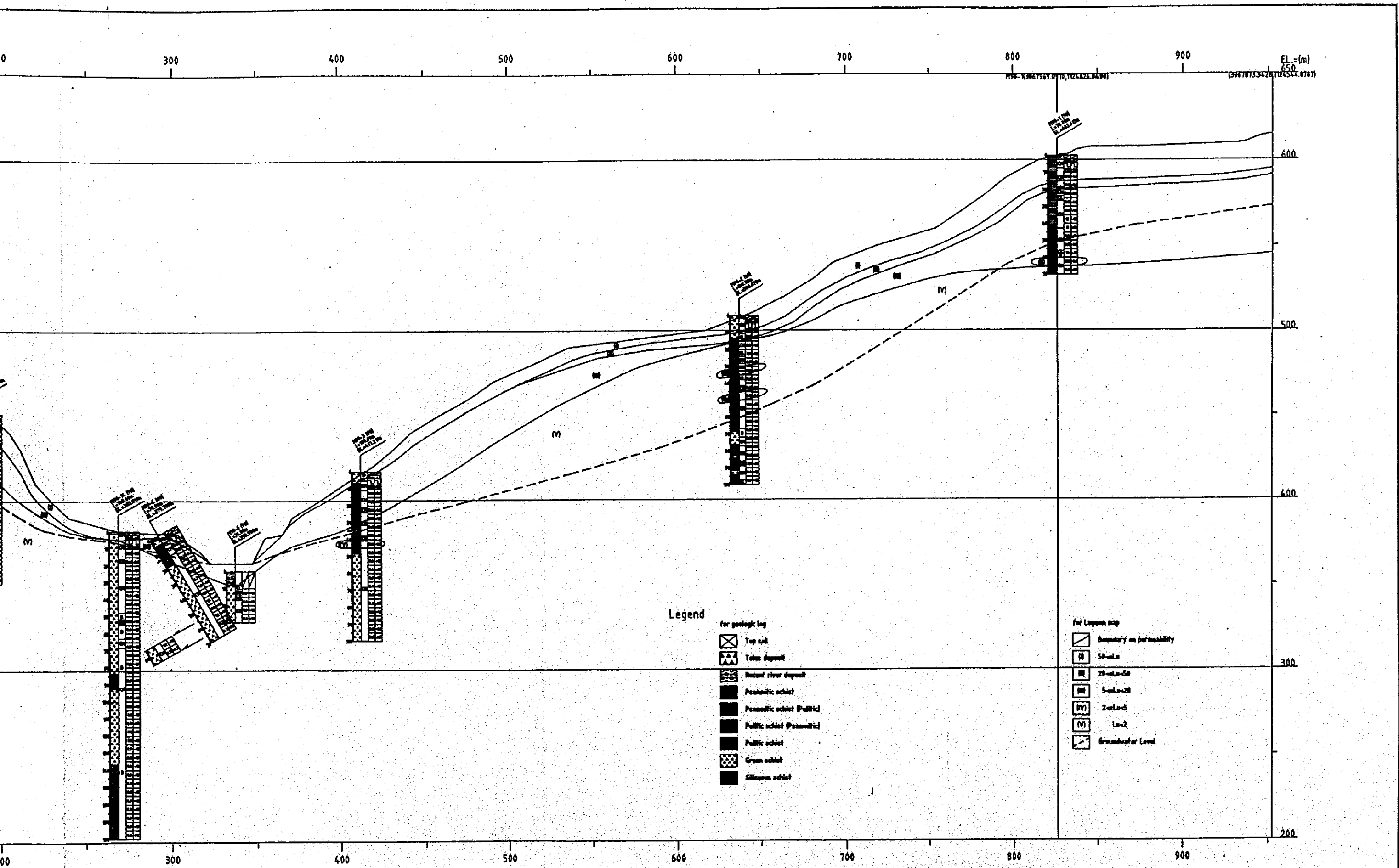


B3.3-2

-200 -100 0 100 200 300 400 500 600



-200 -100 0 100 200 300 400 500 600



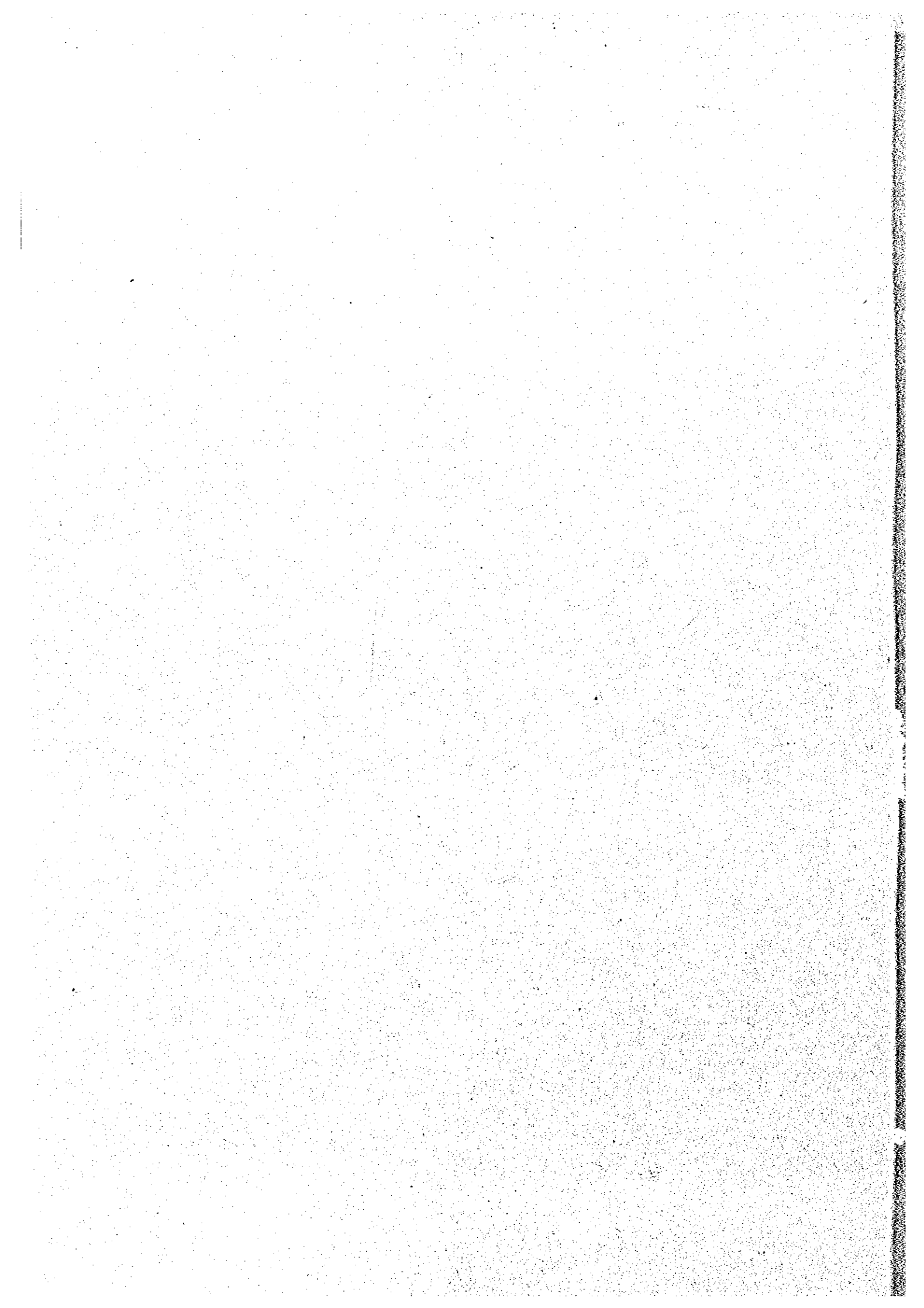
Legend

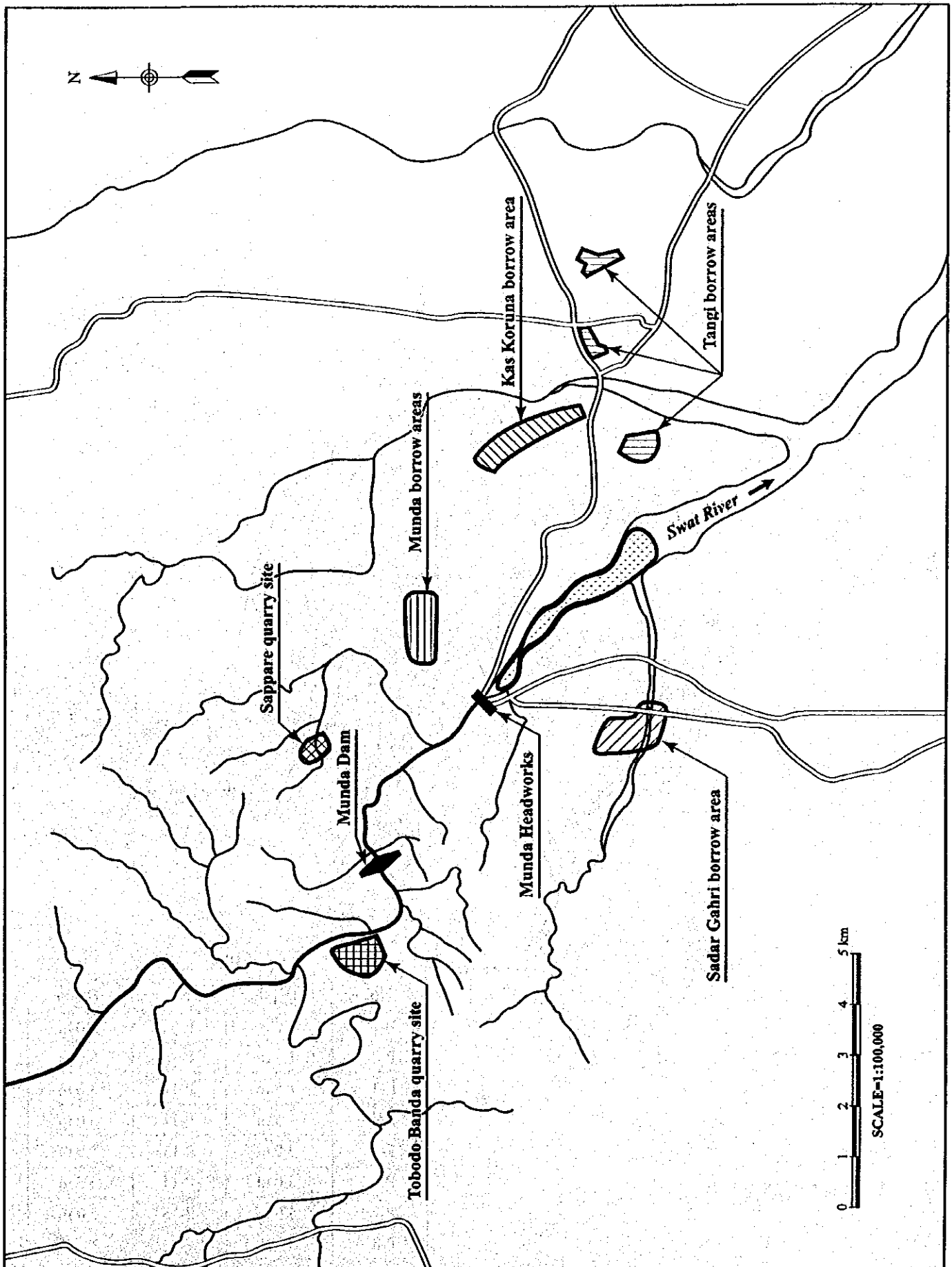
- for geologic log
- ☒ Top soil
 - ☒ Talus deposit
 - ☒ Recent river deposit
 - ☒ Psammitic schist
 - ☒ Psammitic schist (Pulitic)
 - ☒ Pulitic schist (Psammitic)
 - ☒ Pulitic schist
 - ☒ Green schist
 - ☒ Siliceous schist

- for Layer map
- ☒ Boundary on permeability
 - ☒ S₁-L₁
 - ☒ S₂-L₂-S₃
 - ☒ S₄-L₃-S₅
 - ☒ S₆-L₄-S₇
 - ☒ L₅-2
 - ☒ Groundwater Level

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☒ 3.2.6
 ダムサイトルジオンマップ

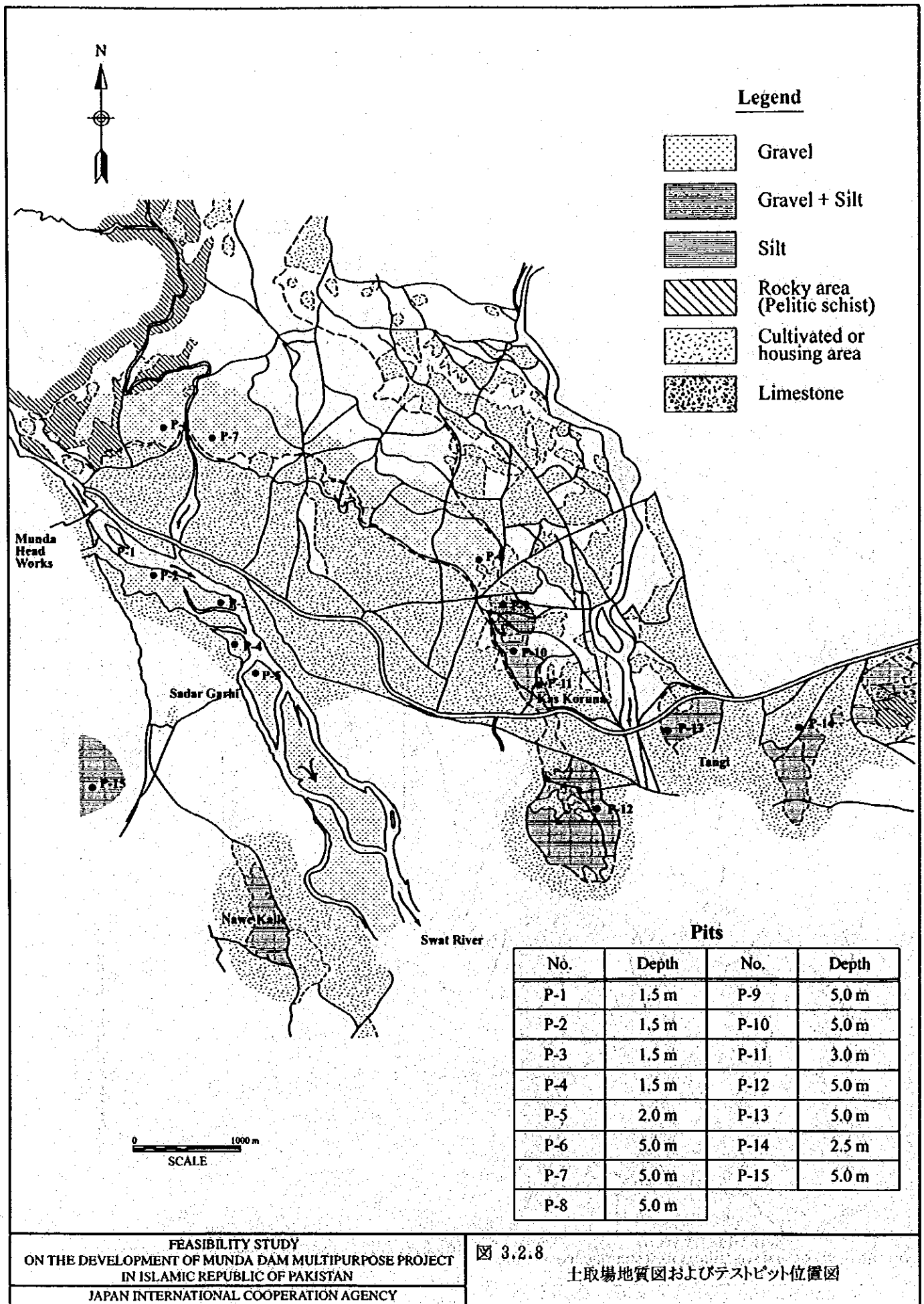




FEASIBILITY STUDY
 ON THE DEVELOPMENT OF MUNDA DAM MULTIPURPOSE PROJECT
 IN ISLAMIC REPUBLIC OF PAKISTAN
 JAPAN INTERNATIONAL COOPERATION AGENCY




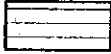

図 3.2.7

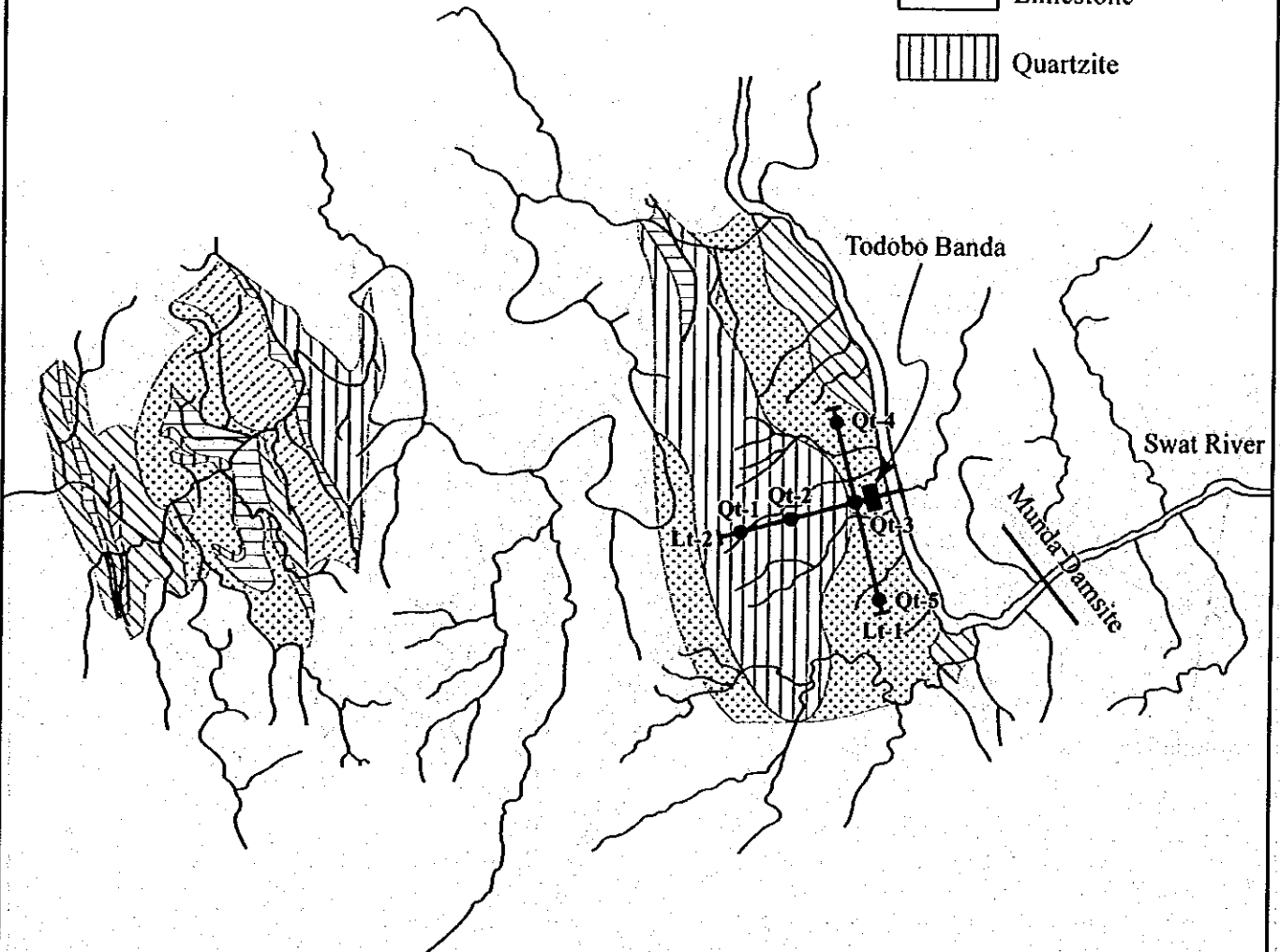
原石山、土取場位置図





Legend

-  Pelitic schist
-  Psammitic schist
-  Calcareous schist
-  Limestone
-  Quartzite



Seismic Prospecting Line

No.	Length
Lt-1	1,080 m
Lt-2	850 m

Drill Holes

No.	Depth
Qt-1	50 m
Qt-2	100m
Qt-3	50 m
Qt-4	50 m
Qt-5	50 m




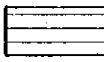
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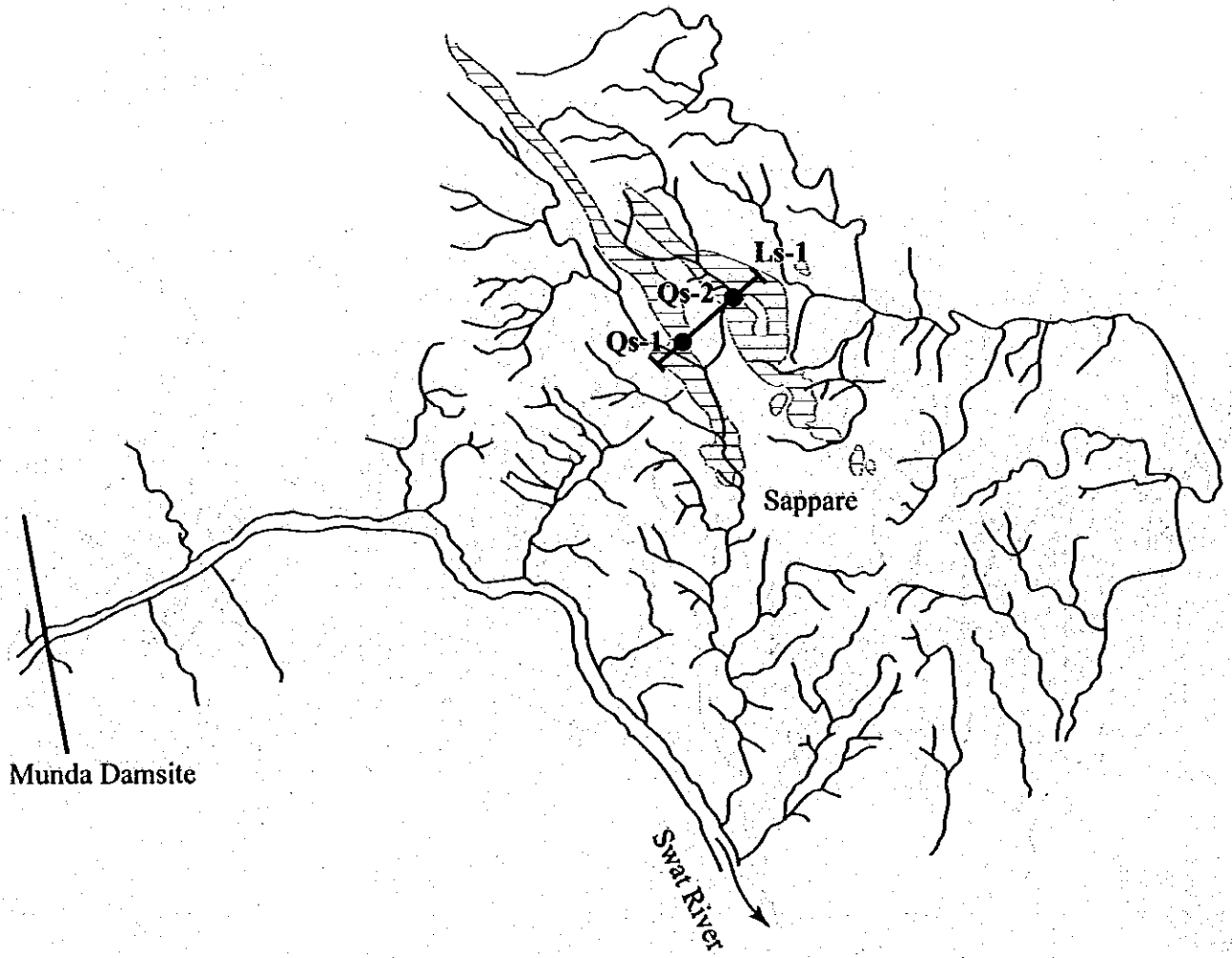
図 3.2.9

トドボ・バンド原石山地質図



Legend

-  Pelitic schist
-  Limestone



Munda Dam site

Swat River

Sappare

Ls-1

Qs-2

Qs-1



SCALE

Seismic Prospecting Line

No.	Length
Ls-1	520 m

Drill Holes

No.	Depth
Qs-1	50 m
Qs-2	100m

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図 3.2.10

サッパレ原石山地質図