Annex 16

Project Profile and Related Data

PROJECT PROFILE

Sheet No. 1

Project Name	Water Supply Project for Tetovo – River Pena Intake
Sector	Municipal water
Phase of implementation	
Target area	Tetovo
Beneficiaries	70,000 inhabitants
Brief description of the project	Tetovo is provided drinking water from water springs on the Shara Mountains, of which altitude is around El. 1,200 m. In winter, spring capacity is reduced by over 50% due to freezing and in summer same situation happens due to less rainfall in the area. In order to solve this problem, construction of river intake in the Pena River at El. 534.2 m is planned.
Project components	1. Construction of intake, filter station and pipeline (Ø=450 mm) 2. Construction of a laboratory 3. Construction of pump station (Q=200 l/sec)
Total construction cost (US$)	3,150,000
Benefits	- Stable and safe supply of drinking water
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	
Responsible ministry	MUPC
Operational organisation	"Tetovo"
Financial plan of operation	

PROJECT PROFILE

Sheet No. 2

Project Name	Studena Voda Groundwater Development Project
Sector	Municipal water (supplemental)
Phase of implementation	
Target area	Tetovo, Gostivar
Beneficiaries	70,000 inhabitants
Brief description of the project	This project is contemplated to supplement drinking water in Tetovo area, which is suffering from the shortage of water sources. The yield of groundwater in this area widely varies in summer with less rainfall and in winter, with ice in the higher zone. To cope with this problem future exploitation of groundwater is prospective, because only 20% of yield of spring and groundwater is utilized at present.
Project components	1. Construction of domestic well (2 nos., d=40 m, yield = 50 l/sec x 2) 2. Construction of pump station (Q = 100 l/sec) 3. Construction of water supply pipeline (d=400 mm, L = 5.2 km) 4. Construction of service reservoir (V= 2,000 m^3)
Total construction cost (US$)	1,032,000
Benefits	Drinking water supply
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	
Responsible ministry	MUPC
Operational organisation	Communal Enterprize - Tetovo
Financial plan of operation	

PROJECT PROFILE

Sheet No. 3

Project Name	Kichevsko Pole Area Irrigation Rehabilitation Project
Sector	Agricultural water
Phase of implementation	
Target area	Kichevo
Beneficiaries	Farmers (to be investigated)
Brief description of the project	Kichevsko Pole is located at the upstream most of the Treska River and lying at the north of municipal center of Kihevo. Total irrigable area is 1,450 ha.
Project components	1. Rehabilitation of intake, main canal, secondary and tertiary canals
Total construction cost (US$ mil.)	2,900,000
Benefits	- Sufficient irrigation water supply
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	None
Implementing agency	PWME Kichevo
Operational organisation	PWME Kichevo
Financial plan of operation	

PROJECT PROFILE

Sheet No. 4

Project Name	Construction of By-pass Channel Raven-Rechica
Sector	Agricultural water
Phase of implementation	
Target area	Gostivar, Tetovo
Beneficiaries	Farmers and AK
Brief description of the project	This project is listed in the Program for Public Sector Investment (1998 – 2000). It aims to tap water from the Vardar River near the village Raven (upstream of Gostivar) and lend to Rechica village (3 km southwest of Tetovo), in a length of over 26 km. The water will be provided for irrigation area of 6,000 ha in the Gostivar and Tetovo Fields.
Project components	1. Construction of intake and channel (around 26 km) 2. Construction of diversion facilities
Total construction cost (US$)	44,000,000
Benefits	- Sufficient irrigation water supply - Increase of agricultural production
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	By-Pass Channel idea Project, Raven-Rechica 1991 Melioproject - Skopje
Responsible ministry	MAFWE
Operational organisation	PWME Gostivar
Financial plan of operation	

PROJECT PROFILE

Sheet No. 5

Project Name	Patishka Reka Water Supply Project
Sector	Municipal Water
Phase of implementation	
Target area	11 villages and 6 villas in Sopishte
Beneficiaries	10,000 inhabitants
Brief description of the project	The Patishka river is a upper reach of the Markova river, which joins with the Vardar downstream of Skopje from the right bank. The Patishka river originates from the Mt. Solunska (El 2,538 m) and flows northward on the mica schist zone. However, just at Patishka Reka the river disappears into the dolomite zone. So, the villages and villas scattered in the Markova basin, south of the Vodno range, have been suffered from water shortage for a long time. The catchment area of the Patishka river at Patishka Reka village is quite small (18.0 km^2), however, there are many depressions and springs on the north-western skirts of Mt. Solunska, so the dependable runoff of the river (60 lit/s) is enough to supply water to the villagers. The domestic water would be delivered through pipeline by means of gravitational flow.
Project components	1. Construction of a Tyrolean intake at Patishka Reka 2. Construction of one (1) filter station just after intake 3. Construction of pipeline, Ø=100~300 mm, L=45 km along the existing roads 4. Construction of seven (7) branching tanks 5. Construction of nine (9) reservoirs (water tank), capacity 10~60~100 m^3
Total construction cost (US $)	3,249,000
Benefits	Stable and safe supply of drinking water
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	The Water Supply System "Patishka Reka", Volume I General Issues Nov. 1990
Responsible ministry	MUPC
Operational organisation	Communal Enterprise – Skopje
Financial plan of operation	

PROJECT PROFILE

Sheet No. 6a

Project Name	Paligrad Multipurpose Dam Project – Phase I
Sector	Municipal, Industrial water
Phase of implementation	
Target area	Grand Skopje
Beneficiaries	500,000 inhabitants
Brief description of the project	This project is oriented and contemplated to the development scheme of the Kadina Reka Water System. Scope of the scheme broadly covers domestic, industrial and irrigation water supply as well as hydropower generation, to meet with increasing water demand. The target area is Metropolitan Skopje and its southern part of suburban area. Phase I scheme consists of construction of the Paligrad dam and water supply facilities, such as pipeline and filter station.
Project components	1. Construction of filter station and water supply pipeline (Q = 1.8 m^3/sec) 2. Construction of Paligrad dam - Catchment area: 74 km^2 - Dam type: Rockfill dam - Height: 91 m - Embankment volume: 1,677,000 m^3 - Gross storage capacity: 24,200,000 m^3 - Effective storage capacity: 22,600,000 m^3 - Water supply capacity:
Total construction cost (US$)	48,109,000 (for all Phases I to III)
Benefits	- Stable and safe supply of drinking water - Tourism attraction
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Irrigation System Skopsko Pole Book I General Report
Responsible ministry	MAFWE MUPC
Operational organisation	PWME Skopje Communal Enterprise - Skopje
Financial plan of operation	

PROJECT PROFILE

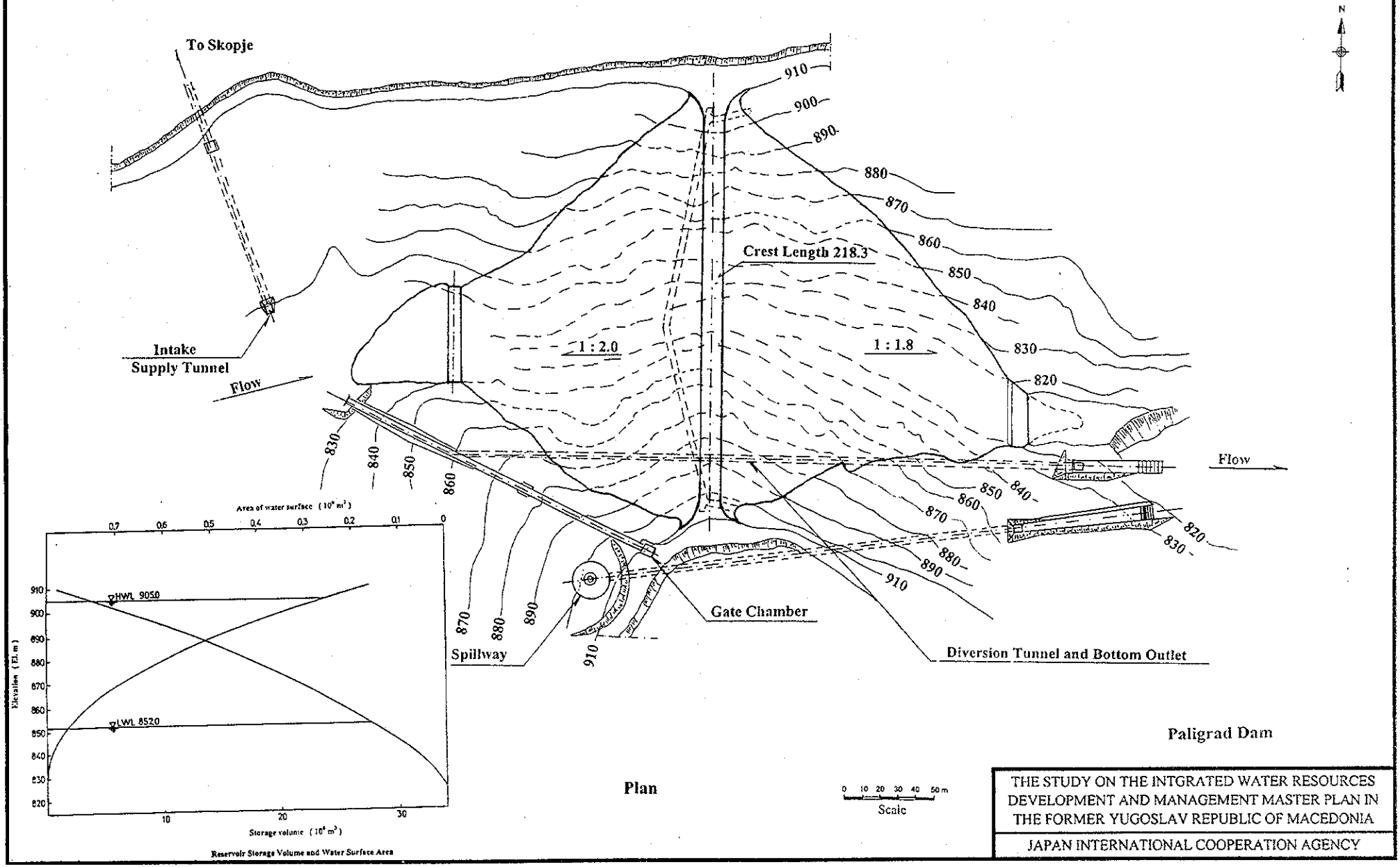
Sheet No. 6b

Project Name	Paligrad Multipurpose Dam Project – Phase II
Sector	Agricultural water
Phase of implementation	
Target area	Grand Skopje
Beneficiaries	500,000 inhabitants
Brief description of the project	Phase II of the Paligrad Multipurpose dam project is aiming at agricultural development in the Skopsko Pole, lying at east of Vodno Mountain.
Project components	1. Construction of irrigation system (A=1,800 ha)
Total construction cost (US$)	Ref. to Phase I
Benefits	Irrigation water supply
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Irrigation System Skopsko Pole, Book I General Report
Responsible ministry	MAFWE
Operational organisation	PWME Skopje
Financial plan of operation	

PROJECT PROFILE

Sheet No. 6c

Project Name	Paligrad Multipurpose Dam Project – Phase III
Sector	Hydropower
Phase of implementation	
Target area	Grand Skopje
Beneficiaries	500,000 inhabitants
Brief description of the project	Succeeding to Phase I and II of the Project, hydropower development planned as Phase III.
Project components	1. Construction of hydroelectric power facilities (58.0 GWh for annual energy)
Total construction cost (US$)	Ref. to Phase I
Benefits	Hydropower generation
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Irrigation System Skopsko Pole, Book I General Report
Responsible ministry	MOE
Operational organisation	ECM
Financial plan of operation	



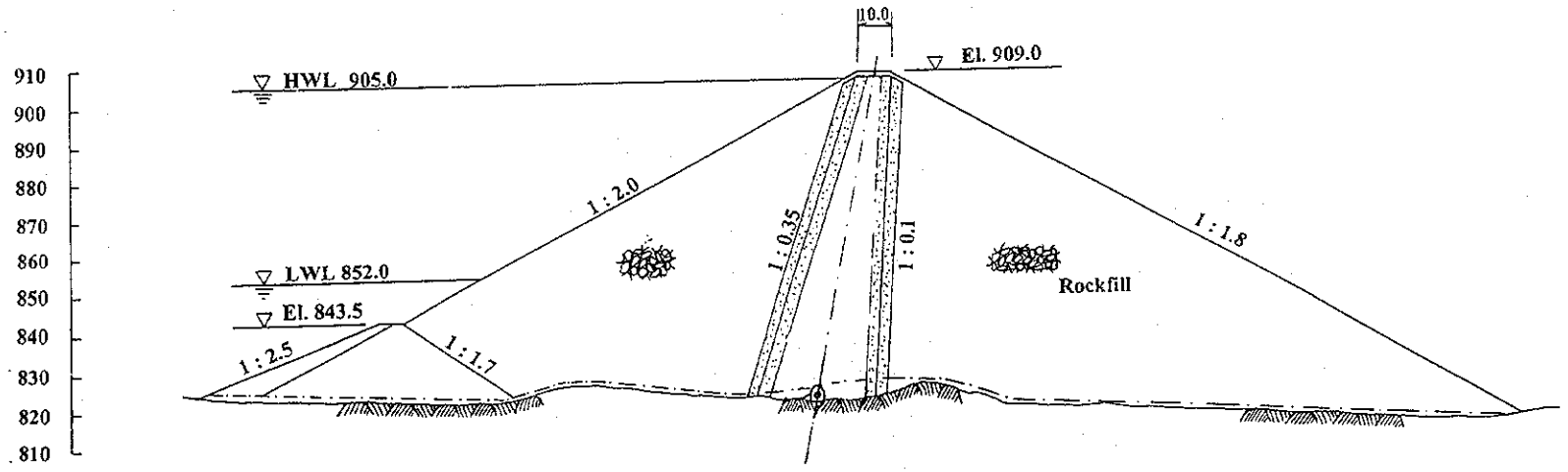
Paligrad Dam

Plan

0 10 20 30 40 50 m
Scale

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY



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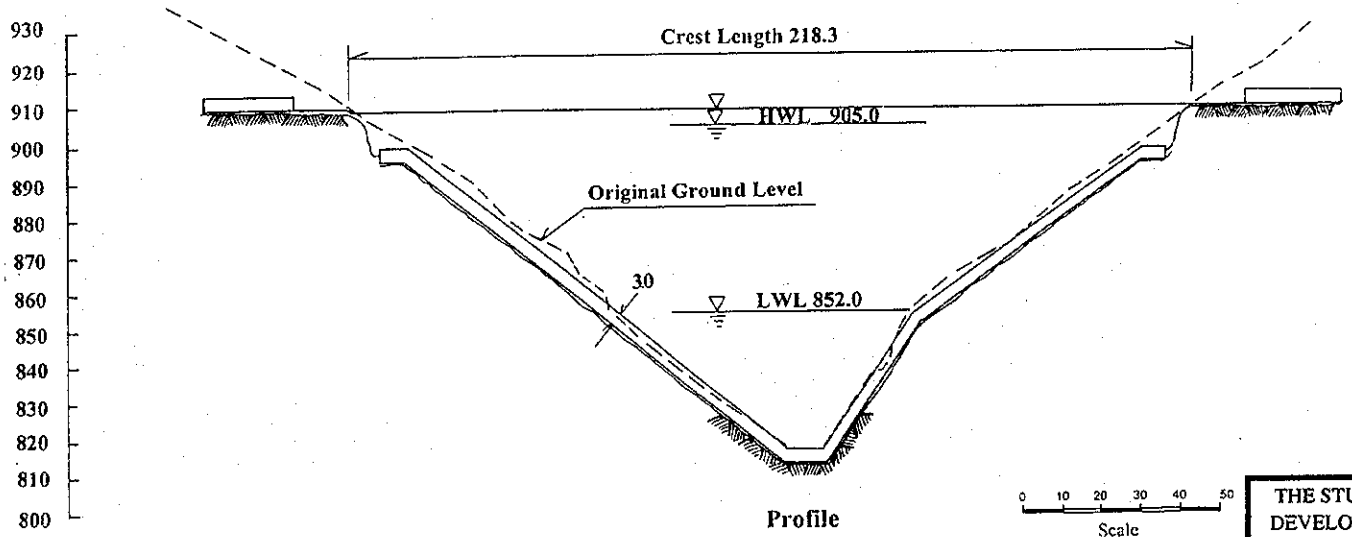

Profile

Paligrad Dam

0 10 20 30 40 50
Scale

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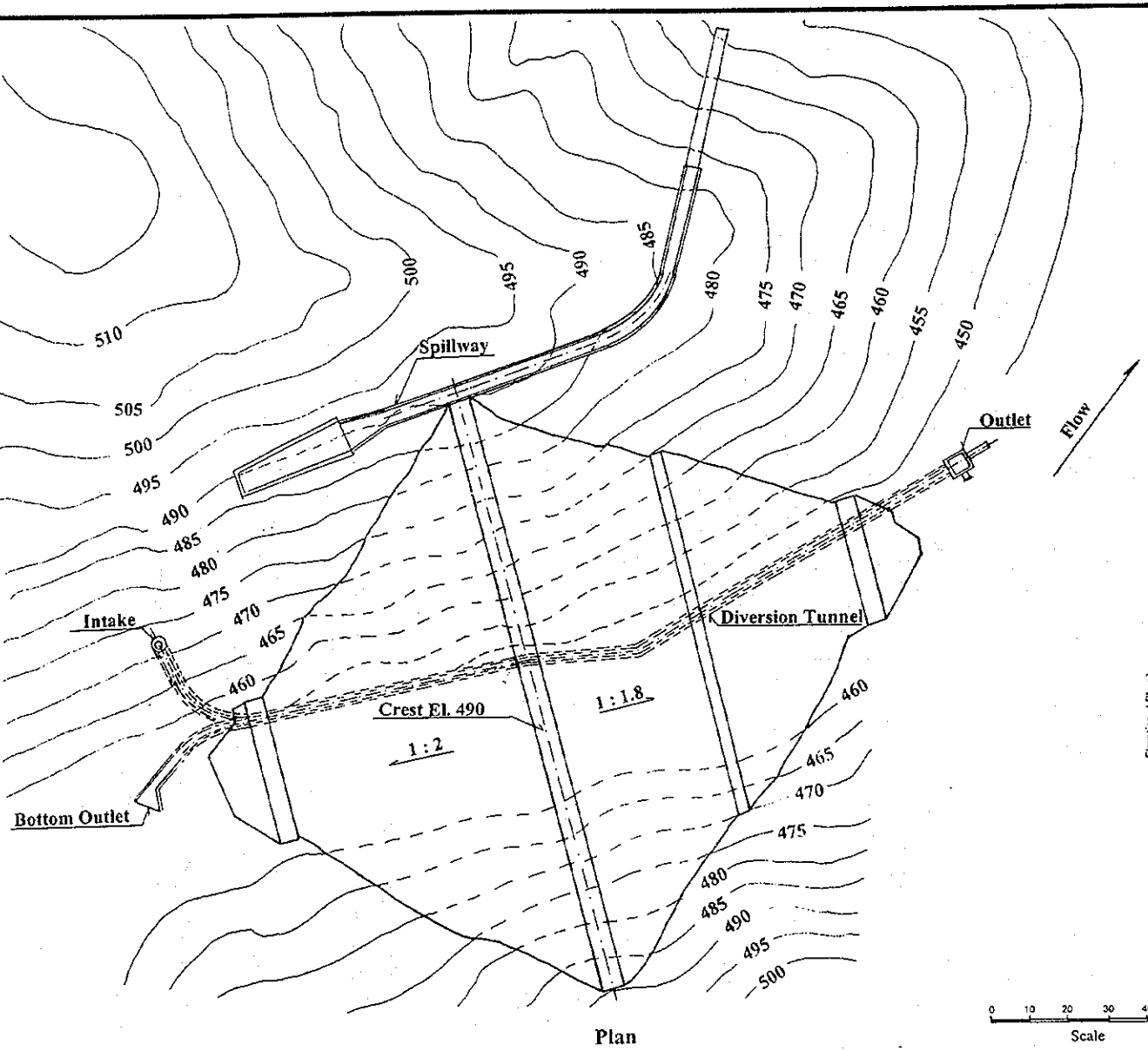
JAPAN INTERNATIONAL COOPERATION AGENCY

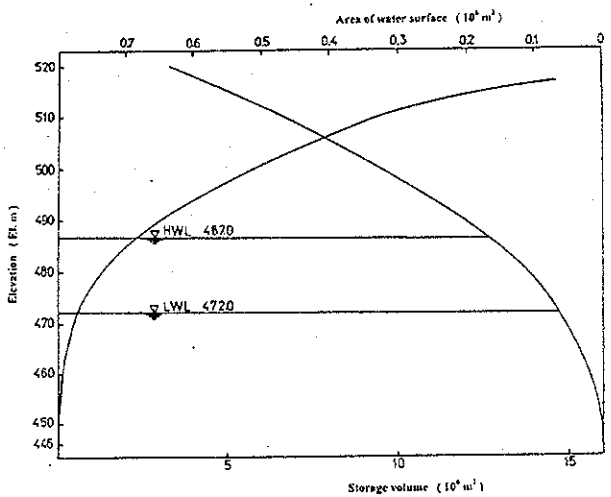
PROJECT PROFILE

Sheet No. 7

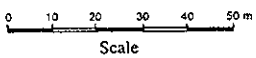
Project Name	Slupchanka Dam Project
Sector	Municipal
Phase of implementation	
Target area	Municipalities of Kumanovo and Lipkovo
Beneficiaries	Citizens in the target area (about 100,000 inhabitants)
Brief description of the project	Kumanovo is located in the central northern part of the country with the annual rainfall of 500 mm or so. The population of Kumanovo municipality is the second largest in the country, following Skopje. The urban area has seriously suffered from the shortage of drinking water during summer. The municipality is currently supplied by two reservoirs, namely Glaznja and Lipkovo. The water from these two reservoirs has been used for drinking and irrigation (present supply capacity for drinking use is 240 lit/s). However, it is anticipated that the present supply capacity can not meet the demand in near future. Thus, construction of the **Slupchanka dam** has been planned as an urgent countermeasure (short-term solution), in order to augment the drinking water supply in Kumanovo area.
Project components	1. Construction of **Slupchanka dam** - Catchment area: 32.3 km^2 - Dam type: Rockfill dam - Height: 50 m - Embankment volume: 270,000 m^3 - Gross storage capacity: 2,500,000 m^3 - Effective storage capacity: 1,850,000 m^3 - Water supply capacity: 260 lit/sec 2. Construction of pipeline - Total length: 10.3 km - Diameter: 711 mm 3. Construction of access road
Total construction cost (US $)	7,282,000
Benefits	Water charge from users
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	 Water Supply of Kumanovo, Provision of New water Quantities, Statement of the Existing Technical Documentation Dec. 1997 Geohydroproject, Skopje
Responsible ministry	MAFWE MUPC
Operational organisation	PWME Branch Office "Kumanovsko Pole" – Kumanovo Communal Enterprise – Kumanovo
Financial plan of operation	



Plan



Reservoir Storage Volume and Water Surface Area



Slupchanka Dam

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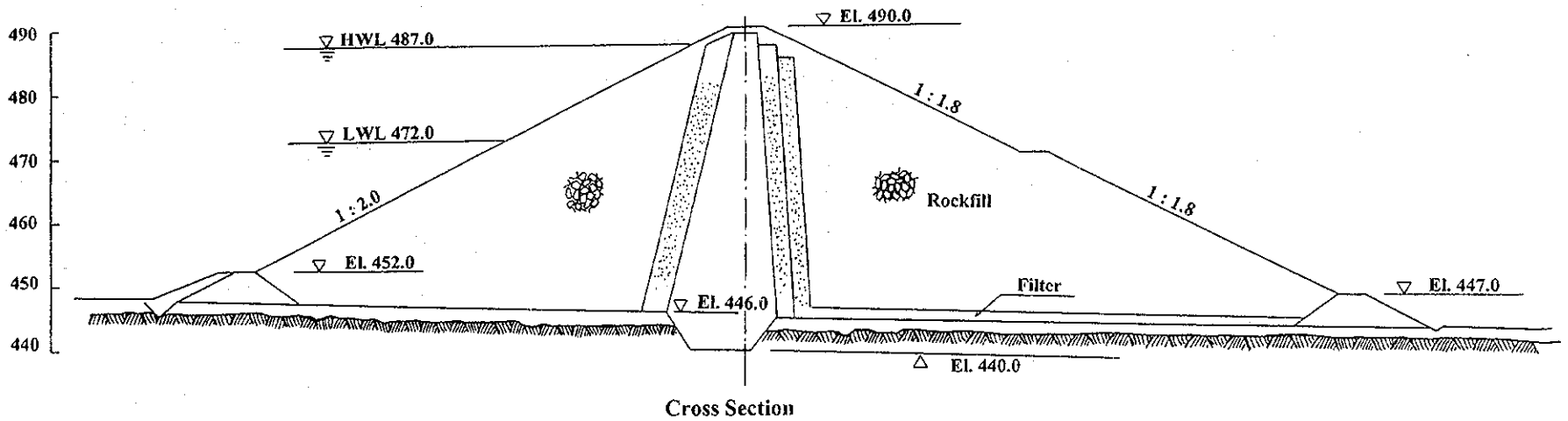

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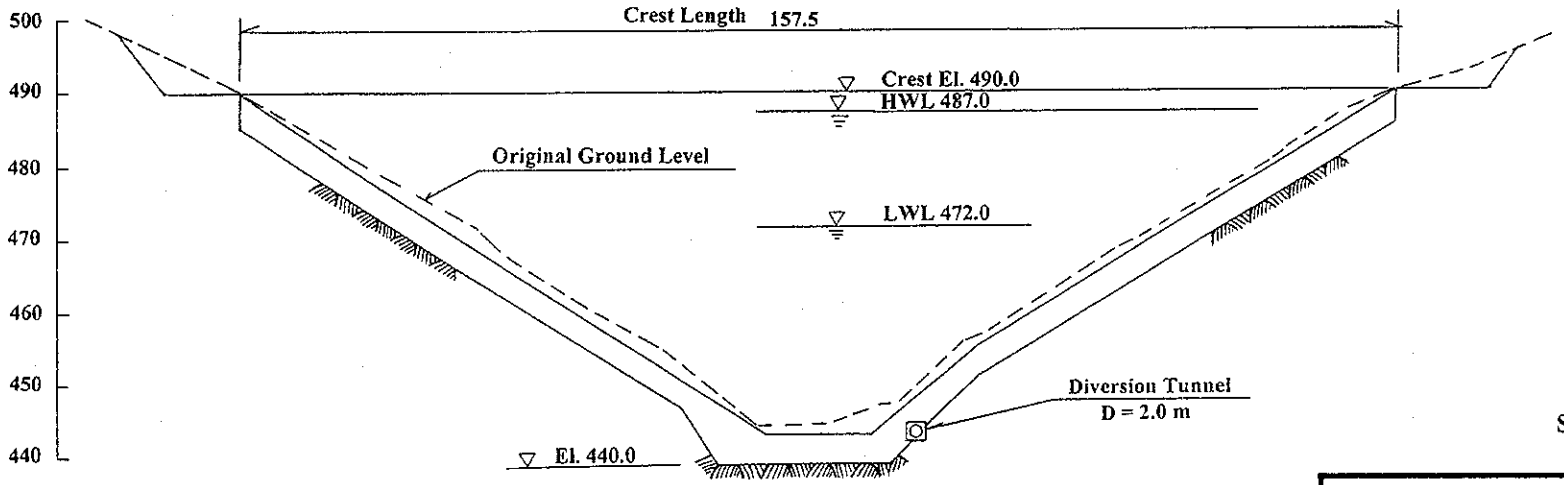

Profile

0 10 20 30 40 50 m

Scale

Slupchanka Dam

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JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

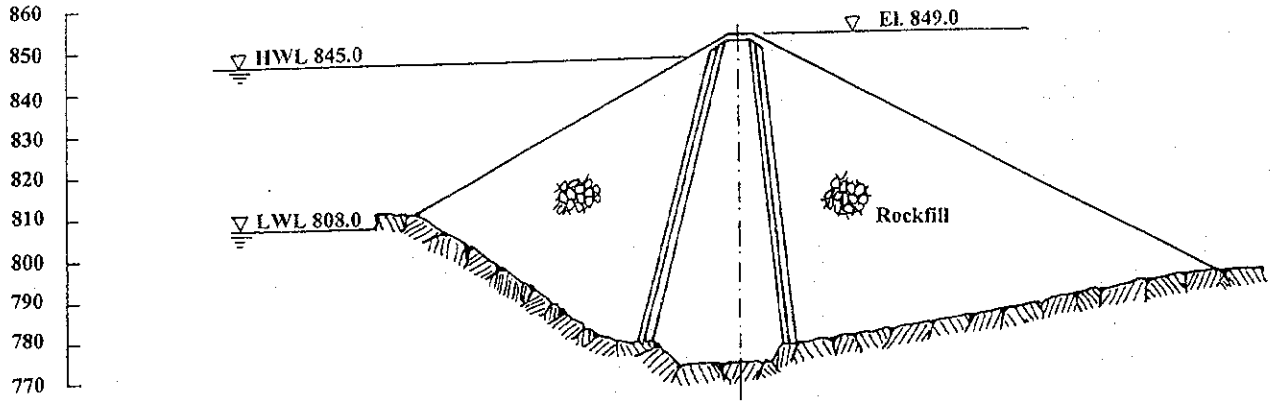
Sheet No. 8

Project Name	Lipkovo-Glaznja Area Irrigation Rehabilitation Project
Sector	Agricultural water
Phase of implementation	
Target area	Lipkovo, Kumanovo
Beneficiaries	Farmers (to be investigated)
Brief description of the project	This irrigation area is widely deployed in the plain located at right side of the Pchinja River. Main products are wheat, maize vegetable etc. The total irrigable area is 10,820 ha.
Project components	1. Rehabilitation of intake, main canal, secondary and tertiary canals
Total construction cost (US$ mil.)	21,640,000
Benefits	- Stable and safe supply of drinking water
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	None
Implementing agency	PWME Kumanovo
Operational organisation	PWME Kumanovo
Financial plan of operation	

PROJECT PROFILE

Sheet No. 9

Project Name	Kiselichka Dam Project
Sector	Municipal, Agricultural
Phase of implementation	
Target area	Municipality of Kriva Palanka
Beneficiaries	Citizens in the target area (about 25,000 inhabitants)
Brief description of the project	Kriva Palanka is located in the north-eastern corner of the country. The **Kiselichka** dam site is located on the uppermost reach of the Kriva river, a tributary of the Pchinja. Downstream of Kriva Palanka, the Vakuf dam site is situated, however, the Vakuf dam and reservoir would not render any water service to Kriva Palanka. So, the Kiselichka project would be inevitable to satisfy the water demand around Kriva Palanka, not only domestic water demand, but also irrigation water demand upstream reaches of the Vakuf.
Project components	1. Construction of **Kiselichka dam** - Catchment area: 81.8 km^2 - Dam type: Rockfill - Height: 77 m - Embankment volume: 936,000 m^3 - Gross storage capacity: 20,000,000 m^3 - Effective storage capacity: 16,000,000 m^3 2. Construction of pipeline 3. Construction of access road
Total construction cost (US $)	46,424,000
Benefits	Water charge from users
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	
Responsible ministry	MAFWE MUPC
Operational organisation	PWME Branch office "Kumanovsko pole" – Kumanovo Communal enterprise - Kriva Palanka
Financial plan of operation	



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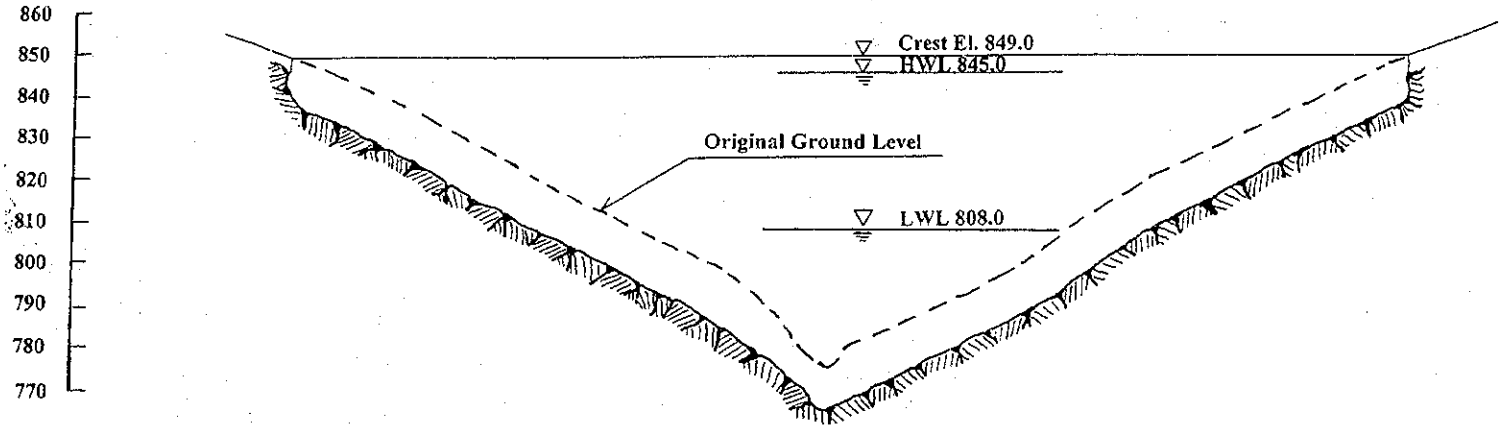
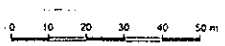


Profile

Kiselichka Dam



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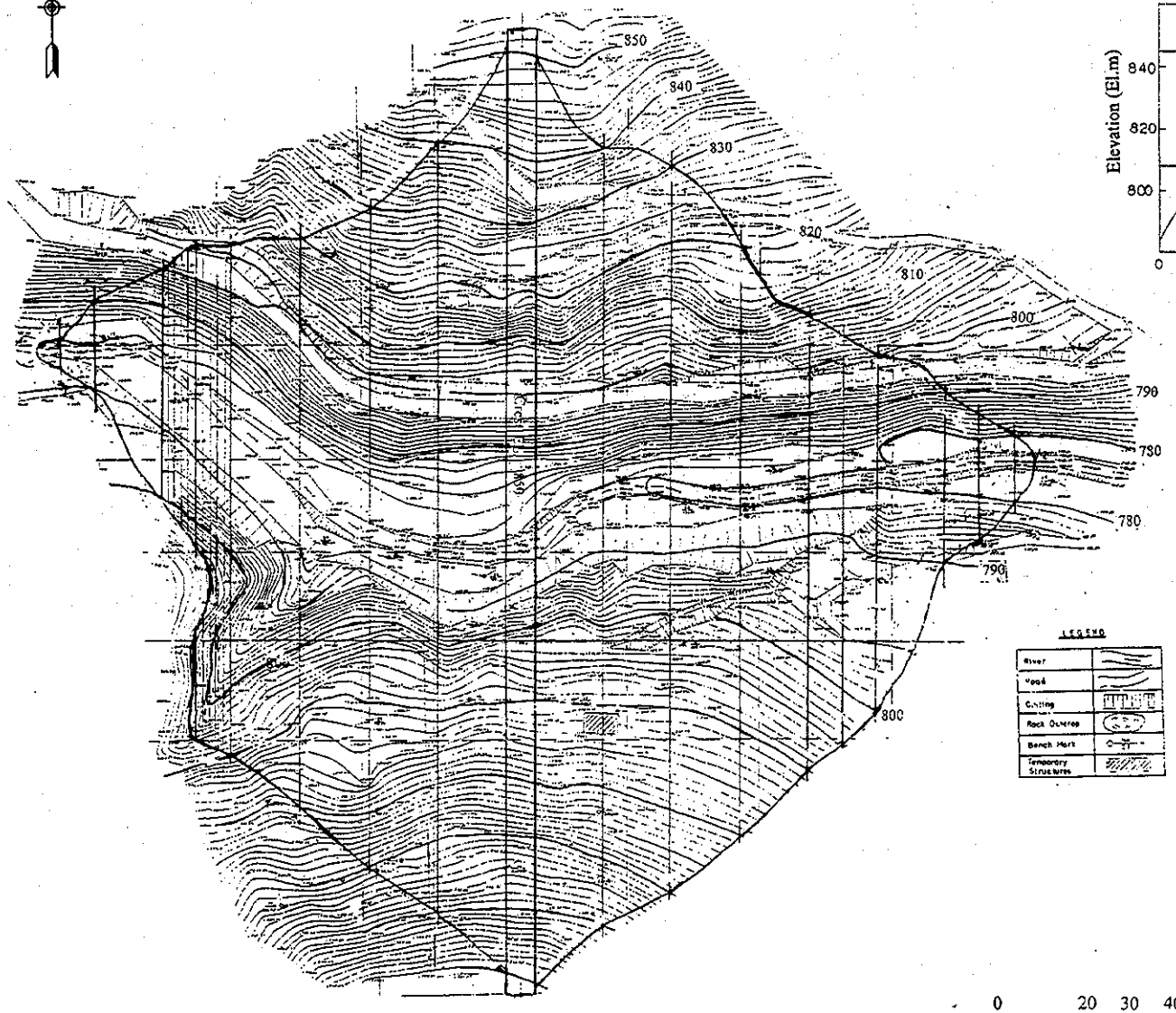
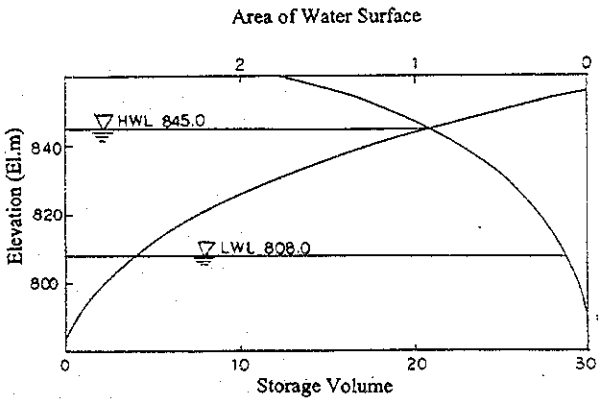


Plan



Reservoir Storage Volume and Water Surface Area

Kiselichka Dam

0 20 30 40 50m

Scale

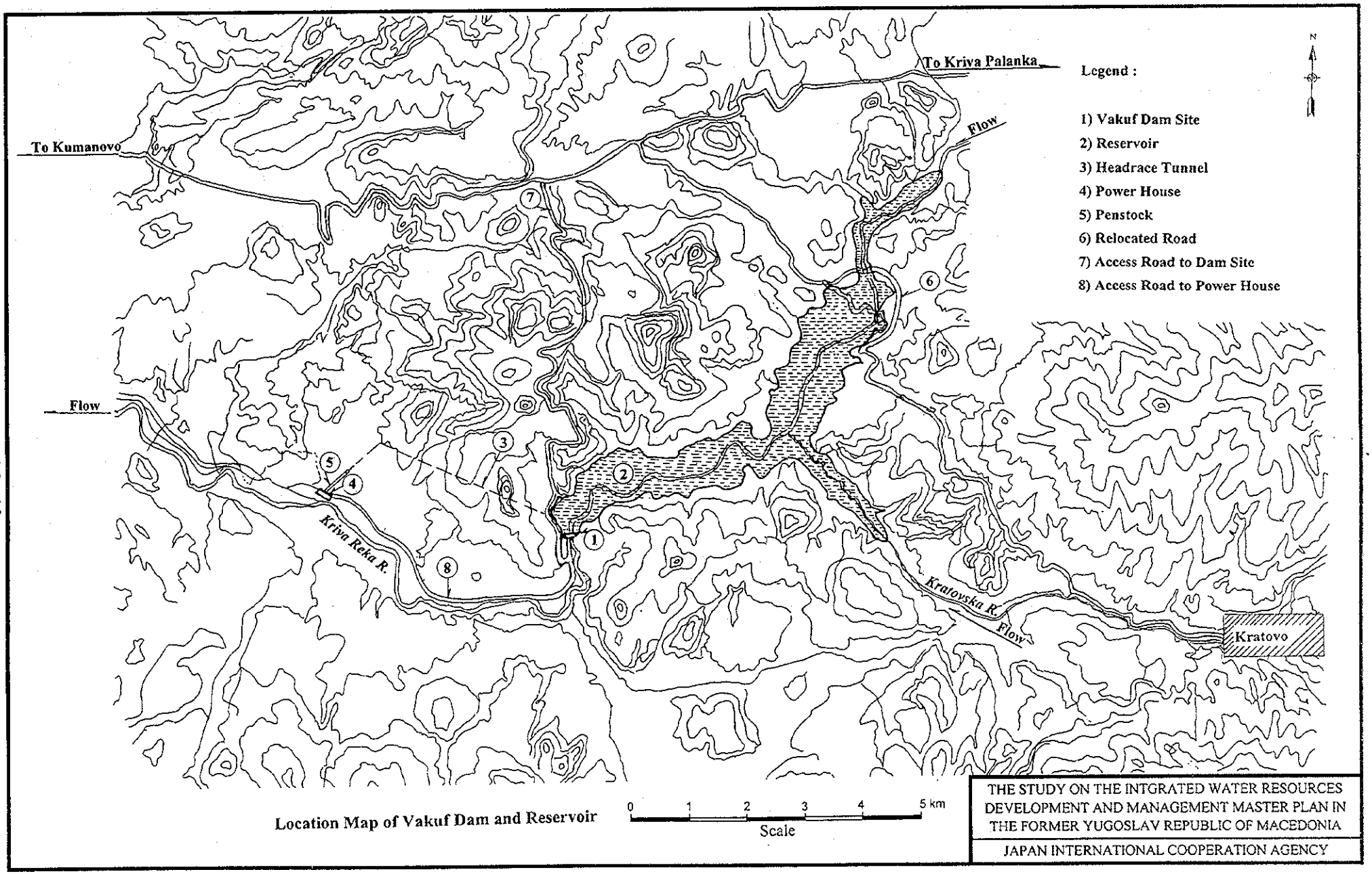
THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

Sheet No. 10

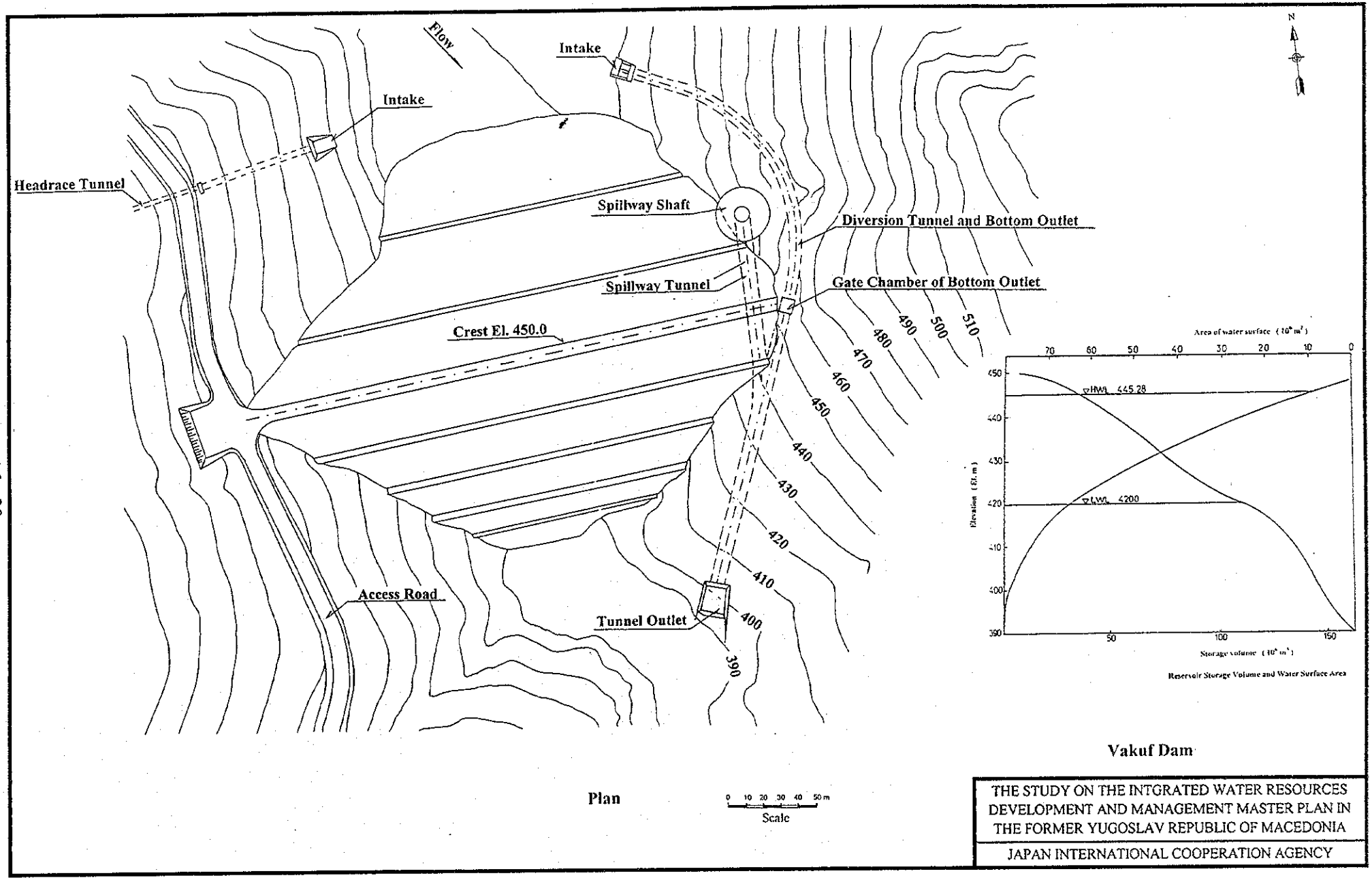
Project Name	Vakuf Dam Project
Sector	Municipal, Agricultural, Industrial water
Phase of implementation	
Target area	Kumanovo, Kratovo etc.
Beneficiaries	Citizens of target area
Brief description of the project	The Vakuf multipurpose dam project is planned for supply of drinking water and irrigation water, hydroelectric power generation and flood control. Specially, it provides irrigation water to the agricultural land lying west of Kumanovo city (about 12,000 ha between the river course of Kumanovska and Pchinja Rivers) and to the lower part of the Bregalnica irrigation system (about 12,000 ha in Sveti Nikole). The damsite is located at the Kriva River, 28 km upstream of the confluence with the Pchinja River. Recently, new railway construction, connecting with the border area of Bulgaria has been extended to the damsite.
Project components	1. Construction of Vakuf dam - Catchment area: 734 km^2 - Dam type: Rockfill with center core - Height: 75 m - Embankment volume: 1.56 x 10^6 m^3 - Gross storage capacity: 1 46 x 10^6 m^3 - Active storage capacity: 1 14 x 10^6 m^3 - Full supply level: El. 448 m - Normal water level: El. 445 m - Minimum water level: El. 420 m 2. Hydropower plant - Mean annual energy production: 14.3 GWh 3. Construction of filter station and water supply system 4. Construction of irrigation pipeline
Total construction cost (US$)	164,342,000
Benefits	- Stable supply of drinking water - Sufficient irrigation water supply - Supplement of power energy
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Water Supply of Kumanovo, Provision of New Water Quantities, Statements of Technical Documentation, 1997
Responsible ministry	MAFWE MUPC MOE
Operational organisation	PWME Branch office "Kumanovsko pole" - Kumanovo Communal Enterprise – Kumanovo ECM
Financial plan of operation	



Location Map of Vakuf Dam and Reservoir

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY



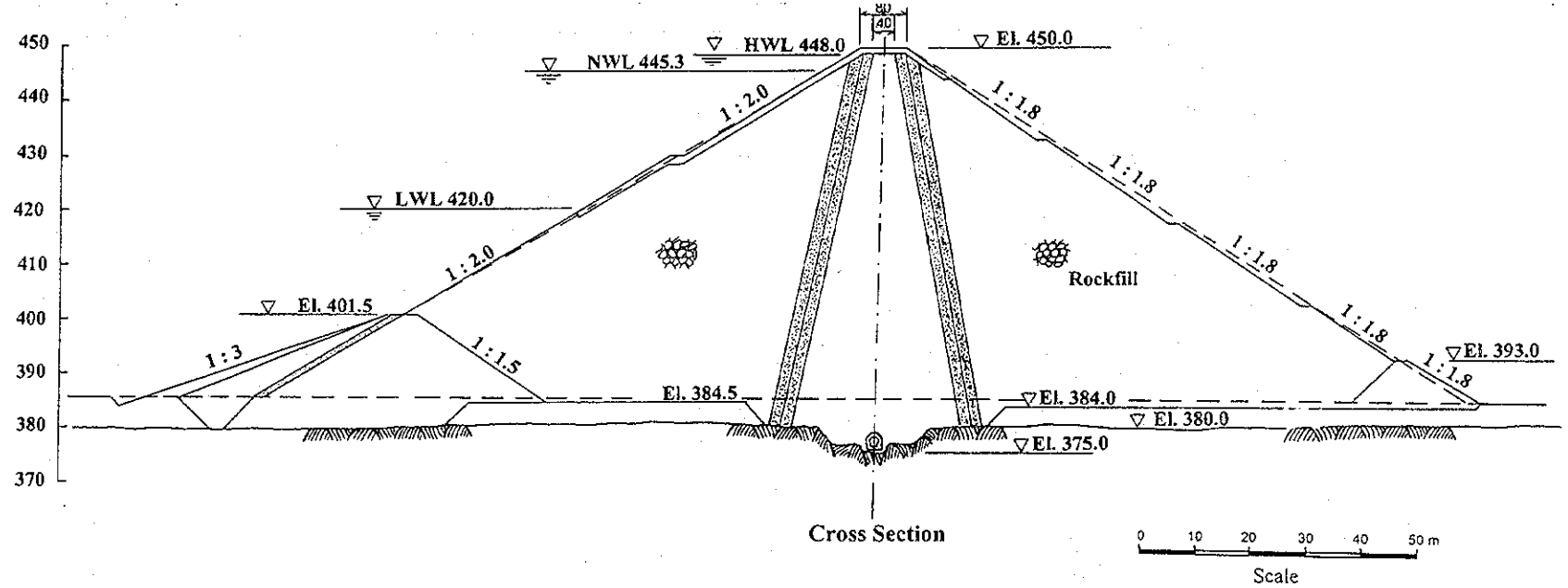
Plan

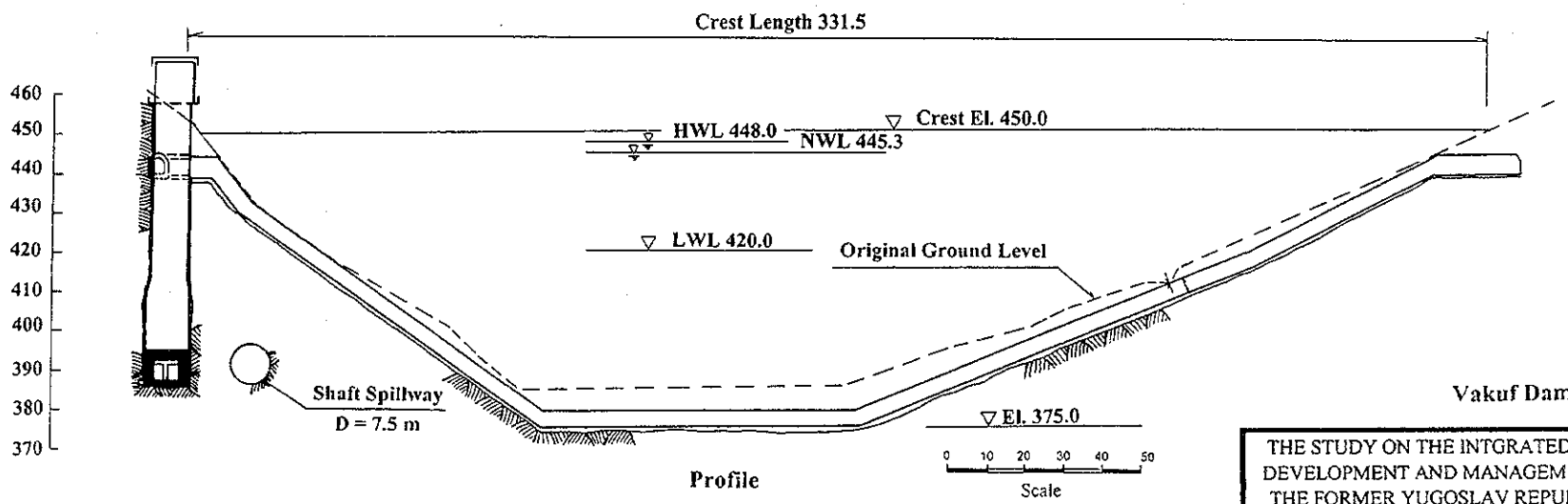
0 10 20 30 40 50 m
Scale

Vakuf Dam

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY





Vakuf Dam

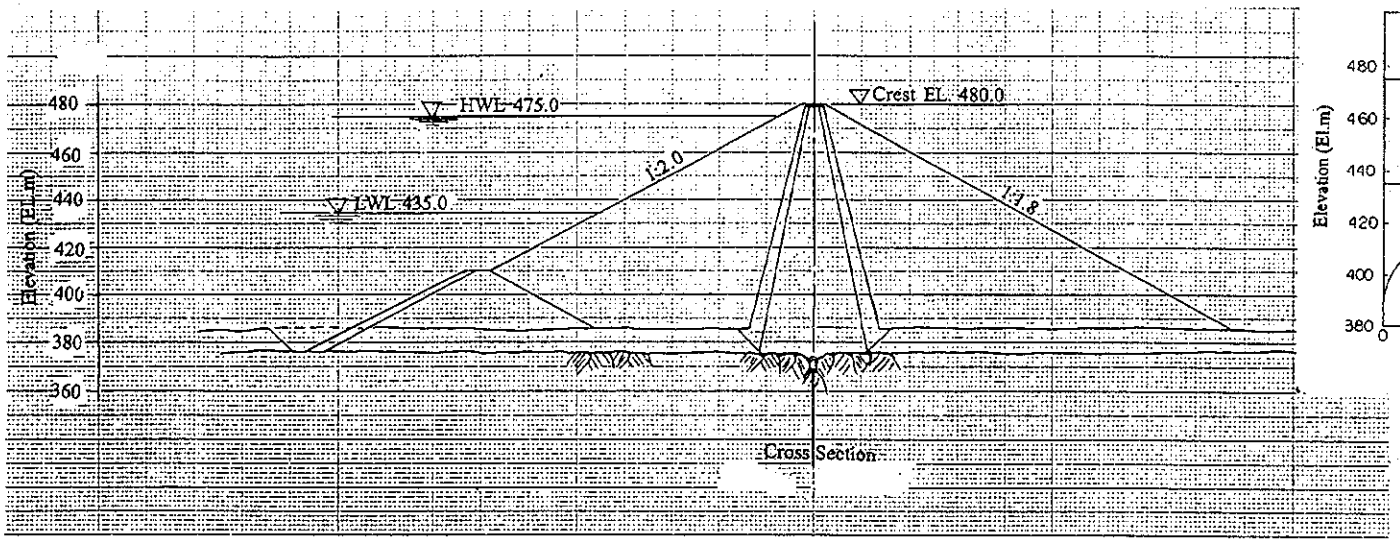
THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

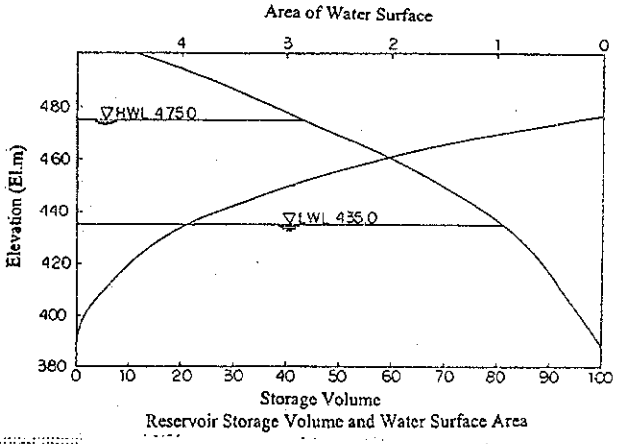
JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

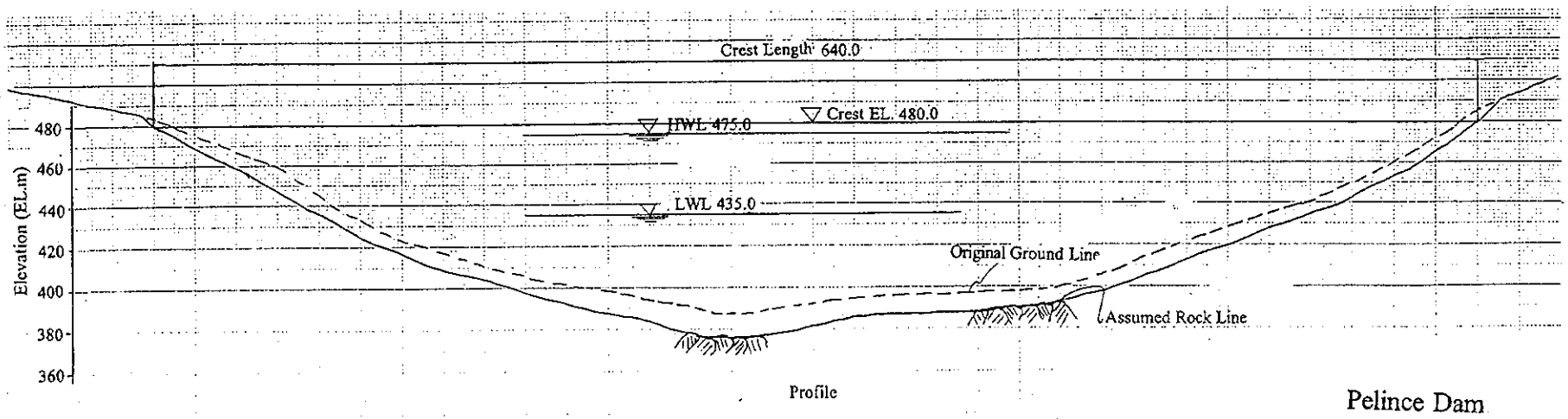
Sheet No. 11

Project Name	Pelince Dam Project
Sector	Agricultural water
Phase of implementation	
Target area	Kumanovo
Beneficiaries	Inhabitants (to be surveyed)
Brief description of the project	The Pelince dam is located in the Pchinja river mainstream, near the village Pelince, around 4 km south from the national border with Yugoslavia. Implementation of this Project is prerequisite for agricultural development in the fertile area lying at east of Kumanovo, of which potential area is around 5,000 ha. However, construction of the Pelince dam is based on the constant natural inflow of the Pchinja River, an agreement with Yugoslavian Government on water resources development will be required.
Project components	1. Construction of Pelince dam 2. Construction of irrigation pipeline
Total construction cost (US$)	57,179,000
Benefits	
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	
Responsible ministry	MAFWE
Operational organisation	PWME Kumanovo
Financial plan of operation	





Reservoir Storage Volume and Water Surface Area



Profile

Pelince Dam

0 20 40 60 80 100m

Scale

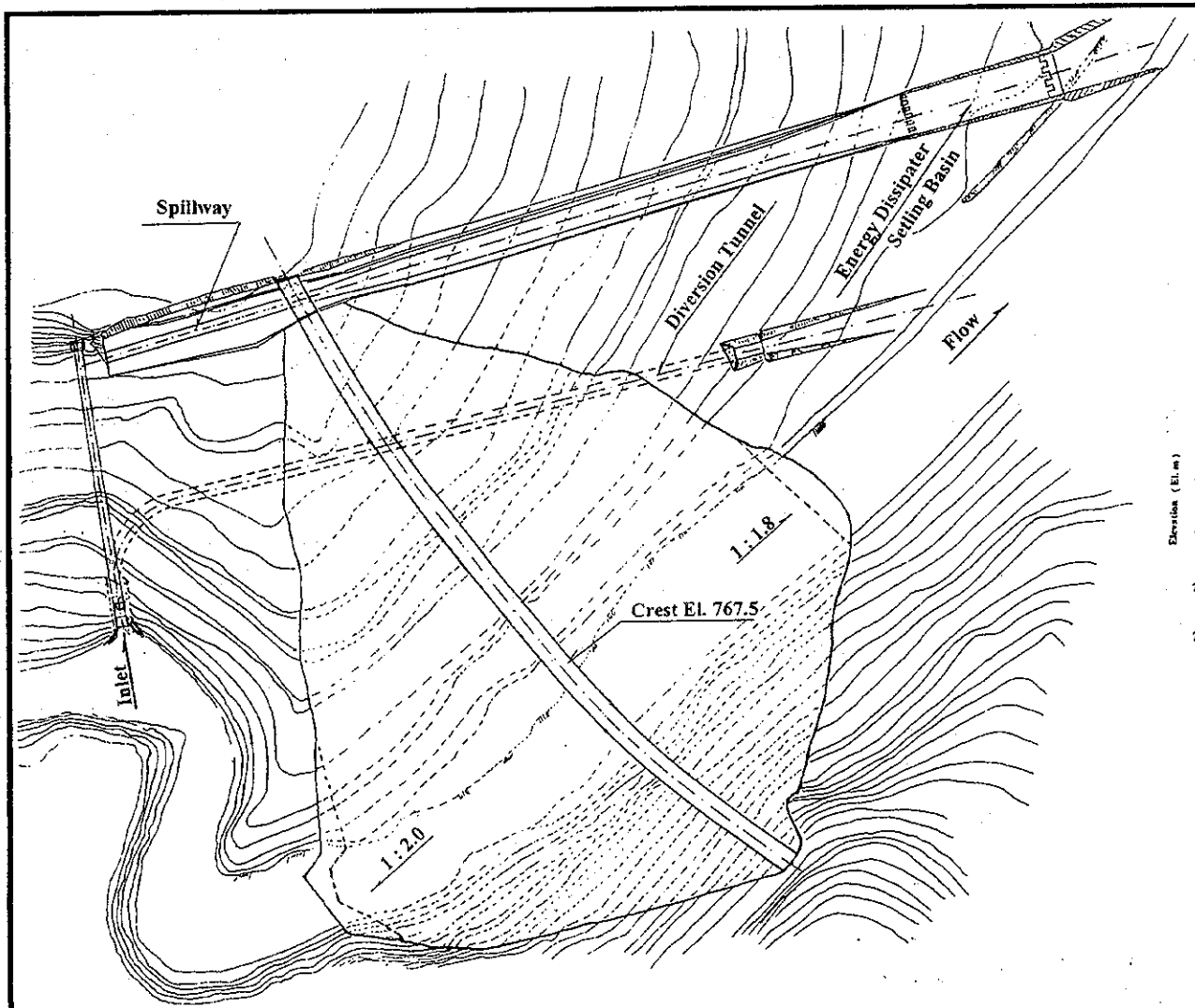
THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

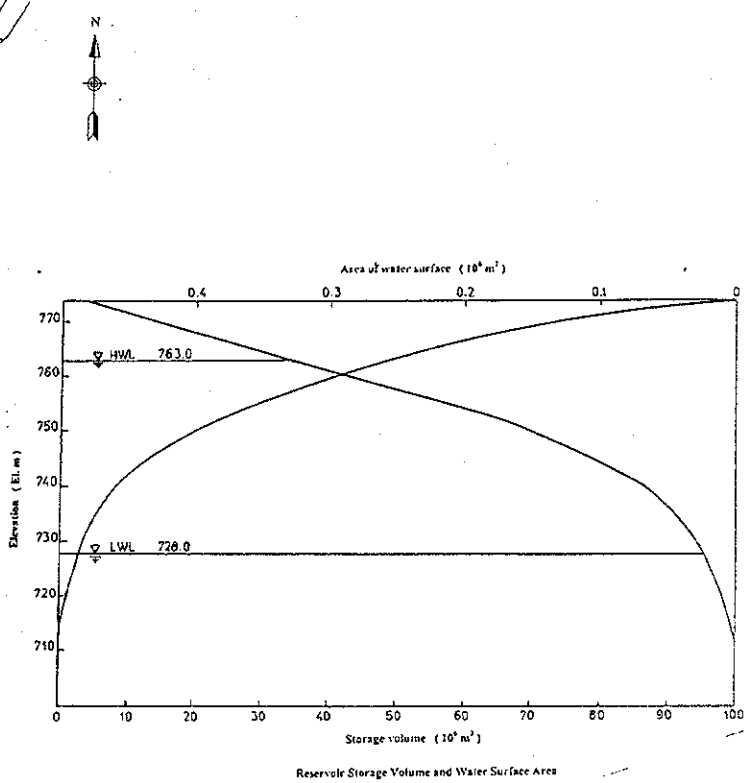
PROJECT PROFILE

Sheet No. 12

Project Name	Razlovci Dam Project
Sector	Municipal, Agricultural water
Phase of implementation	
Target area	Berovo, Delchevo
Beneficiaries	46,000 inhabitants
Brief description of the project	The **Razlovci** dam site is located on the middle reach of the Bregalnica river, upstream existing Kalimanci dam and reservoir. Main purpose of the project is to provide the irrigation water for about 4,000 ha and domestic water to Delchevo and Kochani. Together with the storage capacity of Kalimanci reservoir (120 x 10^6 m^3), water shortage at Delchevo and Kochani will be greatly eased. (Annual inflow into Kalimanci is 340 x 10^6 m^3).
Project components	1. Construction of **Razlovci** dam - Catchment area 456 km^2 - Dam type Rockfill - Height 67.5 m - Embankment volume 940,000 m^3 - Gross storage capacity 48,500,000 m^3 - Active storage capacity 45,500,000 m^3 2. Improvement of water supply system
Total construction cost (US $)	42,270,000
Benefits	- Stable supply of drinking water - Sufficient supply of irrigation water
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	
Responsible ministry	MAFWE MUPC
Operational organisation	PWME Branch office "Bregalnica" – Kochani Communal Enterprise – Berovo
Financial plan of operation	



Plan



Reservoir Storage Volume and Water Surface Area

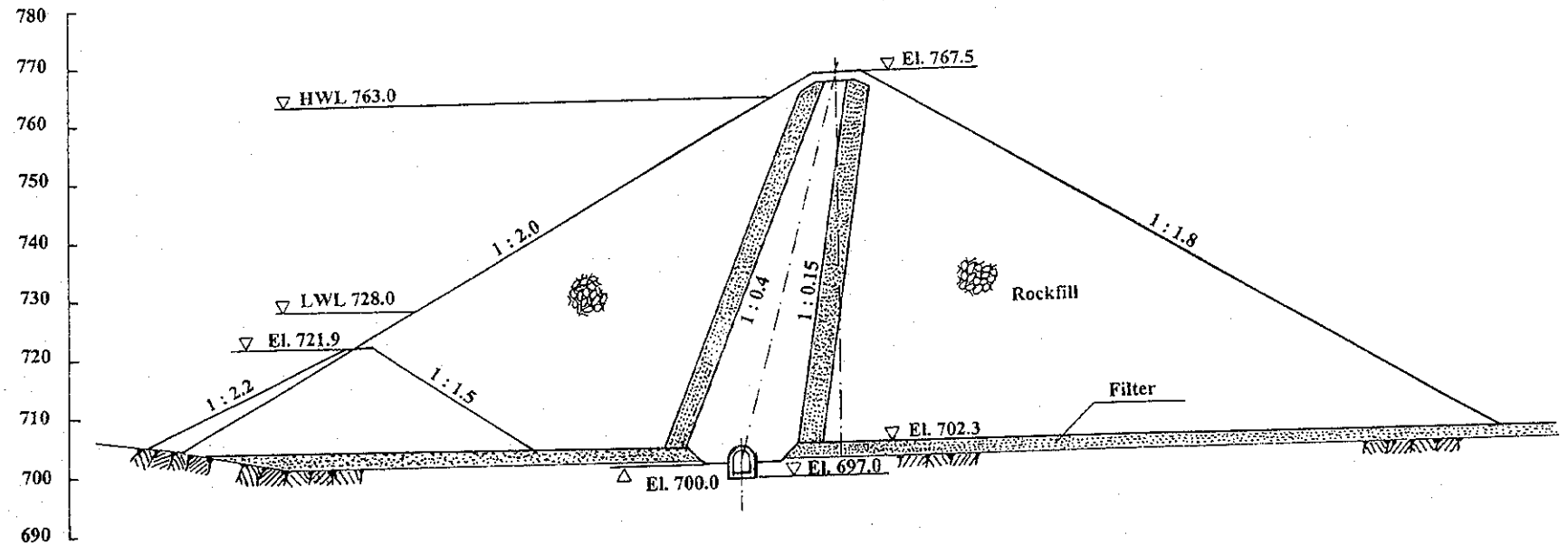
Razlovci Dam

0 50 100 m

Scale

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY



Cross Section

0 10 20 30 40 50 m

Scale

Razlovci Dam

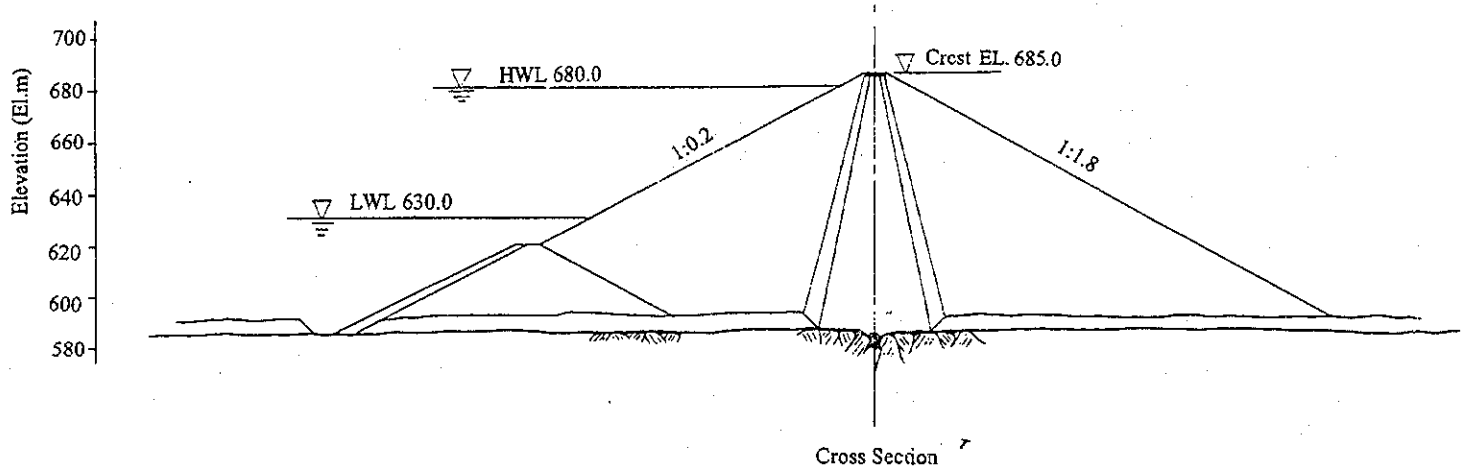
THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

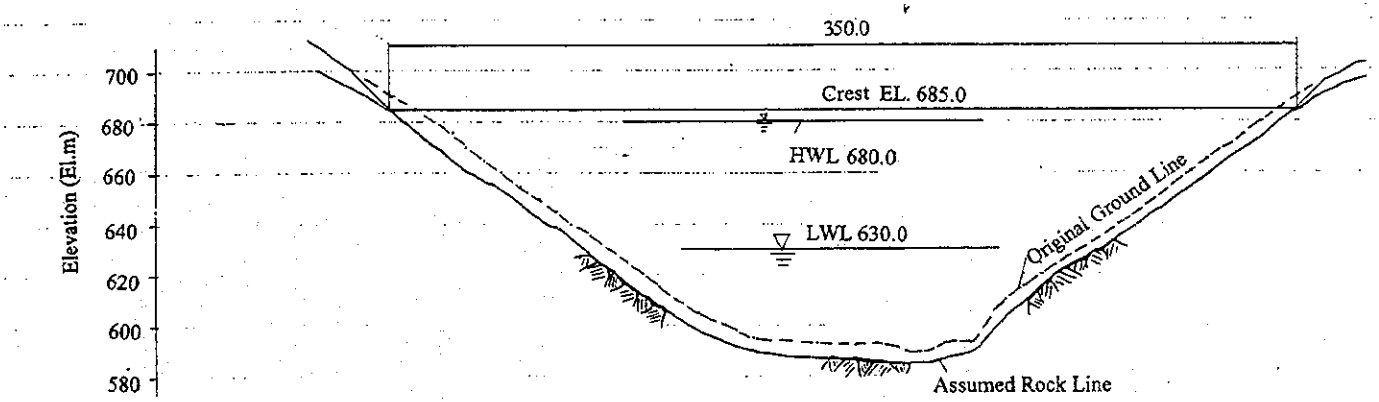
PROJECT PROFILE

Sheet No. 13

Project Name	Blatec Dam Project
Sector	Agricultural water
Phase of implementation	
Target area	Blatec and Vinica
Beneficiaries	
Brief description of the project	This **Blatec** dam scheme on the Osojnica river has been formulated through the JICA study. The Osojnica river originates at the Plachkovica range, flows northward and joins to the Bragalnica nearby Vinica. The basin of this river receives abundant rainfall, and therefore has rich river runoff. Although the details of the project has not yet been cleared, water stored in the reservoir during rainy season will be supplied to the paddy field around Blatec and Vinica.
Project components	1. Construction of **Blatec** dam - Catchment area 82.8 km^2 - Dam type Rockfill - Height 94 m - Embankment volume 2,700,000 m^3 - Gross storage capacity 22,400,000 m^3 - Active storage capacity 20,000,000 m^3 2. Extension of water supply system
Total construction cost (US $)	37,882,000
Benefits	Stable supply of irrigation water
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	None
Responsible ministry	MAFWE
Operational organisation	PWME - Kochani and Vinica Communal Enterprise - Kochani and "Solidarnost"
Financial plan of operation	



Cross Section



Profile

Blatec Dam

Scale

0 20 40 60 80 100m.

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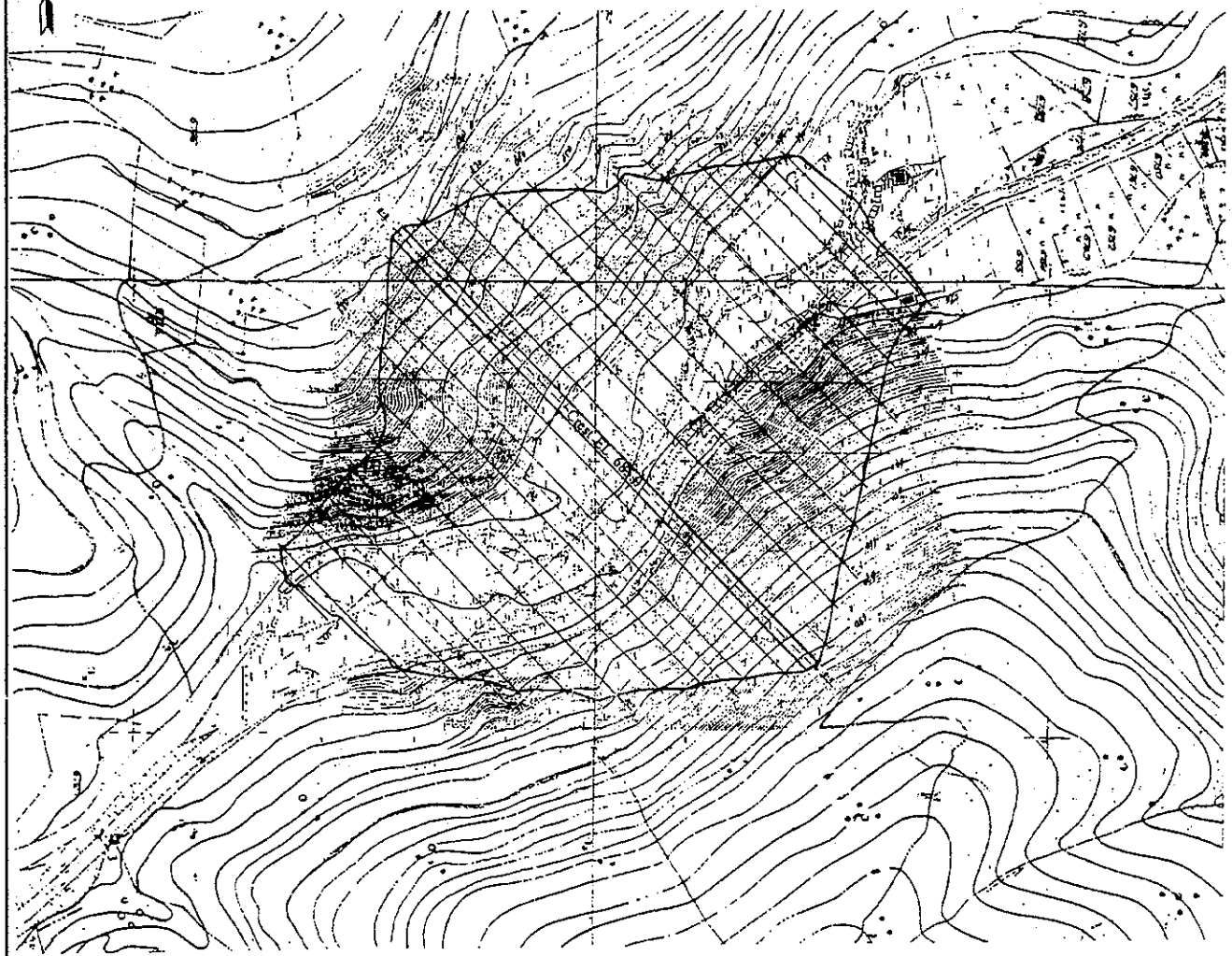
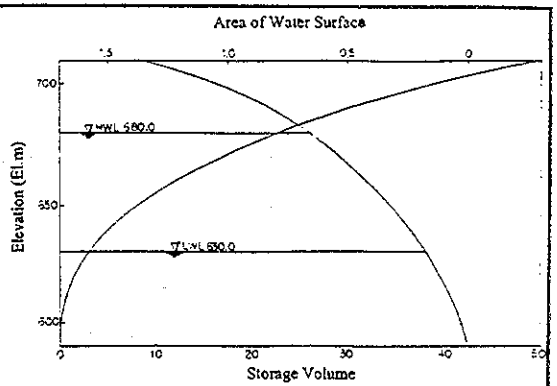
JAPAN INTERNATIONAL COOPERATION AGENCY



Plan

0 20 40 60 80 100m

Scale



Reservoir Storage Volume and Water Surface Area

Blatec Dam.

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

Sheet No. 14a

Project Name	Rechani Multipurpose Dam Project – Phase I
Sector	Municipal water
Phase of implementation	
Target area	Kochani, Vinica
Beneficiaries	45,000 inhabitants
Brief description of the project	Domestic water in the Kochani and Vinica municipalities and their surrounding areas are now supplied from the well systems, however, the water in the wells are contaminated from the pesticides used in the neighbouring paddy fields. So, exploiting the Orizarska river, which originates from Mt. Carev vrv (El. 2,084 m), runs southwards and joins to the Bregalnica nearby the Kochani town, has been formulated. On the Orizarska River, the Rechani dam is scheduled in the second stage of the Orizarska River development. As the first stage plan, this water supply system is contemplated. A filter station at Vinica has been completed and filter station at Kochani is now under construction.
Project components	1. Construction of intake and pipeline - Total length 28.4 km - Capacity 877 lit/s 667 lit/s for Kochani 210 lit/s for Vinica
Total construction cost (US $)	11,300,000
Benefits	- Stable supply of drinking water till 2025
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Regional Water Supply System for Kochani and Vinica from the Hydrosystem "Orizarska Reka" Dec 1996
Responsible ministry	MUPC
Operational organisation	Communal Enterprise - Kochani and "Solidarnost"
Financial plan of operation	

PROJECT PROFILE

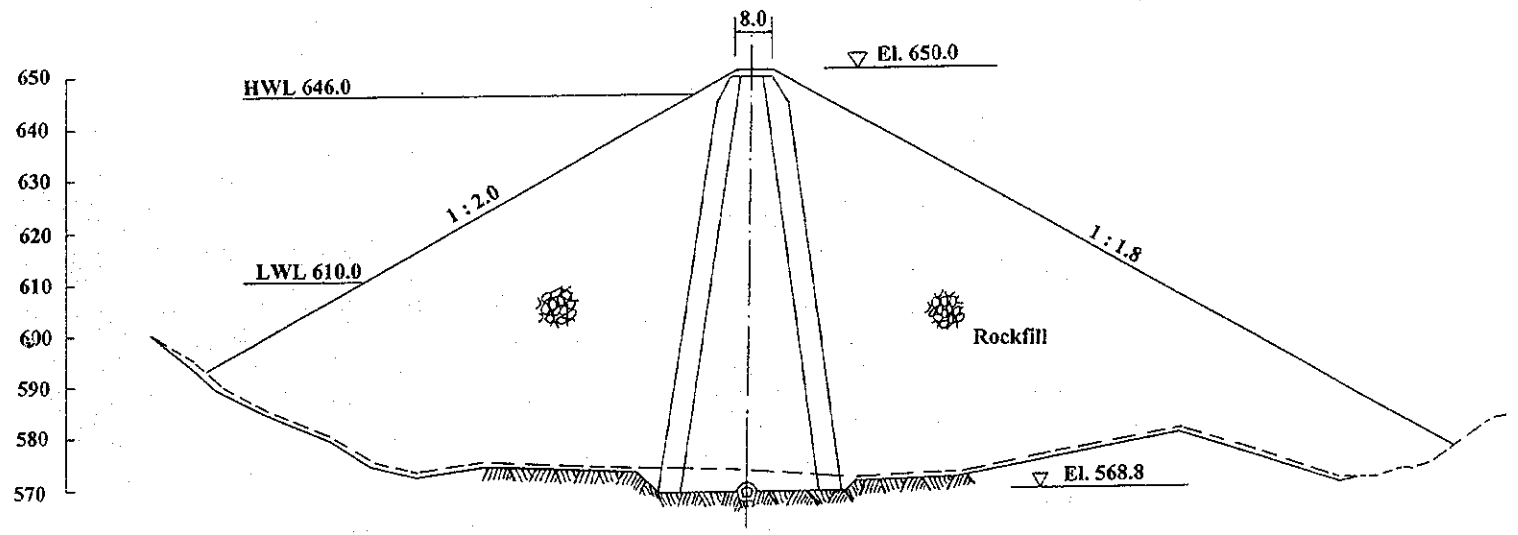
Sheet No. 14b

Project Name	Rechani Multipurpose Dam Project – Phase II
Sector	Municipal water
Phase of implementation	
Target area	Kochani, Vinica
Beneficiaries	45,000 inhabitants
Brief description of the project	As the second stage project of the Orizarska river water resources development, the **Rechani** dam has been contemplated. (refer to Sheet No. 14) Since the storage capacity of the Gradche reservoir, developed during the '50s, is rather small against the runoff of the Kochanska river, the water resources of the Kochanska has not been utilised fully. To absorb the unused water of the Kochanska, the river runoff of the Kochanska would be diverted into the Rechani reservoir.
Project components	1. Construction of **Rechani** dam - Catchment area 92.9 + 51.8 km^2 - Dam type Rockfill - Height 81 m - Embankment volume 860,000 m^3 - Gross storage capacity 23,000,000 m^3 - Active storage capacity 20,000,000 m^3 - Water supply capacity 0.88 m^3/s 2. Construction of intake and diversion tunnel from upper reach of the existing Gradche dam on the Kochanska river (CA=51.8 km^2) - Intake on the Golema, a left branch of Kochansk - Diversion tunnel d=2.0 m, L=800 m 3. Extension of water supply system
Total construction cost (US $)	23,000,000
Benefits	Stable supply of drinking water till 2025
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Regional Water Supply System for Kochani and Vinica from the Hydrosystem "Orizarska Reka" Dec 1996
Responsible ministry	MAFWE MUPC
Operational organisation	PWME Kochani and Vinica Communal Enterprise - Kochani and "Solidarnost"
Financial plan of operation	

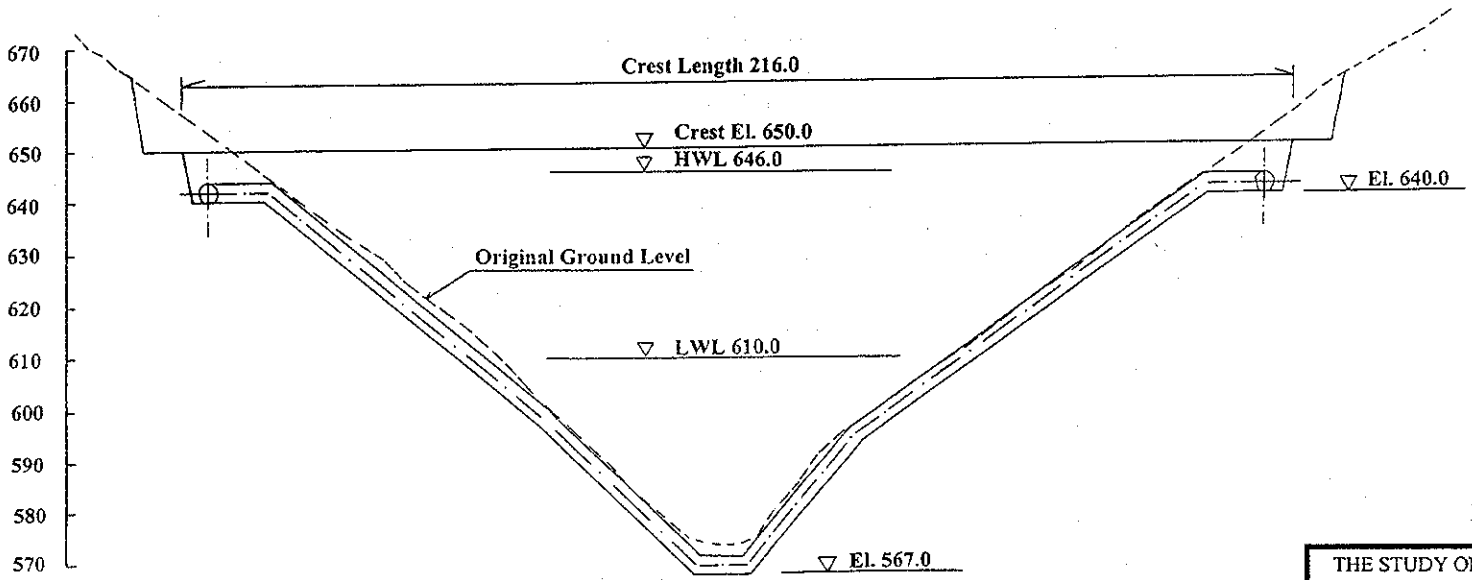
PROJECT PROFILE

Sheet No. 14c

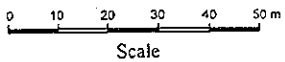
Project Name	Rechani Multipurpose Dam Project – Phase III
Sector	Hydropower
Phase of implementation	
Target area	Kochani, Vinica
Beneficiaries	45,000 inhabitants
Brief description of the project	After construction of the Rechani dam, total 3 small-scale hydro power plants will be constructed as Phase III to gain more benefit by implementation of the project. A cascade type hydro power development is considered suitable to utilize the differential head of about 20 m.
Project components	1. Construction of hydroelectric power facilities (3 power plants, total annual energy 19.7 x 10^6 kWh. 2. Construction of transmission line to connect with national grid system
Total construction cost (US$)	50,300,000
Benefits	- Supplement of power energy
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Regional Water Supply System for Kochani and Vinica from the Hydrosystem "Orizarska reka" 1997
Responsible ministry	MOE
Operational organization	ECM
Financial plan of operation	



Cross Section



Profile



Rechani Dam

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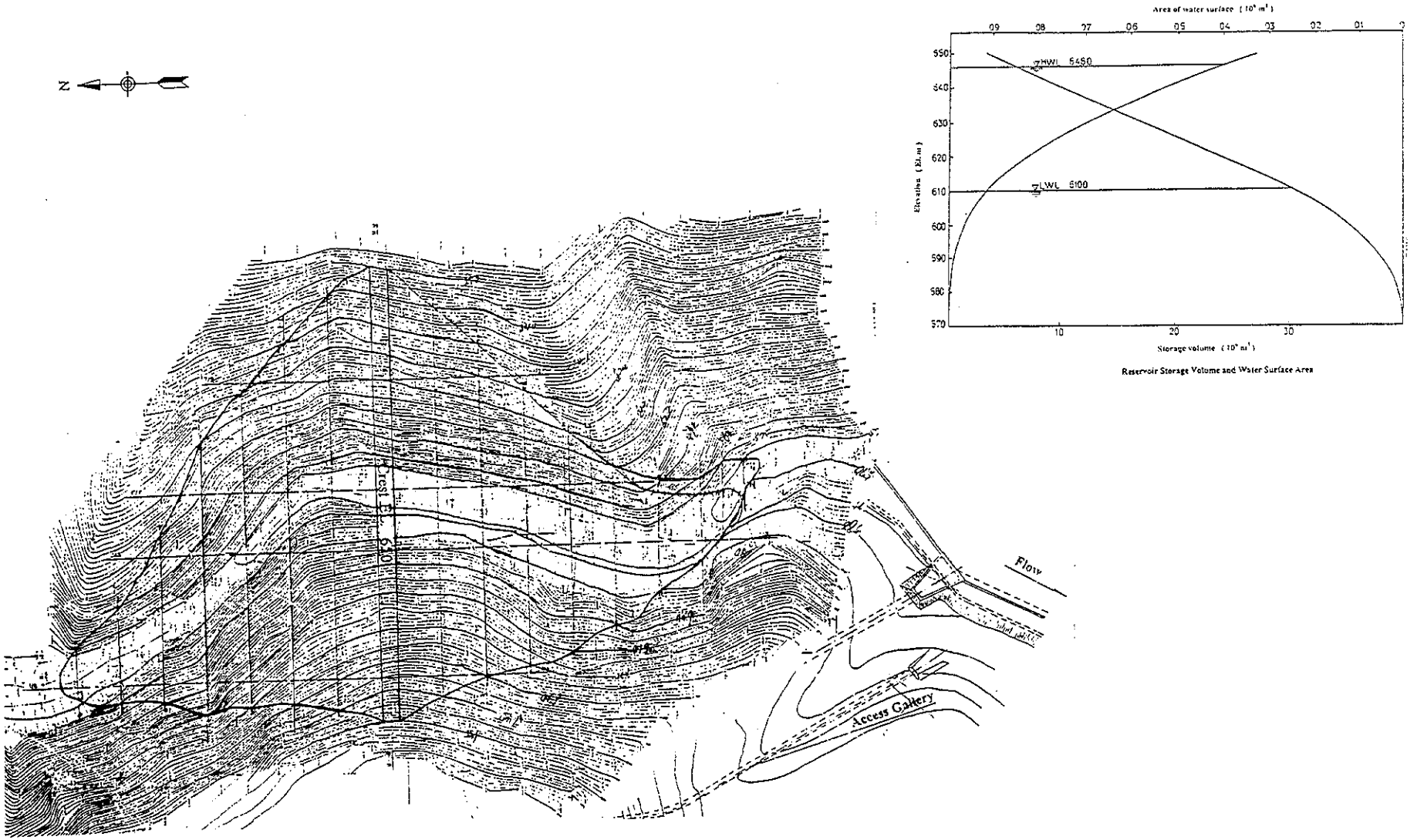
JAPAN INTERNATIONAL COOPERATION AGENCY



Reservoir Storage Volume and Water Surface Area

Plan

Rechani Dam

0 100 200 300m

Scale

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

Sheet No. 15a

Project Name	Zletovica Multipurpose Dam Project – Phase I-A
Sector	Municipal, Industrial water
Phase of implementation	
Target area	Probishtip, Zletovo, Lezovo, Sveti Nikole, Karbinci, Shtip, Kratovo
Beneficiaries	140,000 inhabitants
Brief description of the project	The Zletovska river is a small, but significant tributary of the Bregalnica river. Its drainage area in the mountainous region is 179 km^2. The **Knezevo dam** will play a key role for water supply to the target area. Runoffs of the small tributaries will be used without waste. Water of the Kuceska (CA=6.9 km^2) will be diverted into the Knezevo reservoir. Runoff of Emiricka (CA=12.0 km^2) and Venecka (CA=9.4 km^2) will be poured into the surge tank of the future Zletovica I power station. Water of Zelengradska (CA= 7.9 km^2) will be utilized for power generation through future Zletovica III power station.
Project components	1. Construction of access road (L=20 km) 2. Construction of **Knezevo dam** - Catchment area : 52.0 km^2 (main)+ 6.9 km^2 - Dam type : Rockfill - Height : 84.7 m - Embankment volume : 1,615,000 m^3 - Gross storage capacity : 23,500,000 m^3 - Active storage capacity : 22,500,000 m^3 3.85x10^6 m^3 for Kratovo (being supplied) 8.05x10^6 m^3 for Probistip 14.86x10^6 m^3 for Shtip 4.04x10^6 m^3 for St.Nilole
Total construction cost (US $)	63,000,000
Benefits	- Stable and safe supply of drinking water
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Hydrosystem Zletovica Feasibility Study May 1996
Implementing agency	PWME Communal enterprises
Operational organisation	
Financial plan of operation	

PROJECT PROFILE

Sheet No. 15b

Project Name	Zletovica Multipurpose Dam Project – Phase I-B
Sector	Municipal, Industrial water
Phase of implementation	
Target area	Probishtip, Zletovo, Lezovo, Sveti Nikole, Karbinci, Shtip, Kratovo
Beneficiaries	140,000 inhabitants
Brief description of the project	The Zletovska river is a small, but significant tributary of the Bregalnica river. Its drainage area in the mountainous region is 179 km^2. The **Knezevo dam** will play a key role for water supply to the target area. Runoffs of the small tributaries will be used without waste. Water of the Kuceska (CA=6.9 km^2) will be diverted into the Knezevo reservoir. Runoff of Emiricka (CA=12.0 km^2) and Venecka (CA=9.4 km^2) will be poured into the surge tank of the future Zletovica I power station. Water of Zelengradska (CA= 7.9 km^2) will be utilized for power generation through future Zletovica III power station.
Project components	1. Construction of water supply system - Steel pipeline, Ø 457 mm, L=22 km (completed) (intake is located upstream of Knezevo reservoir) for Kratovo - Polyester pipeline, Ø 500 mm, L=7.7 km (under construction) for Probishtip - Polyester/steel pipeline, Ø 1000~457 mm, total L=51.8 km for Shtip and St. Nikole
Total construction cost (US $)	21,250,000
Benefits	- Stable and safe supply of drinking water
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Hydrosystem Zletovica Feasibility Study May 1996
Responsible ministry	MAFWE MUPC
Operational organisation	PWME Communal Enterprizes
Financial plan of operation	

PROJECT PROFILE

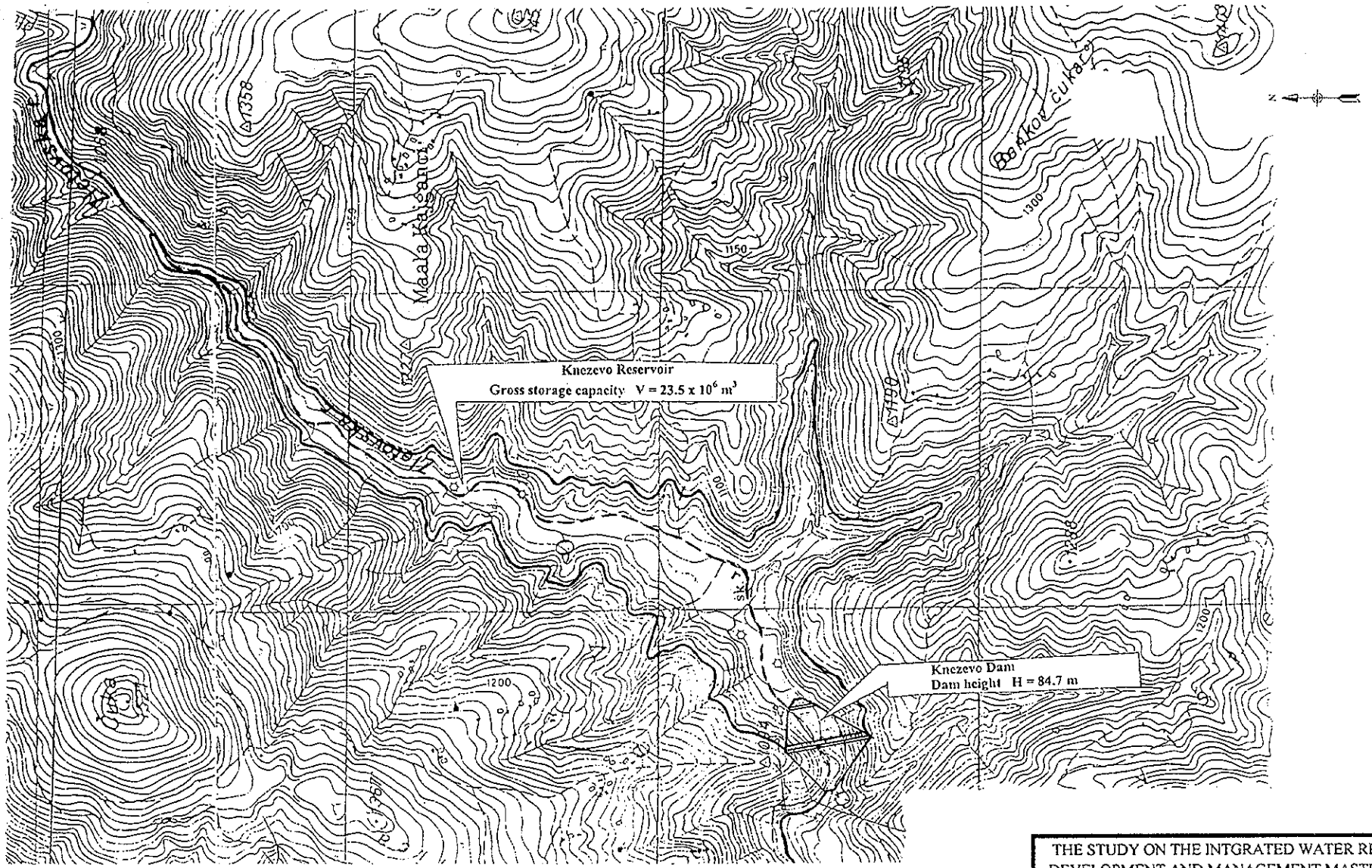
Sheet No. 15c

Project Name	Zletovica Multipurpose Dam Project – Phase II
Sector	Agricultural water
Phase of implementation	
Target area	Probishtip, Zletovo, Lezovo, Sveti Nikole, Karbinci, Shtip, Kratovo
Beneficiaries	3,100 ha
Brief description of the project	The Zletovska river pours into the plain at Zletovo. On the plain along the river a fertile land develops. There is a small reservoir (Pishiva, CA=15 km^2) exclusive use for irrigation. However, owing to low flow of the Zletovska river during the irrigation period (Apr. thru Oct.), serious water shortage for irrigation occurs recently. In order to improve this situation, it is planned to develop new irrigation system along the Zletovica River. Irrigation area consists of Lower zone 2,000 ha and Upper zone 1,100 ha. Lower zone could be irrigated only by water release out of the Knezevo dam, however, upper zone ought to wait until realising of Zletovica III power station, since the intake for irrigation of upper zone would be provided at the head pond of the Zletovica III.
Project components	1. Construction of irrigation system Main supply line for lower zone L=17.45 km Main supply line for upper zone L=15.40 km
Total construction cost (US $)	18,300,000
Benefits	- Stable supply of irrigation water - Increased and diversified agricultural production - Tourism attraction
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Hydrosystem Zletovica Feasibility Study May 1996
Implementing agency	MAFWE MUPC
Operational organisation	PWME Communal enterprises
Financial plan of operation	

PROJECT PROFILE

Sheet No. 15d

Project Name	Zletovica Multipurpose Dam Project – Phase III
Sector	Hydropower
Phase of implementation	
Target area	Probishtip, Zletovo, Lezovo, Sveti Nikole, Karbinci, Shtip, Kratovo
Beneficiaries	140,000 inhabitants
Brief description of the project	Available head between the Normal High Water Level (NHL) of the **Knezevo reservoir** and the village of Zletovo, 580 m, would be utilized by three (3) power stations as shown below: Zletovo I; dam and waterway type; Q=3.2 m^3/s, Hgross=235.2 m, P=6.2 MW, E=22.1 GWh/yr Zletovo II; run-of-river type; Q=3.2 m^3/s, Hgross=183.6 m, P=4.9 MW, E=20.0 GWh/yr Zletovo III; run-of-river type; Q=3.5 m^3/s, Hgross=131.1 m, P=3.8 MW, E=14.2 GWh/yr However, power and energy would be produced mainly by releasing the required water for irrigation and so on, so not continuously, but interruptedly. Then, the dependable power output should be none.
Project components	1. Construction of hydroelectric power facilities (3 power plants) Zletovo I; Waterway from the reservoir; pressure tunnel D=2.5m, L=3,460 m Waterway from the Emiricka & Venecka free flow channel Q=1.05 m^3/s, L=6,650 m Zletovo II; free flow channel L=3,020 m pressure tunnel D=2.2m, L=1,200 m Zletovo III; free flow channel L=7,730 m, including 2 siphons
Total construction cost (US $)	68,200,000
Benefits	- Supplement of power energy
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Hydrosystem Zletovica Feasibility Study May 1996
Implementing agency	MOE
Operational organisation	ECM
Financial plan of operation	



Location Map of Knezhevo Dam

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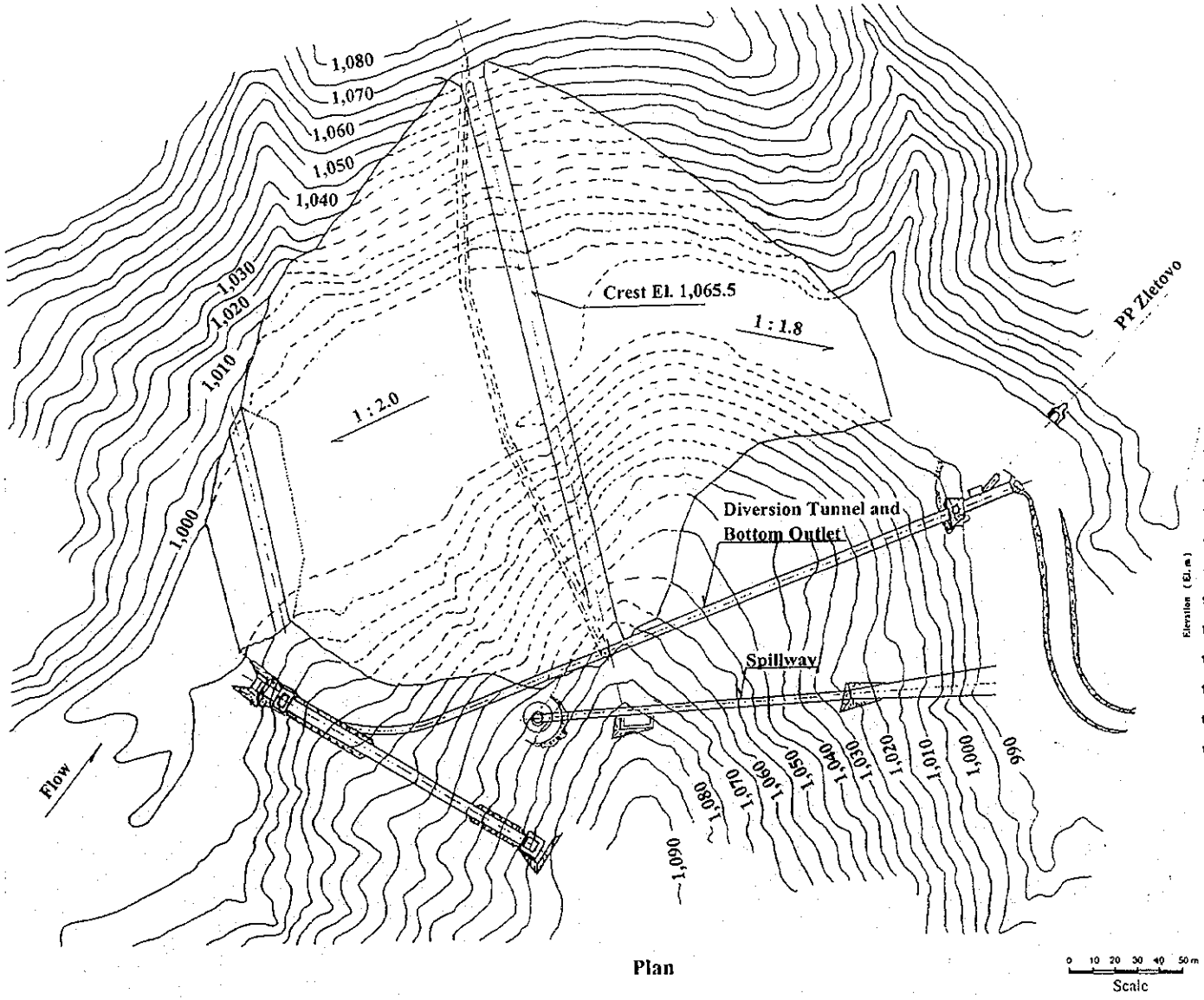
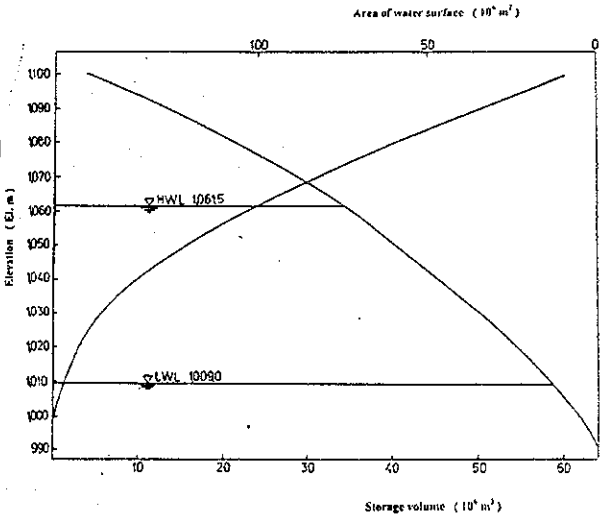
JAPAN INTERNATIONAL COOPERATION AGENCY



Plan

Scale 0 10 20 30 40 50 m



Reservoir Storage Volume and Water Surface Area

Knezhevo Dam

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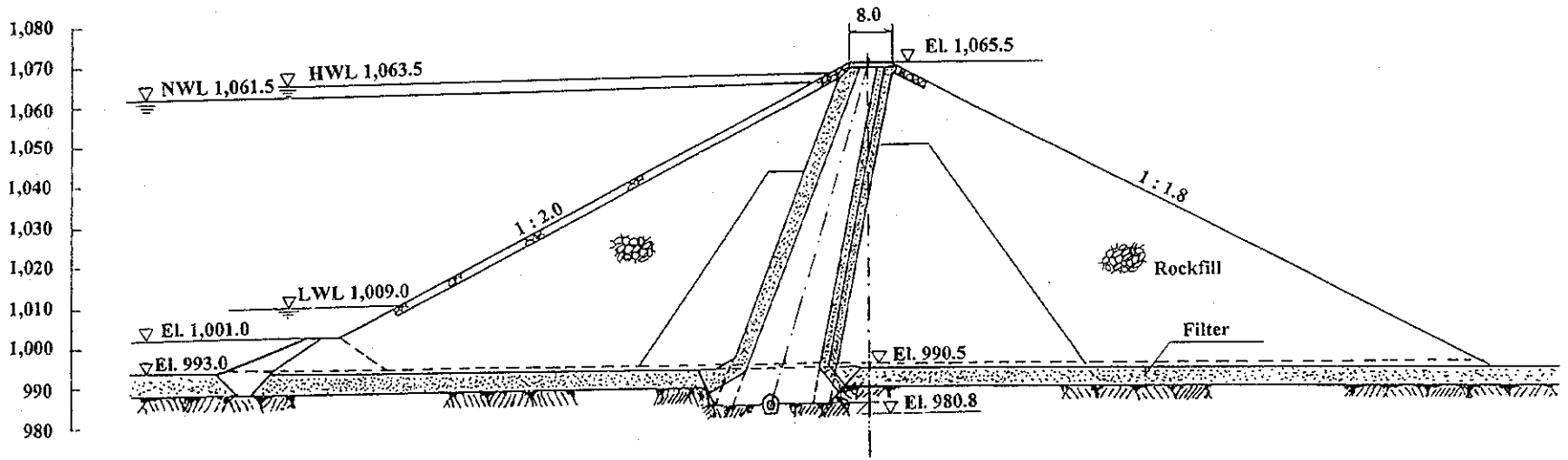

Knezhevo Dam

Cross Section

0 10 20 30 40 50
Scale

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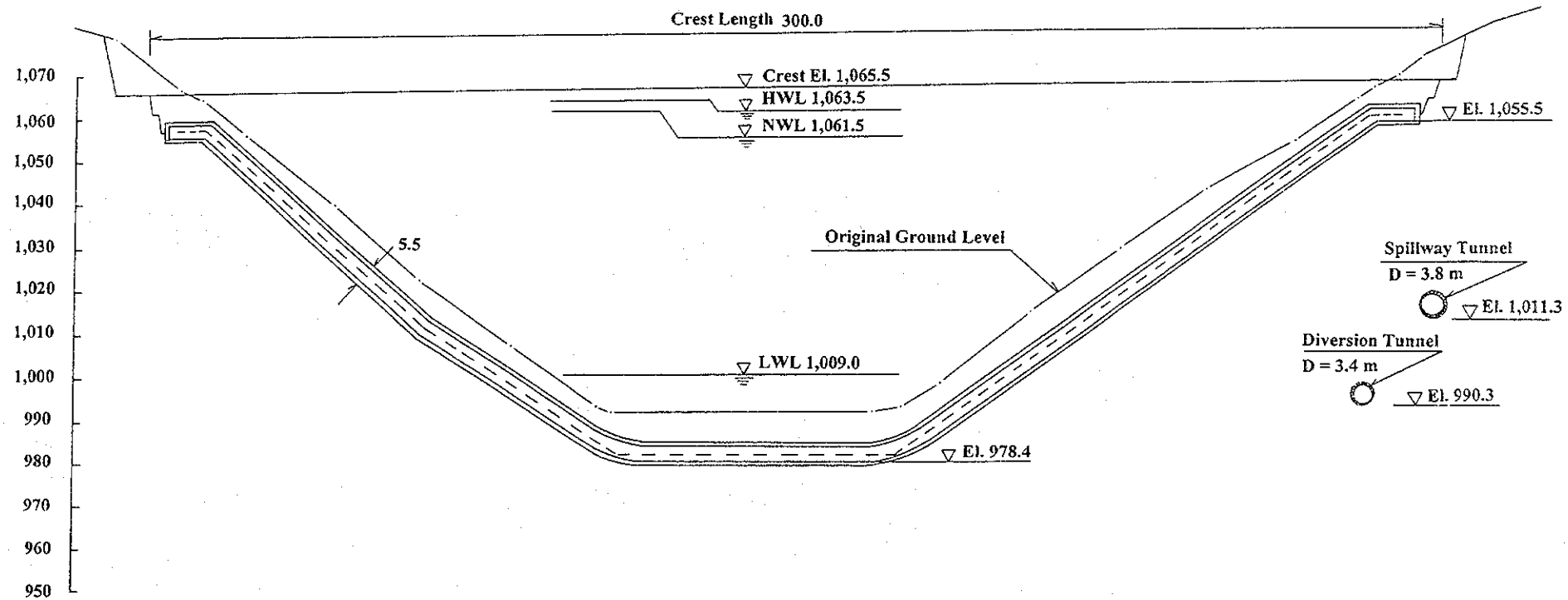
JAPAN INTERNATIONAL COOPERATION AGENCY



Knezhevo Dam

Profile

0 10 20 30 40 50 m
Scale

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

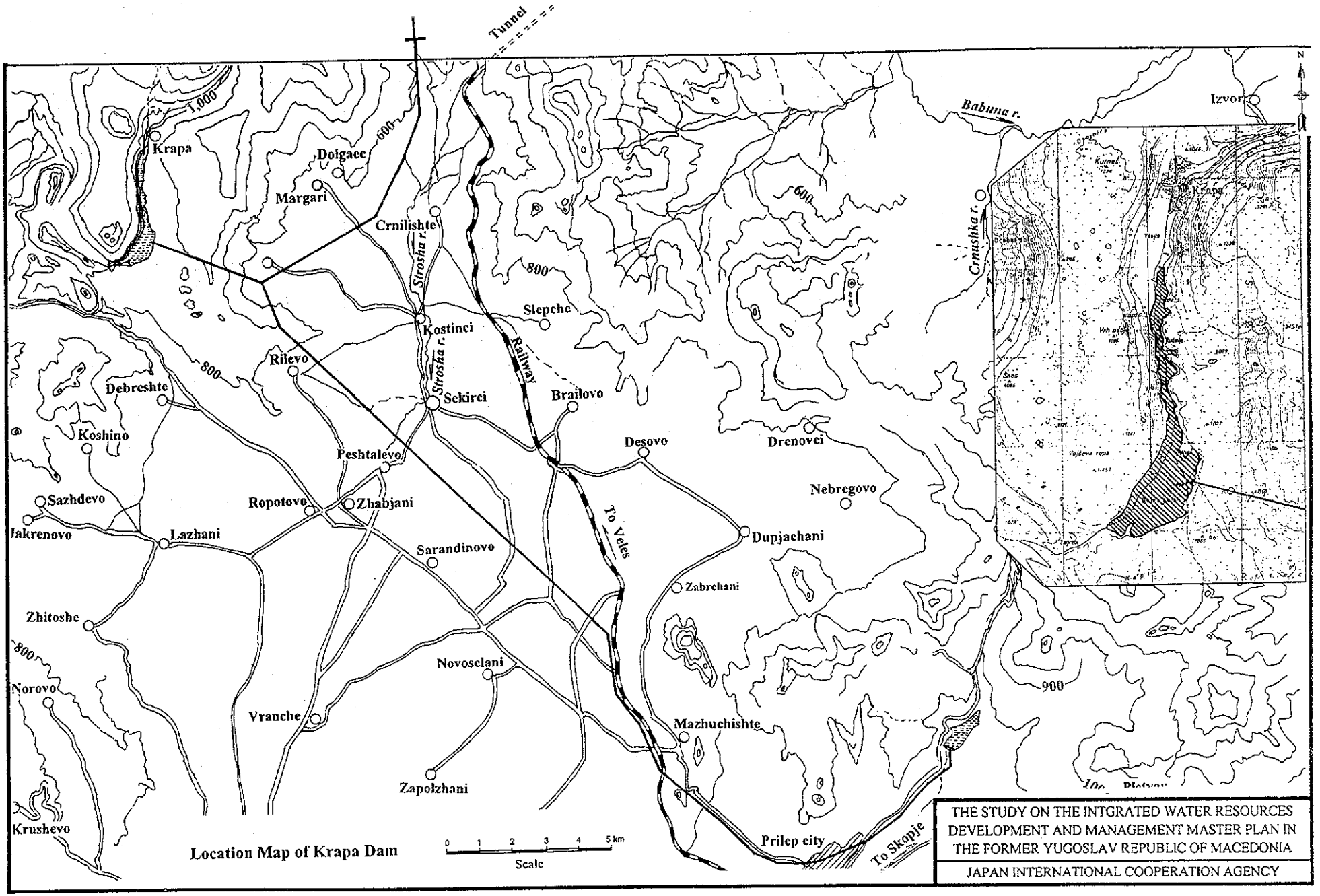
Sheet No. 16

Project Name	Construction of Irrigation of Sub-system "Shtipsko Pole"
Sector	Agricultural water
Phase of implementation	
Target area	Shtip
Beneficiaries	Farmers (to be estimated) and AK (to be confirmed)
Brief description of the project	The Sub-system "Shtipsko Pole", which is located left side of the Bregalnica irrigation system, is the only one that has not been built yet. The project includes extension of main canal to cover the irrigation network for 2,773 ha.
Project components	1. Construction of left side of hydro-meliorating system "Bregalnica"
Total construction cost (US$)	13,900,000
Benefits	- Sufficient supply of irrigation water - Increase of agriculture production
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Main Project 1974 Melioproject - Skopje
Implementing agency	MAFWE
Operational organisation	PWME Shtip
Financial plan of operation	

PROJECT PROFILE

Sheet No. 17

Project Name	Krapa Dam Project
Sector	Municipal, Agricultural water
Phase of implementation	
Target area	Prilep, Debreshte, Desovo, Dolneni, Slivje, Crnilishte
Beneficiaries	Inhabitants (to be surveyed)
Brief description of the project	Krapa is located in the Treska River basin around 10 km northeast from Makedonski Brod. This project aims to store water of around 13 x 10^6 m^3 in the natural cavern and to supply water for drinking and irrigation purposes. In addition, to meet the demand, it is planned to supplement water by transferring from the Babuna River, at over El. 820 m, about 25.0 x 10^6 m^3. The total available water is estimated 43.0 x 10^6 m^3 including capturing from the Stroska River. The target irrigation area is 8,000 ha lying at north of the Pelagonija Field.
Project components	1. Construction of intake shaft 2. Construction of branket 3. Construction of intake at Stroska River, which belongs to the Babuna River basin 4. Construction of water supply pipeline L = 16.6 km (from Krapa intake – Prilep dam) L = 4.6 km (from Stroska intake – diversion point)
Total construction cost (US$)	(54,209,000)
Benefits	Drinking water and irrigation water supply
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Report from the Economy Problems of Prilep and the Prilep Field and Possibilities of their Solution
Responsible ministry	MAFWE
Operational organisation	PWME Prilep
Financial plan of operation	



Location Map of Krapa Dam

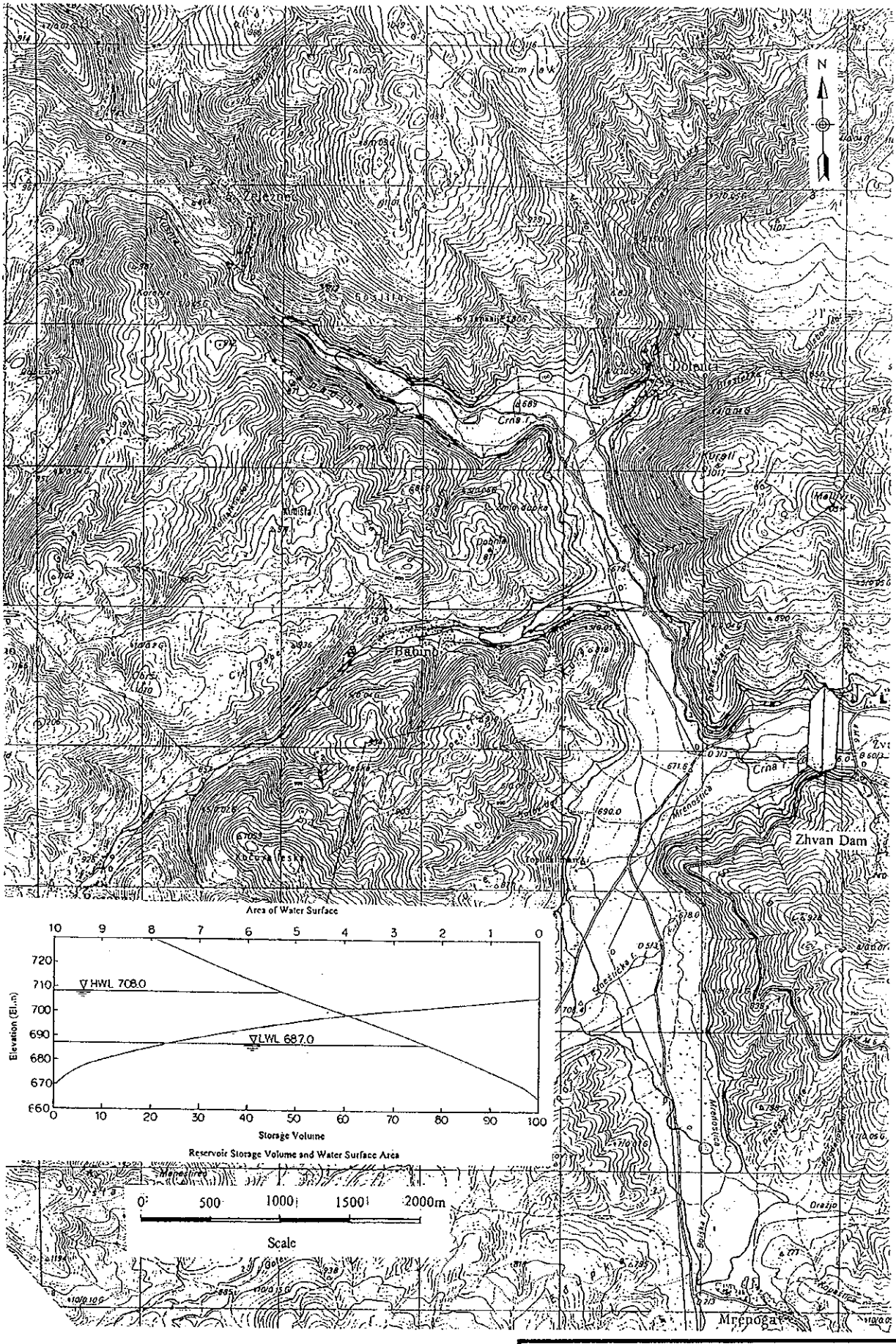
THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

Sheet No. 18

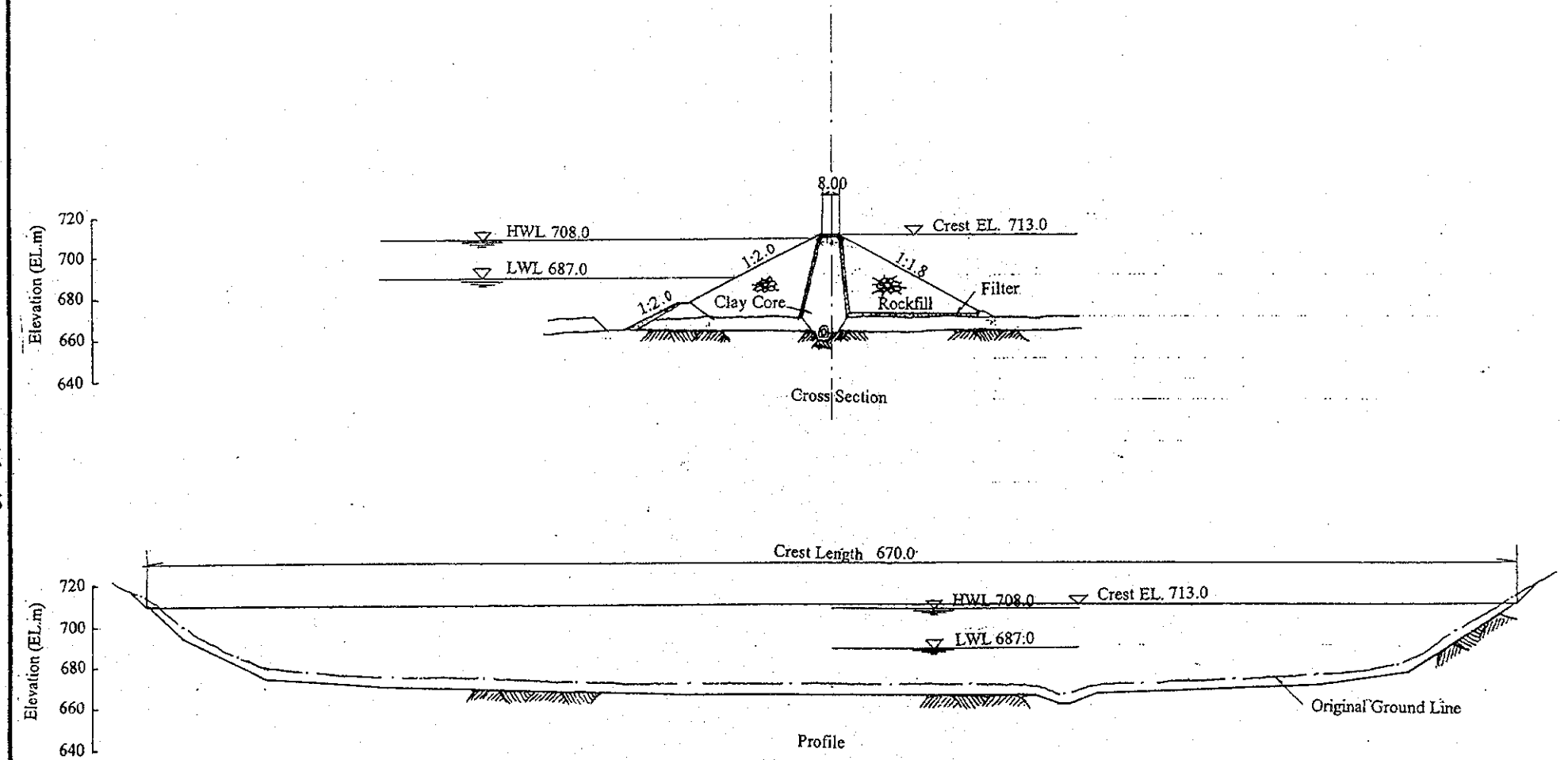
Project Name	Zhvan Dam Project
Sector	Agricultural water
Phase of implementation	
Target area	Demir Hisar
Beneficiaries	Farmers, AK (to be estimated)
Brief description of the project	The Zhvan dam is located in the Crna River at immediately upstream of Zhavan village. This dam site was originally identified and its principal features are described in Hydrosystem "PELA" – Pelagonija. It is projected as alternative of high Buchin dam. Total irrigation area in the central part of Pelagonija Field, where is targeted by this project, is approximately 36,000 ha. Requirement of resettlement and relocation of road, etc. shall be further examined in the feasibility study.
Project components	1. Construction of Zhvan dam 2. Construction of irrigation canal and related facilities - Catchment area: 298 km^2 - Dam type: Rockfill dam - Height: 50 m - Embankment volume: 1,400 x 10^3 m^3 - Gross storage capacity: 108 x 10^6 m^3 - Effective storage capacity: 83 x 10^6 m^3
Total construction cost (US$)	(127,084,000)
Benefits	Irrigation water supply
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	 Hydrosystem "PELA" - Pelagonija 1997 Sterna – Prilep and Strezevo - Bitola
Responsible ministry	MAFWE
Operational organisation	PWME Prilep
Financial plan of operation	



Location Map of Zhvan Dam

THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY



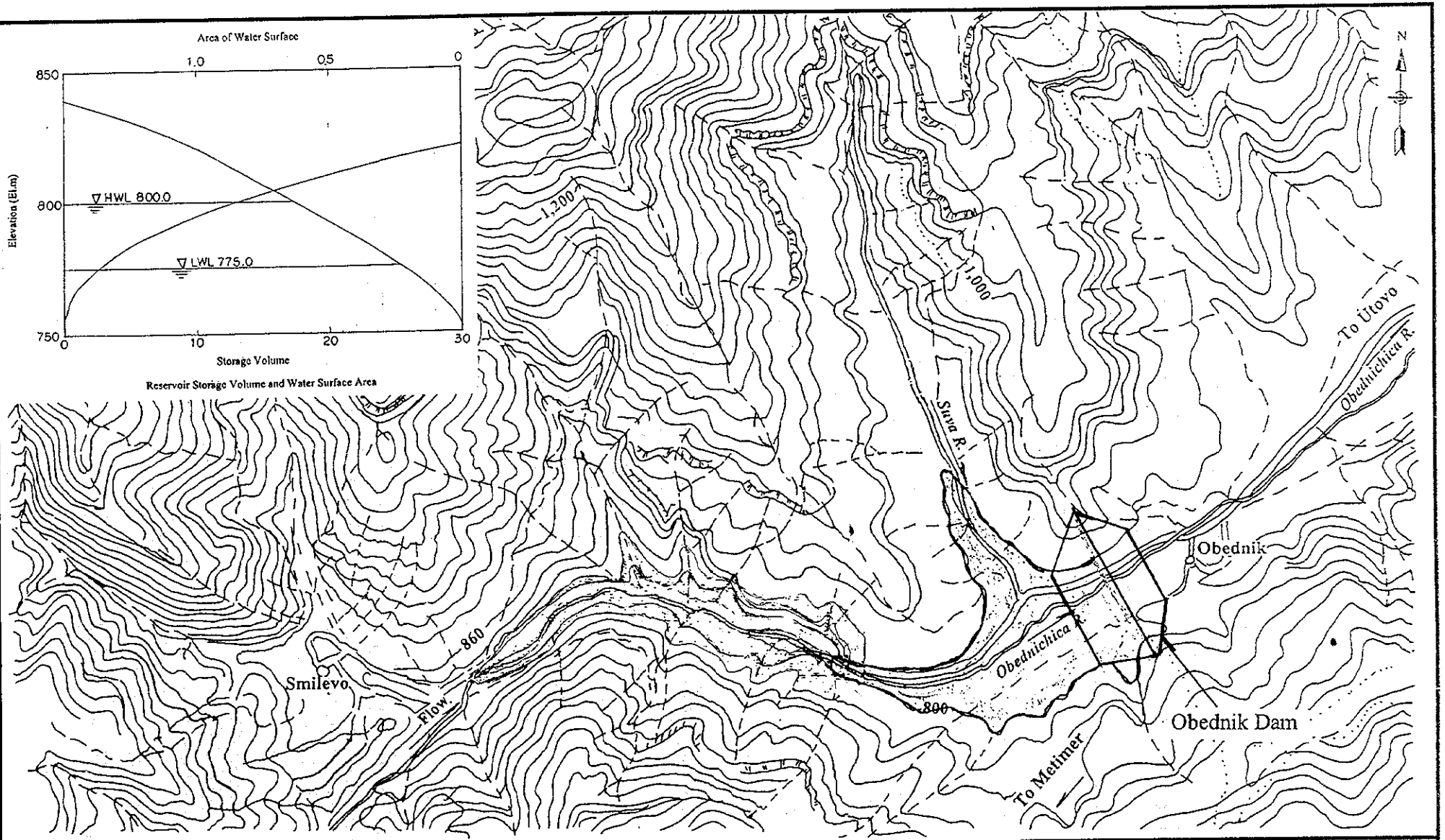
THE STUDY ON THE INTGRATED WATER RESOURCES DEVELOPMENT AND MANAGEMENT MASTER PLAN IN THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA

JAPAN INTERNATIONAL COOPERATION AGENCY

PROJECT PROFILE

Sheet No. 19

Project Name	Obednik Dam Project
Sector	Agricultural water
Phase of implementation	
Target area	Demir Hisar
Beneficiaries	Farmers, AK (to be estimated)
Brief description of the project	The Obednik dam is located in the Obednichka River that is branched from the Crna River near Demir Hisar, at around 5 km northwest of the Strezevo dam. This damsite was identified in the small booklet Hydrosystem "PELA" – Pelagonija as same as Zhvan, Kochishte and Zhurce. The water exploited by the Obednik dam will be supplied to the central part of Pelagonija Field, of which target irrigation area is 36,000 ha.
Project components	1. Construction of Obednik dam 2. Construction of irrigation canal and related facilities - Catchment area: 26.7 km^2 - Dam type: Rockfill dam - Height: 58 m - Embankment volume: 1,400,000 m^3 - Gross storage capacity: 13.0 m^3 - Effective storage capacity: 10.4 x 10^6 m^3
Total construction cost (US$)	(44,616,000)
Benefits	Irrigation water supply
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Hydrosystem "PELA" - Pelagonija 1997 Sterna – Prilep and Strezevo - Bitola
Responsible ministry	MAFWE
Operational organisation	PWME Prilep
Financial plan of operation	



Location Map of Obednik Dam

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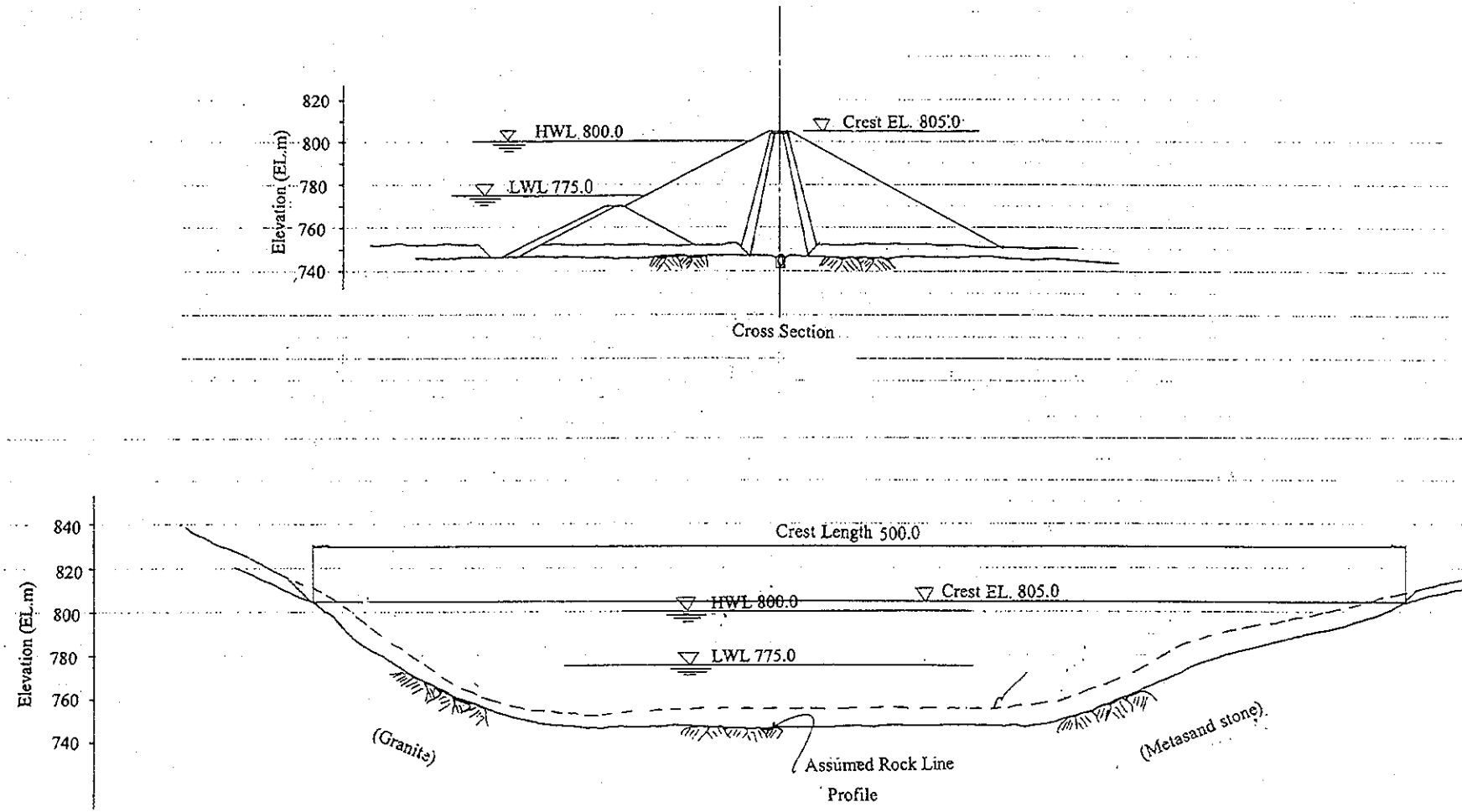

Obednik Dam

0 20 40 60 80 100m
Scale

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PROJECT PROFILE

Sheet No. 20

Project Name	Kochishte Dam Project
Sector	Agricultural water
Phase of implementation	
Target area	Krushevo
Beneficiaries	Farmers, AK (to be estimated)
Brief description of the project	The Kochishte dam is located immediately upstream of Kochishte village, about 7 km west of Krushevo. This dam site is initially identified in the Hydrosystem "PELA" – Pelagonija as a part of possible alternative water resources development instead of Buchin dam project. This scheme will contribute to realize stable irrigation water supply to the target area of 36,000 ha with other 3 new dams, i.e. Zhvan, Obednik and Zhurche.
Project components	1. Construction of Kochishte dam 2. Construction of irrigation canal and related facilities - Catchment area: 62.7 km^2 - Dam type: Rockfill dam - Height: 67 m - Embankment volume: 2,500,000 m^3 - Gross storage capacity: 32.5 m^3 - Effective storage capacity: 27.3m^3
Total construction cost (US$)	66,388,000
Benefits	Irrigation water supply
Related studies completed **- Title of study** **- Year/Month** **- Author/Agency**	Hydrosystem "PELA" - Pelagonija 1997 Sterna – Prilep and Strezevo - Bitola
Responsible ministry	
Operational organisation	PWME Prilep
Financial plan of operation	