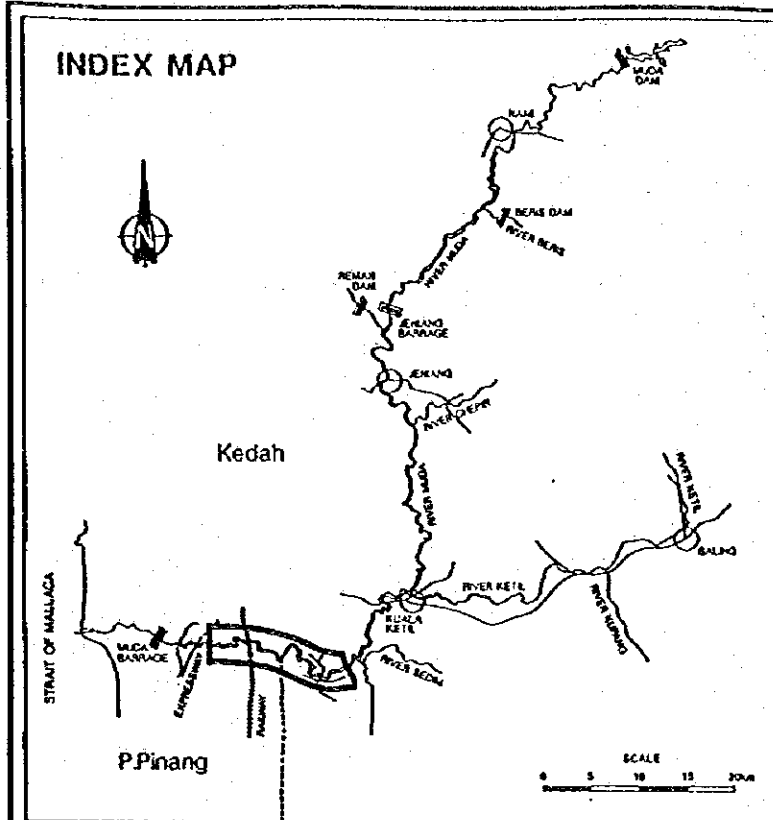


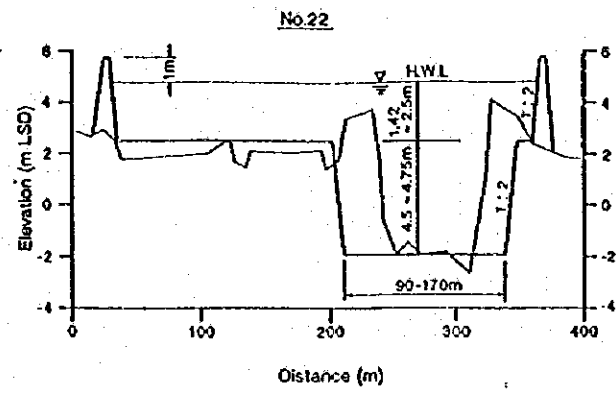
LEGEND			
—	Proposed Dike	⇐	Proposed Drop
—	Proposed Low Water Channel	▽	Discharge Station
▨▨▨▨	Proposed Revetment	◇	Proposed Sluice
- - - -	Existing Sea Dike	⊙	Pump Station
- - - -	Boundary of Proposed River Reserve Area	(I)	Irrigation Purpose
⊠	Proposed Barrage	(D)	Domestic / Industrial Purpose

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

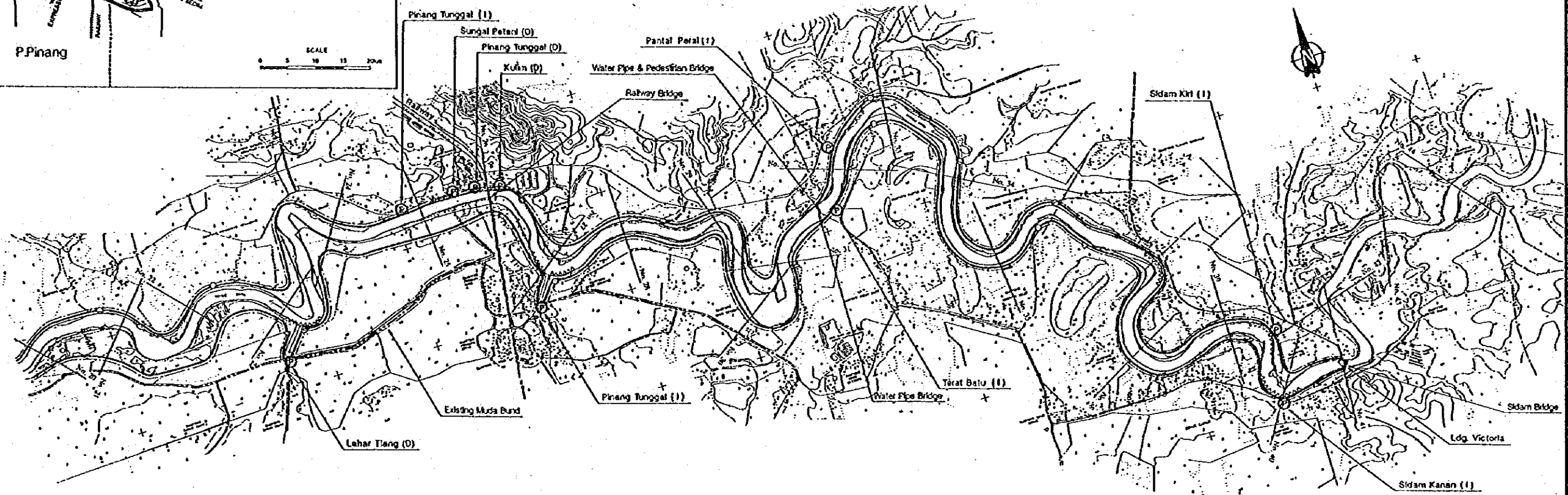
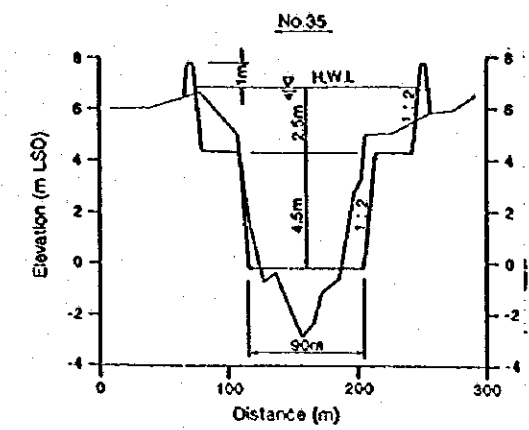
FIG. 3.1.2 (1/2)
PLAN AND TYPICAL CROSS SECTION OF
PROPOSED LOWER MUDA RIVER IMPROVEMENT



Typical Cross Section
(No.11+300-No.30+55)



Typical Cross Section
(No.30+55-No.41)

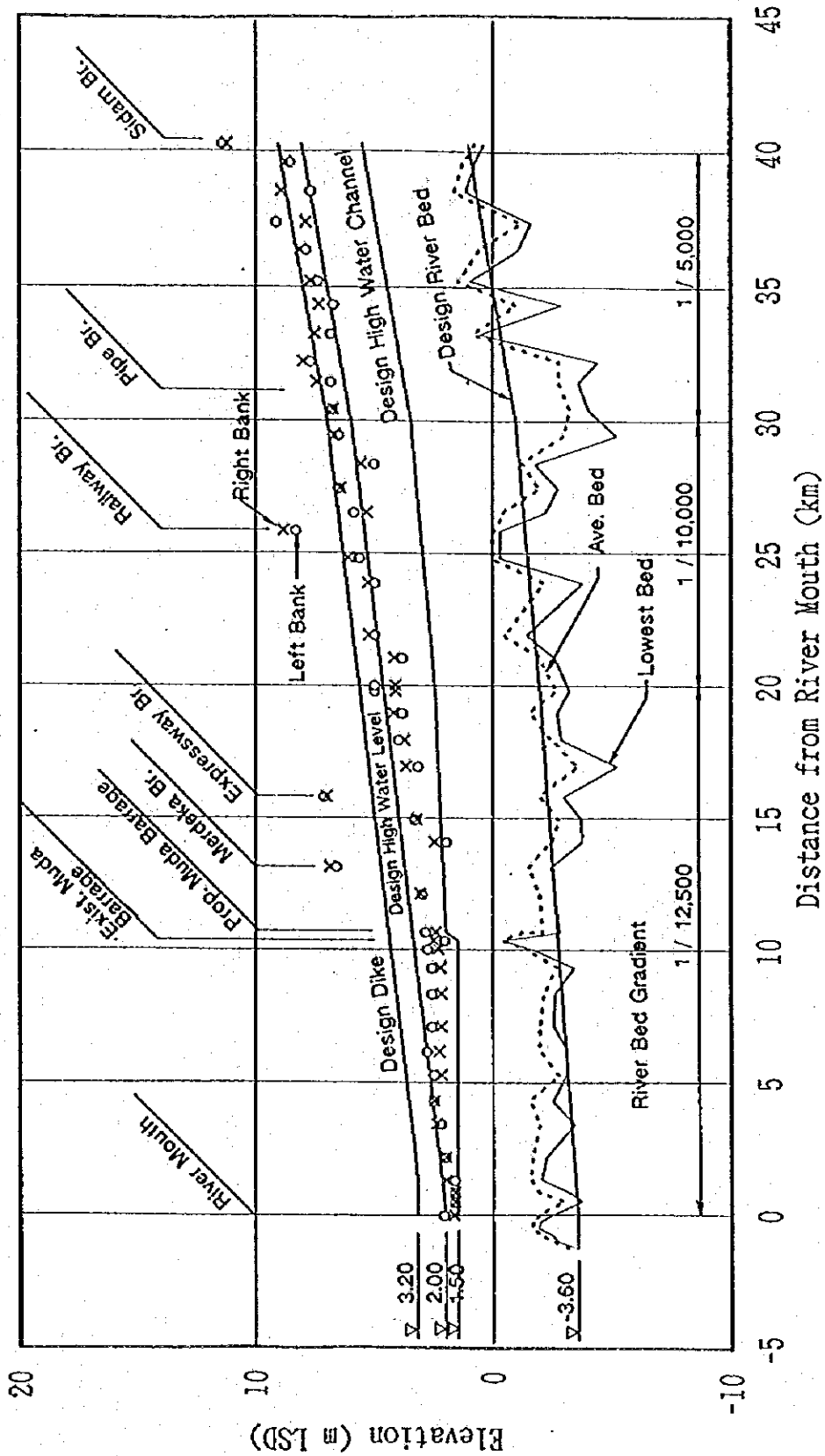


LEGEND			
—	Proposed Dam	—	Proposed Drop
—	Proposed Low Water Channel	▽	Discharge Station
—	Proposed Reinment	—	Proposed Dike
—	Existing Sea Dike	⊙	Pump Station
—	Boundary of Proposed River	(I)	Irrigation Purpose
—	Proposed Storage	(D)	Domestic / Industrial Purpose

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.1.2 (2/2)
PLAN AND TYPICAL CROSS SECTION OF
PROPOSED LOWER MUDA RIVER IMPROVEMENT

Longitudinal Profile of Lower Muda River

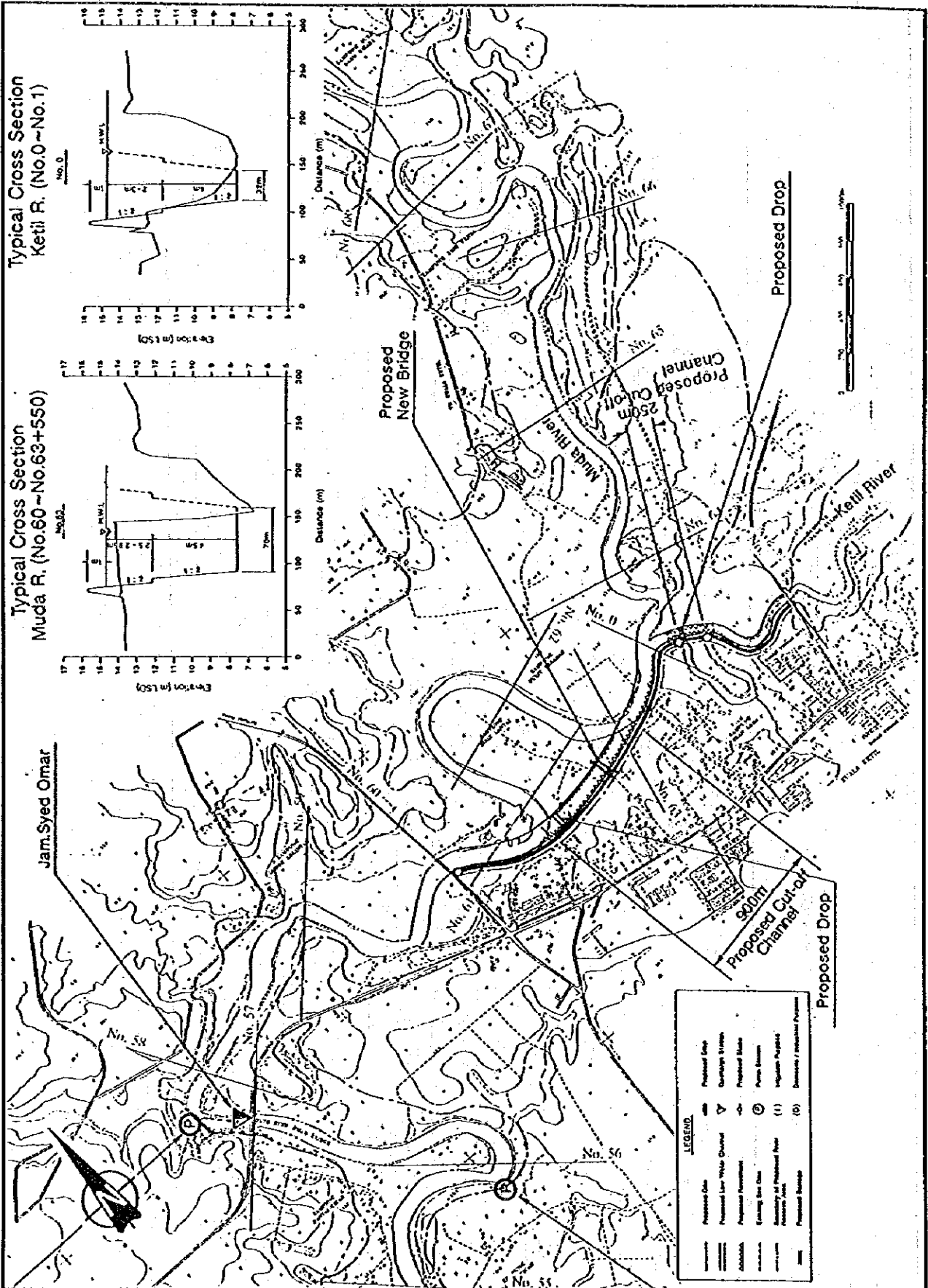


COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.1.3

LONGITUDINAL PROFILE OF PROPOSED LOWER MUDA RIVER IMPROVEMENT

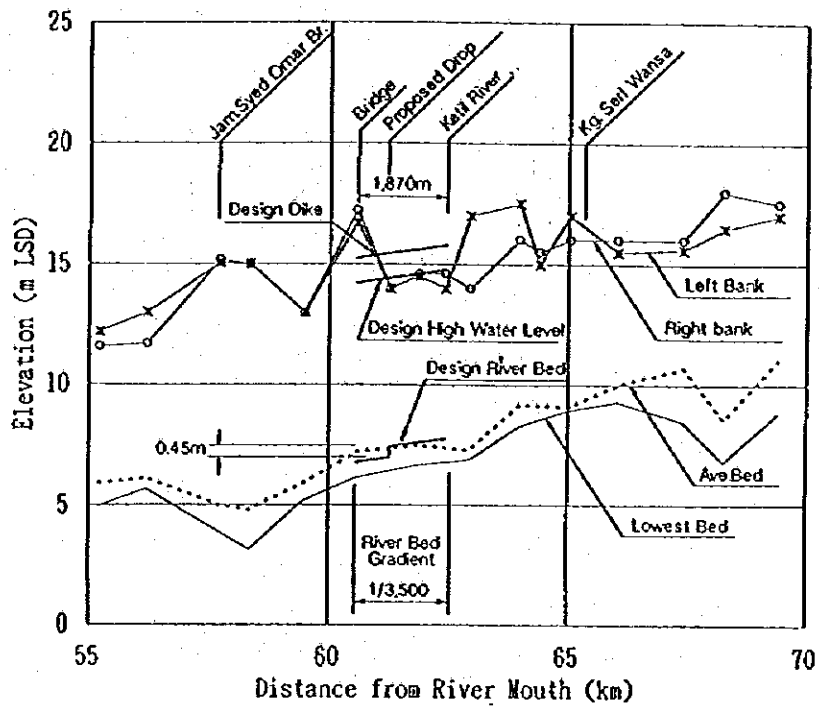


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

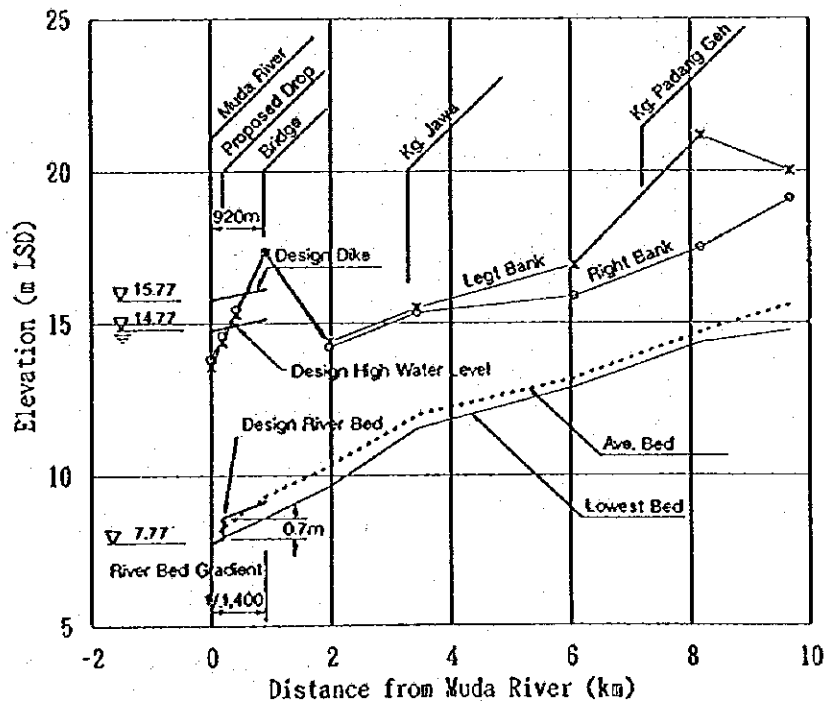
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.1.4
PLAN AND TYPICAL CROSS SECTION OF PROPOSED
KUALA KETIL TOWN STRETCH IMPROVEMENT

Muda River



Ketil River

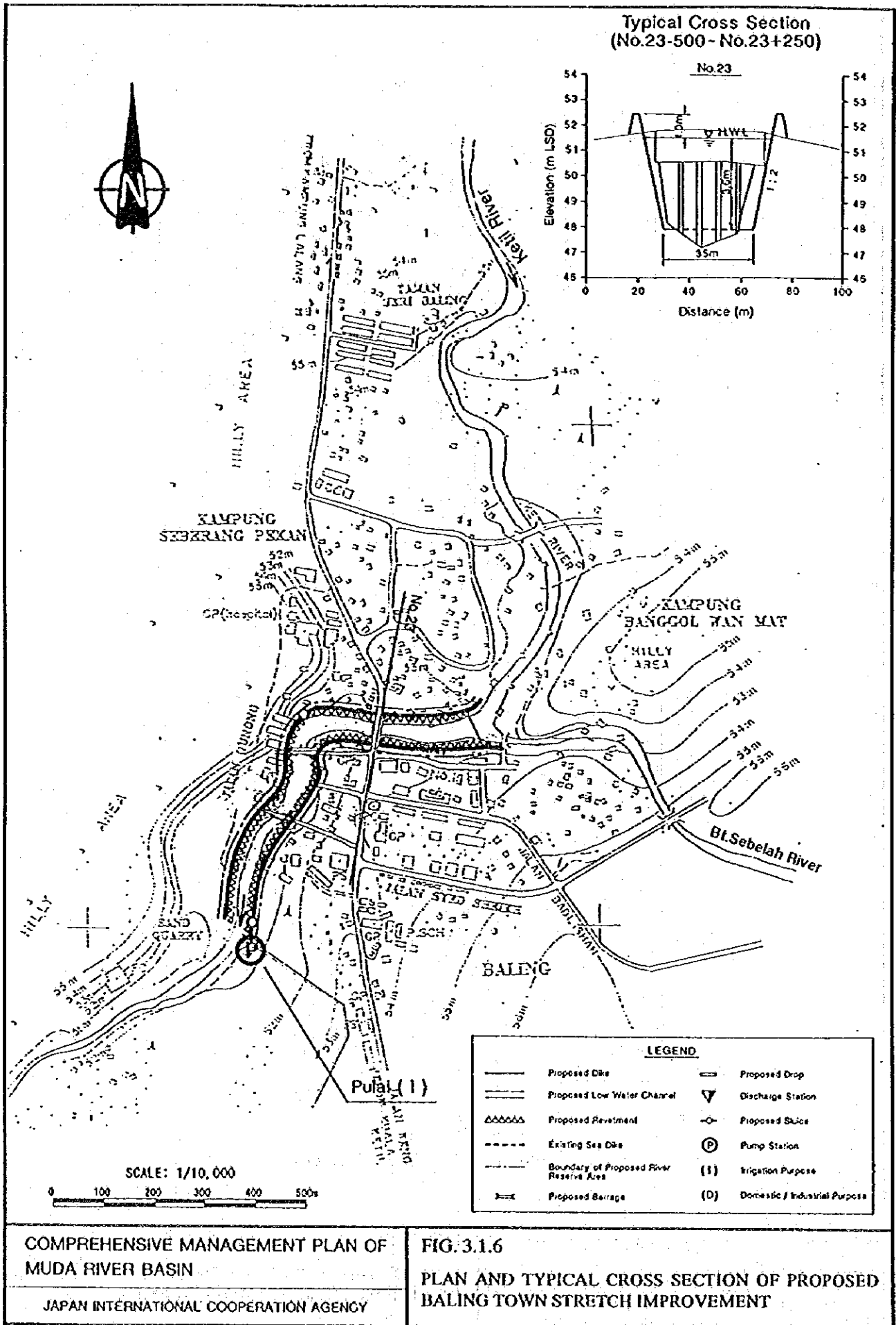


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

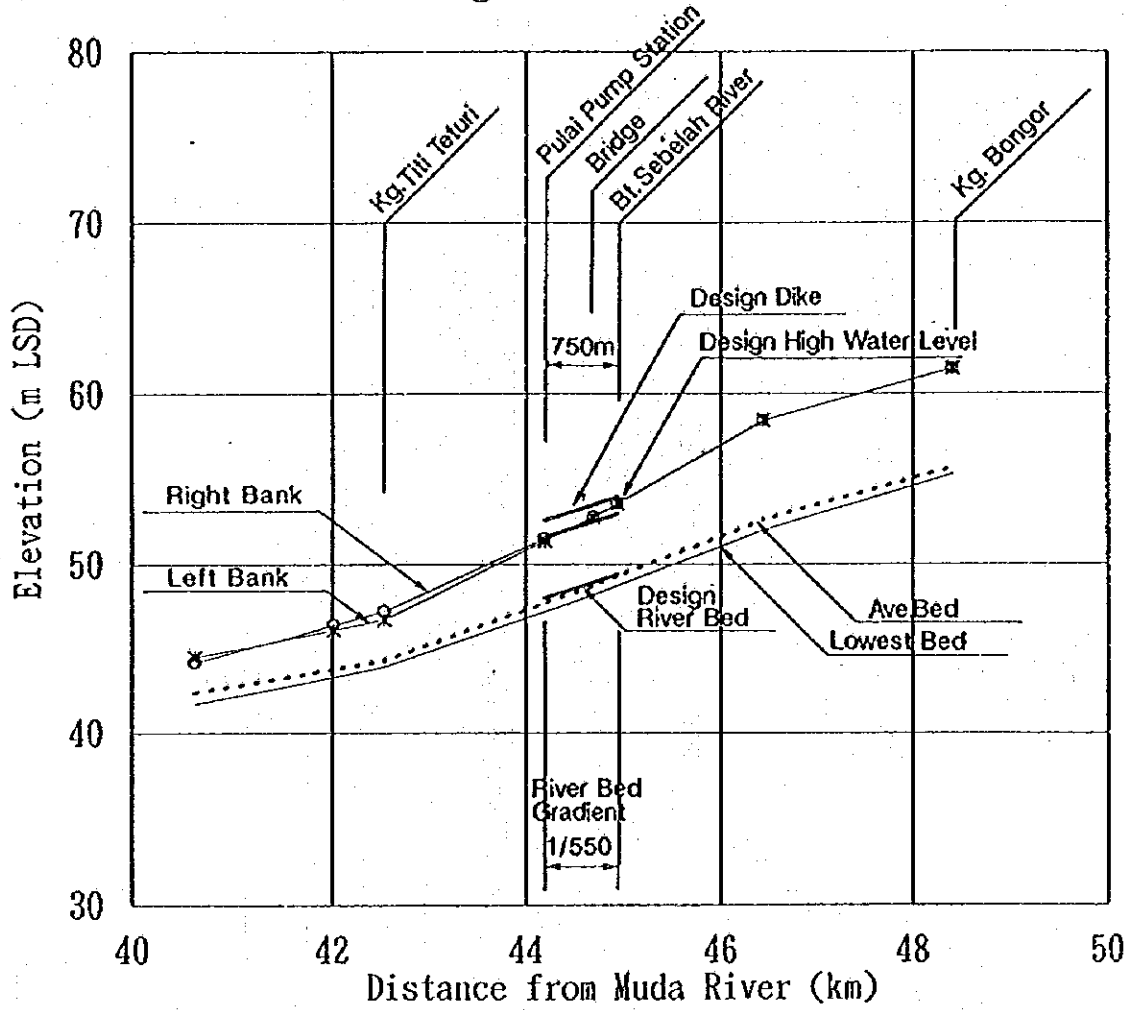
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.1.5

LONGITUDINAL PROFILE OF PROPOSED KUALA
KETIL TOWN STRETCH IMPROVEMENT



Longitudinal Profile

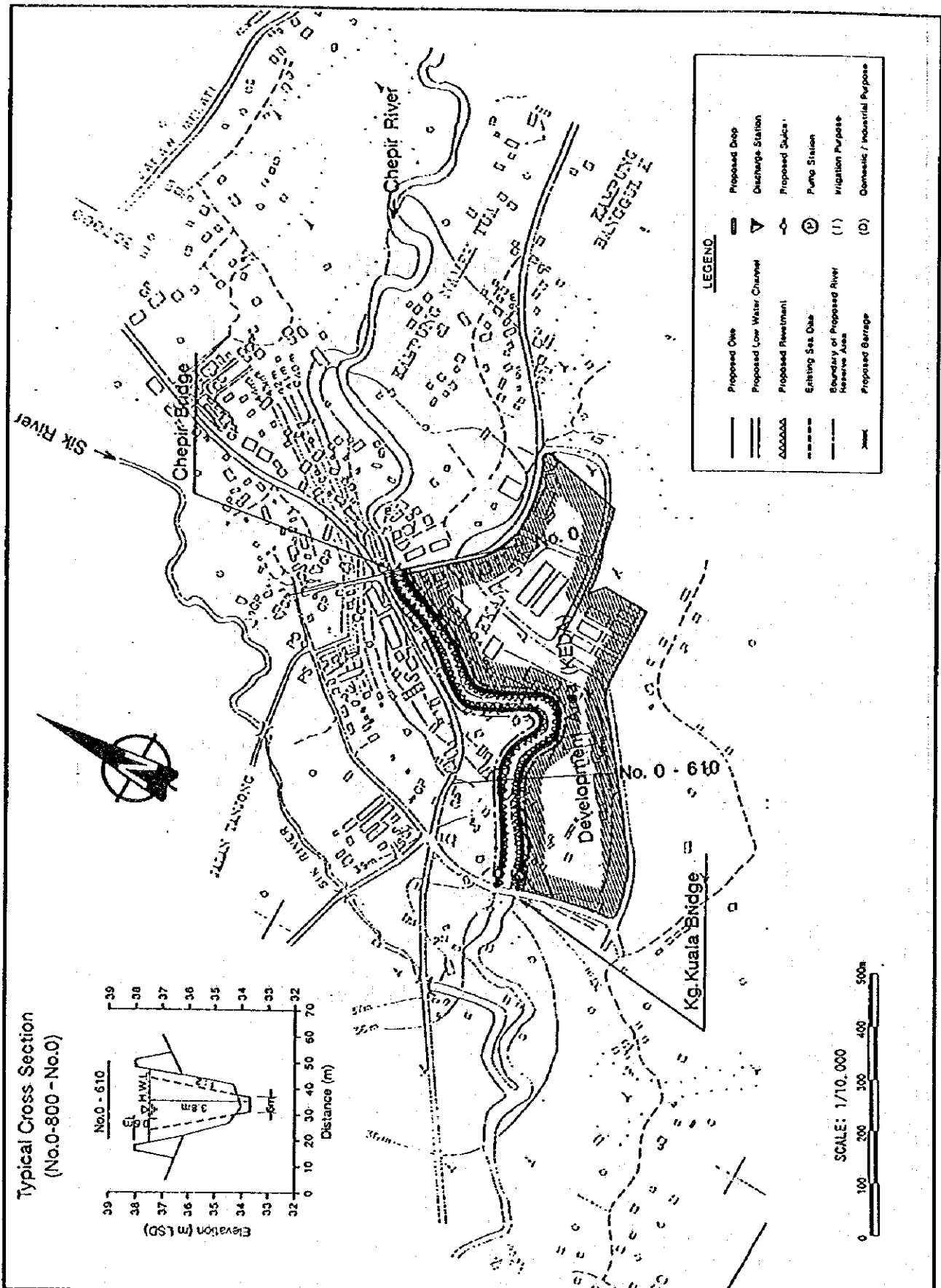


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.1.7

LONGITUDINAL PROFILE OF PROPOSED BALING
TOWN STRETCH IMPROVEMENT



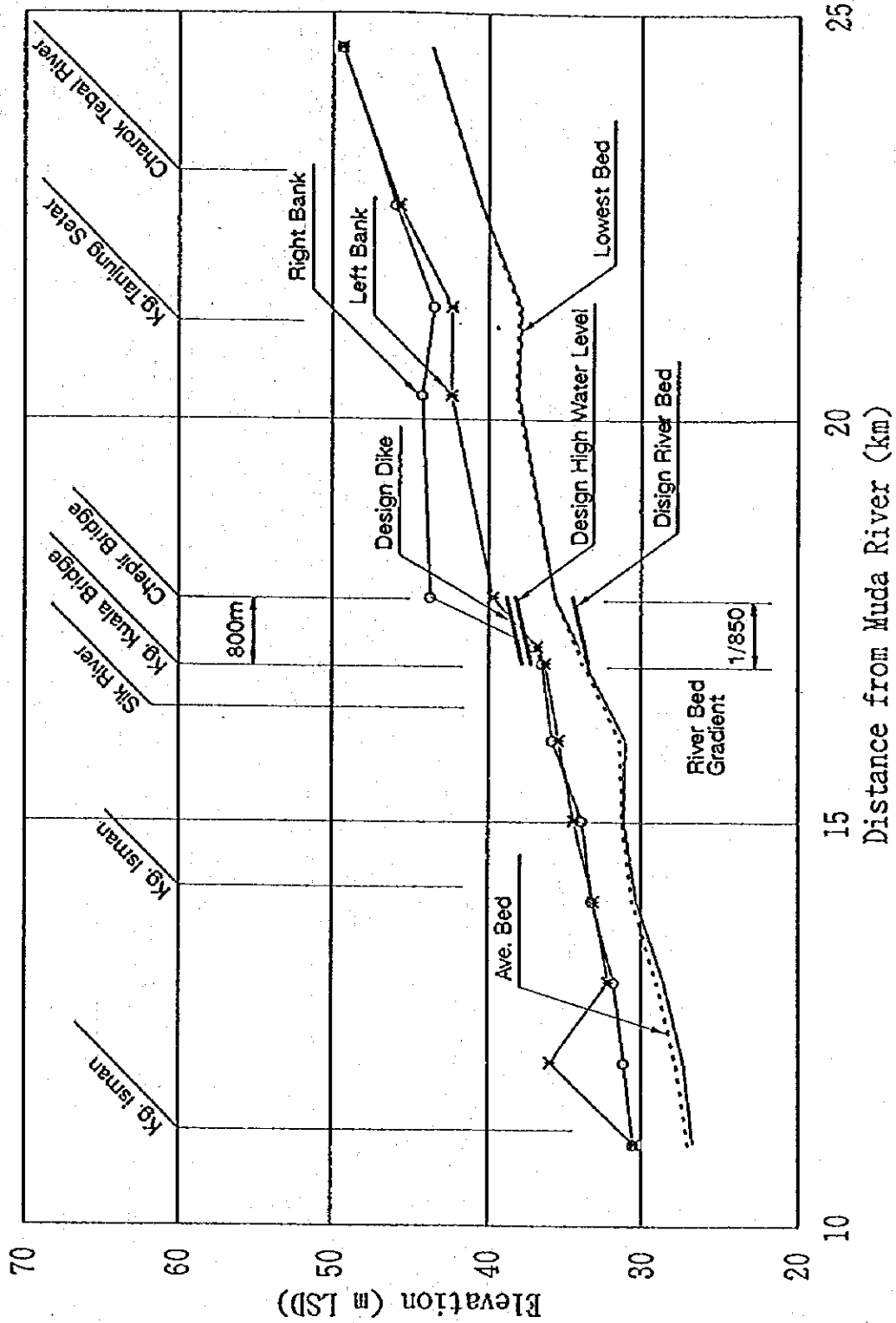
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.1.8

PLAN AND TYPICAL CROSS SECTION OF
PROPOSED SIK TOWN STRETCH IMPROVEMENT

Chepir River

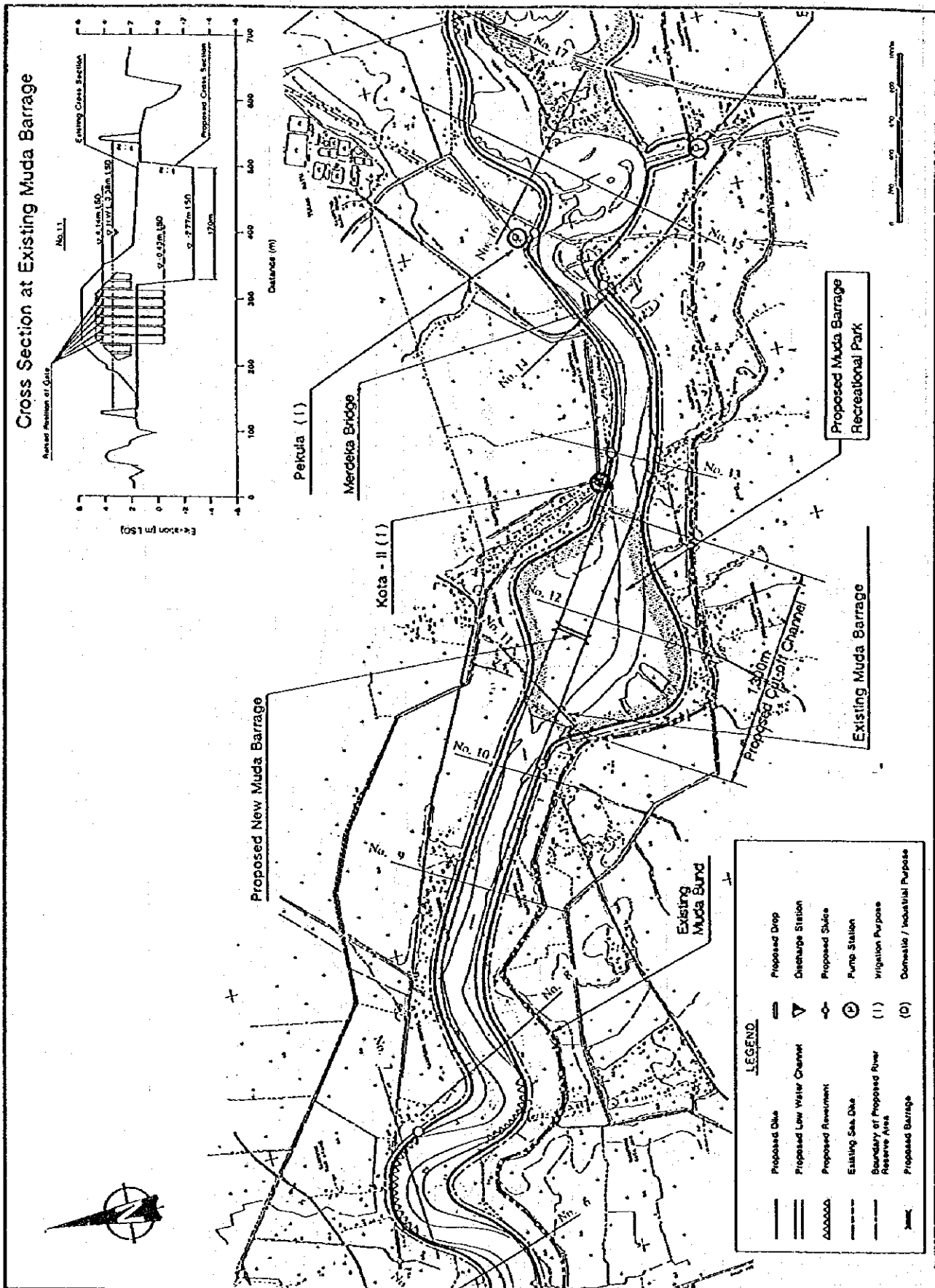


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.1.9

LONGITUDINAL PROFILE OF PROPOSED SIK
TOWN STRETCH IMPROVEMENT

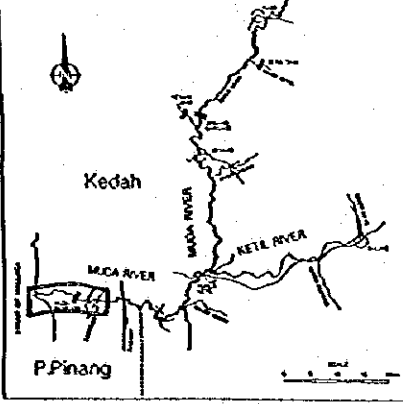


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

FIG. 3.1.10
RECONSTRUCTION OF MUDA BARRAGE

JAPAN INTERNATIONAL COOPERATION AGENCY

INDEX MAP



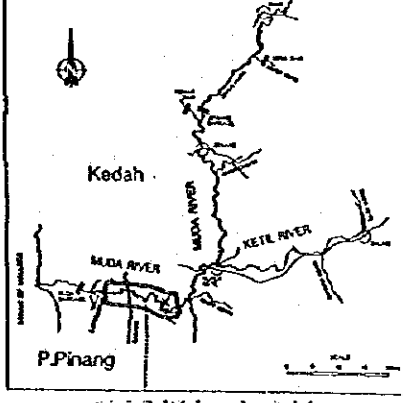
Boundary of Proposed River Reserve Area

Boundary of Proposed River Reserve Area

Boundary of Proposed River Reserve Area

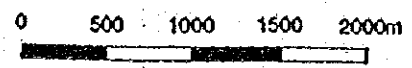
Boundary of Proposed River Reserve Area

INDEX MAP



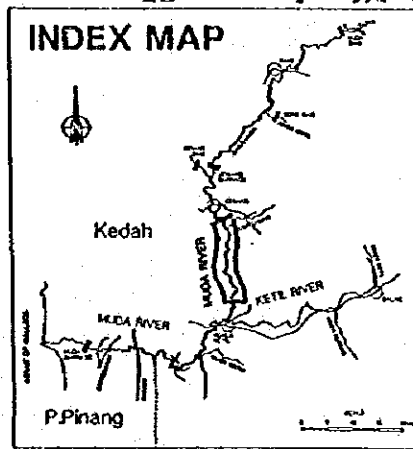
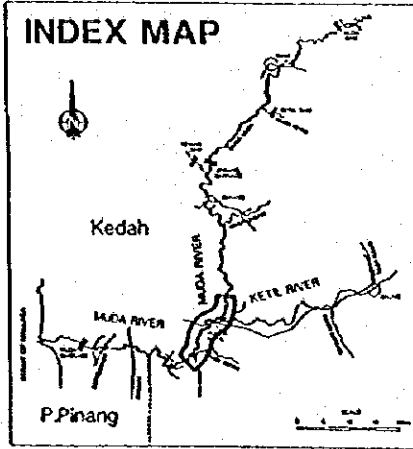
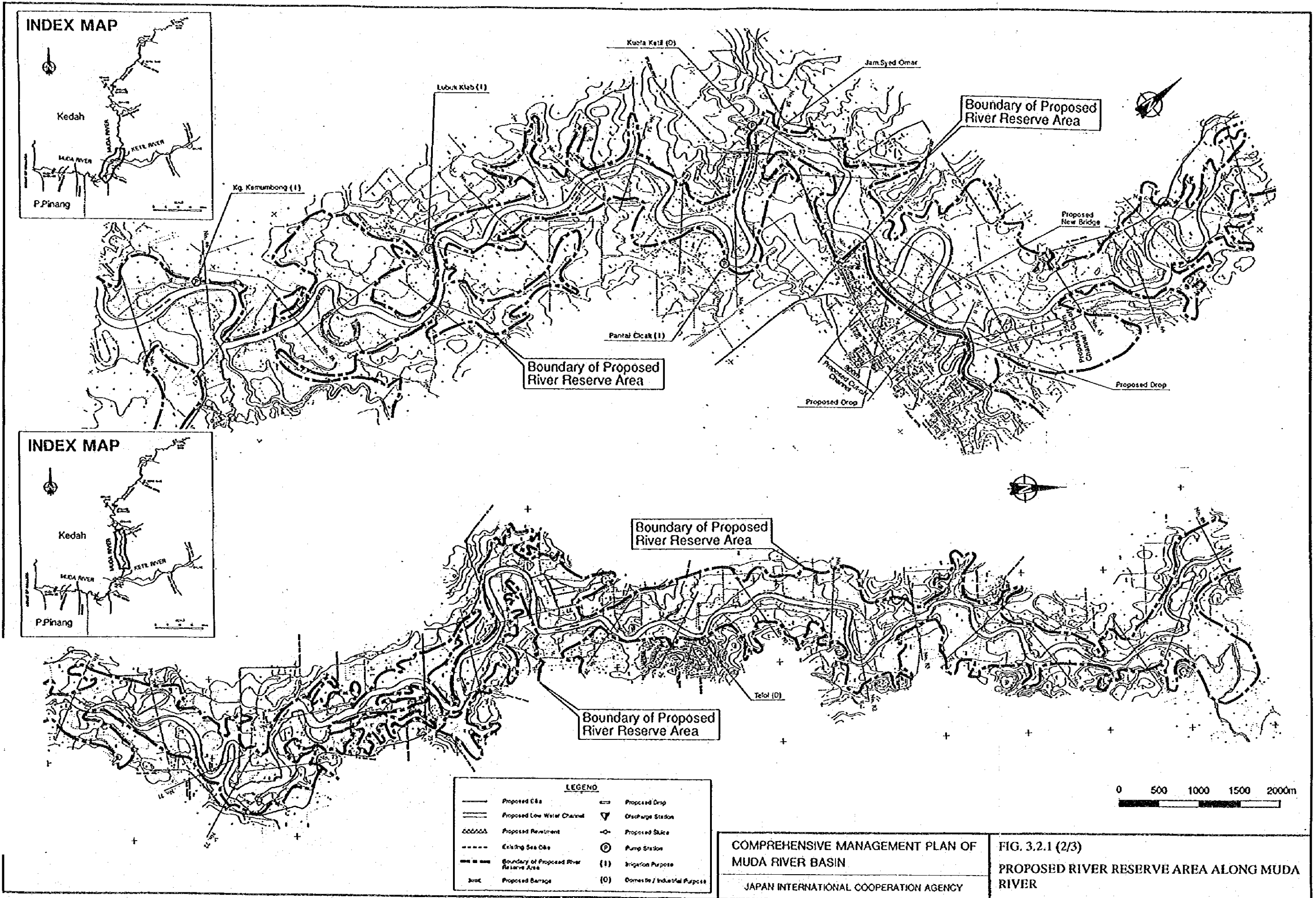
LEGEND

—	Proposed Dam	—	Proposed Drop
—	Proposed Low Water Channel	▽	Discharge Station
⊘	Proposed Revetment	⊕	Proposed Sinks
---	Existing Sea Dike	⊙	Pump Station
---	Boundary of Proposed River Reserve Area	(1)	Irrigation Purpose
⊕	Proposed Barrage	(0)	Domestic / Industrial Purpose



COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.2.1 (1/3)
PROPOSED RIVER RESERVE AREA ALONG MUDA RIVER

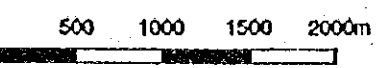


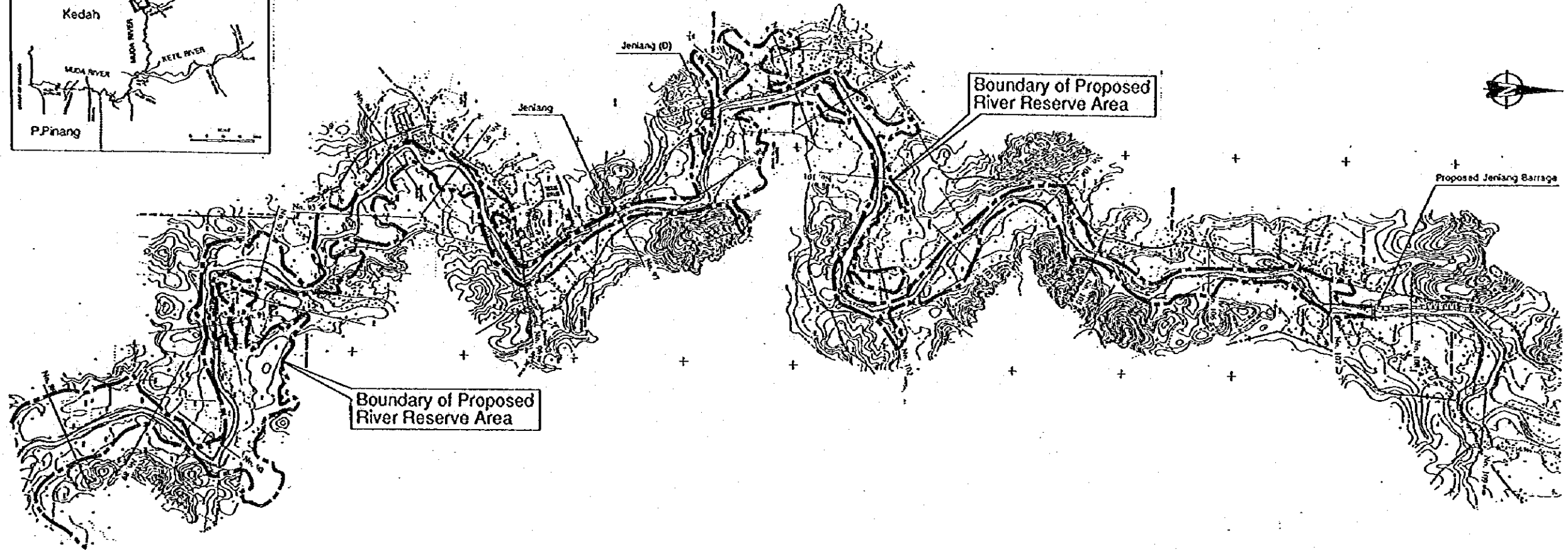
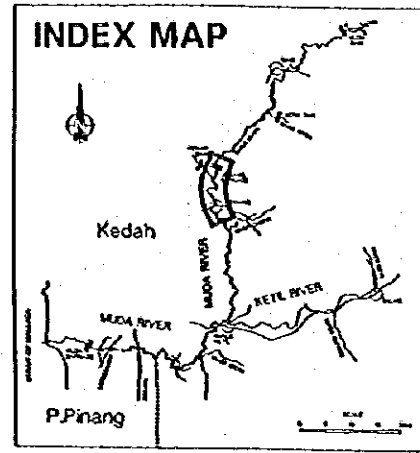
LEGEND

	Proposed E&A		Proposed Drop
	Proposed Low Water Channel		Discharge Station
	Proposed Revetment		Proposed Sluice
	Existing Sea Dike		Pump Station
	Boundary of Proposed River Reserve Area		Irrigation Purpose
	Proposed Barrage		Domestic / Industrial Purpose

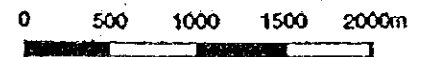
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.2.1 (2/3)
PROPOSED RIVER RESERVE AREA ALONG MUDA RIVER



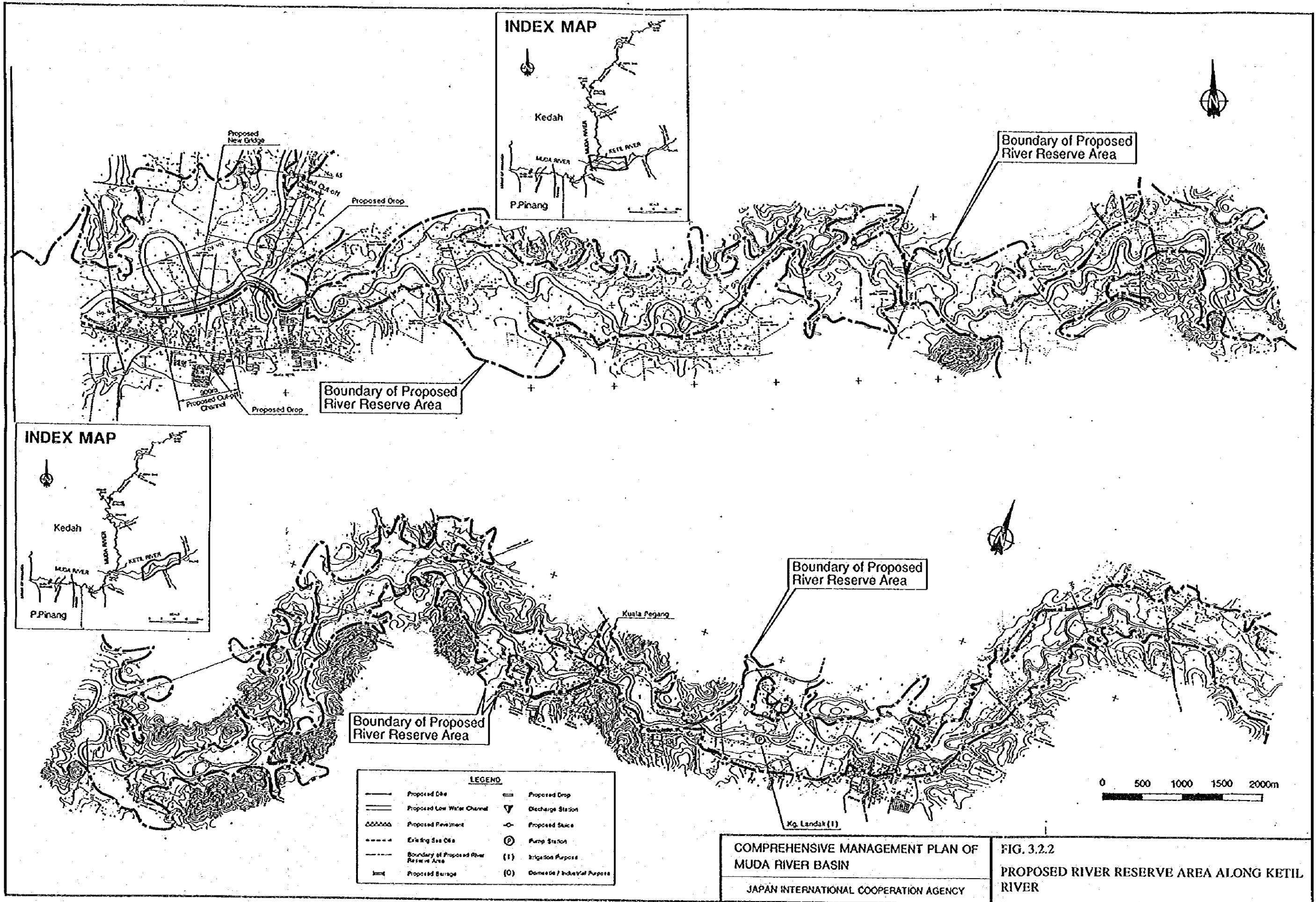


LEGEND			
—	Proposed Ode	◁	Proposed Drop
==	Proposed Low Water Channel	▽	Discharge Station
△△△△	Proposed Retriement	◇	Proposed Sluice
- - - -	Existing Sea Dike	⊙	Pump Station
--- ---	Boundary of Proposed River Reserve Area	(1)	Irrigation Purpose
≡	Proposed Barrage	(0)	Domestic / Industrial Purpose

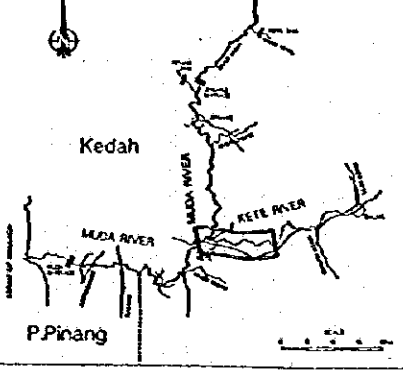


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 3.2.1 (3/3)
PROPOSED RIVER RESERVE AREA ALONG MUDA RIVER



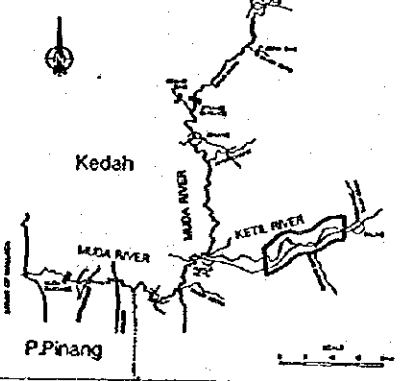
INDEX MAP



Boundary of Proposed River Reserve Area

Boundary of Proposed River Reserve Area

INDEX MAP



Boundary of Proposed River Reserve Area

Boundary of Proposed River Reserve Area

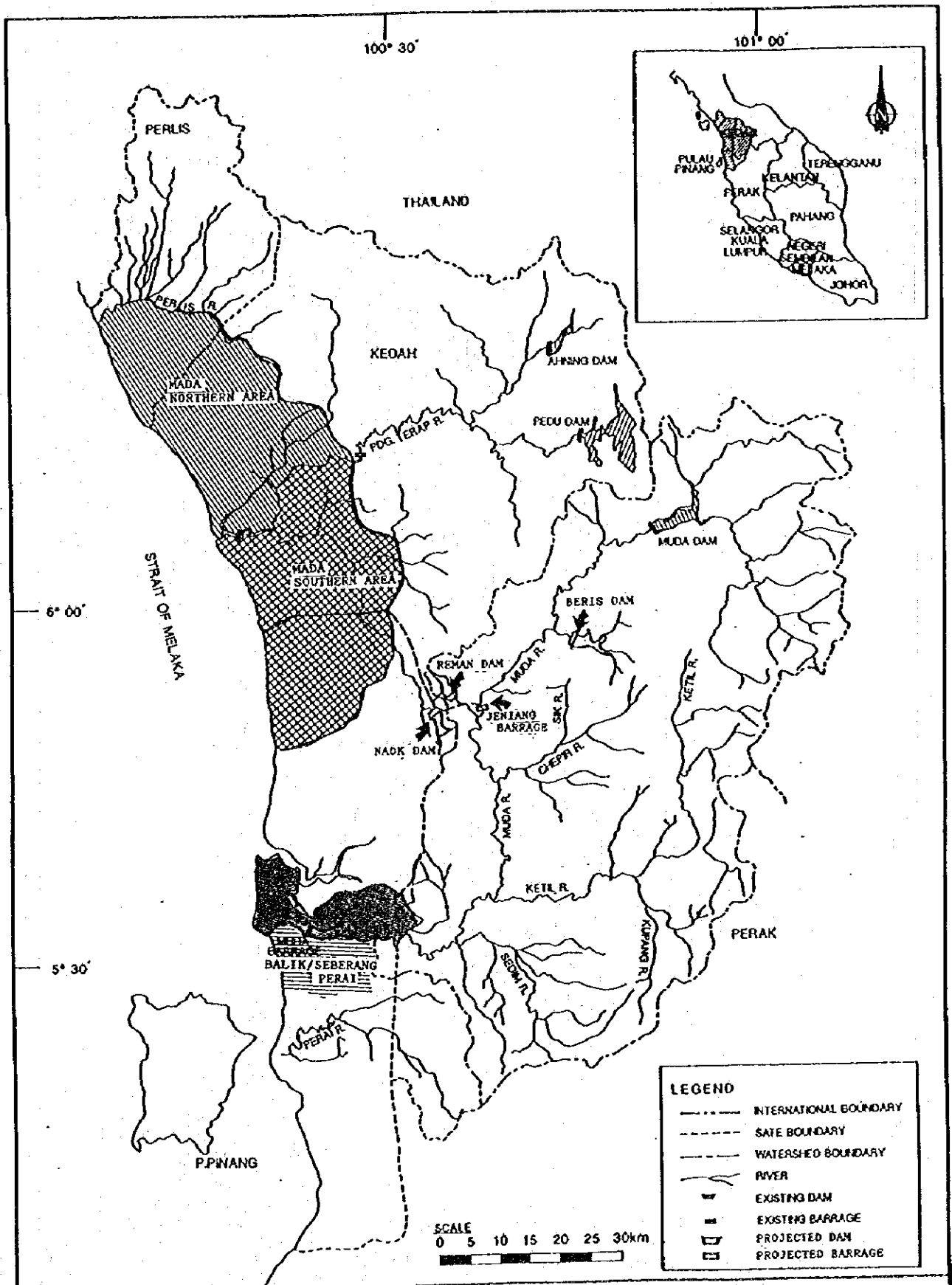
LEGEND

—	Proposed Dam	—	Proposed Drop
—	Proposed Low Water Channel	▽	Discharge Station
○○○○○○	Proposed Weirment	⊕	Proposed Sluice
-----	Existing Sea Cais	⊙	Pump Station
-----	Boundary of Proposed River Reserve Area	(1)	Irrigation Purpose
	Proposed Storage	(0)	Domestic / Industrial Purpose

COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

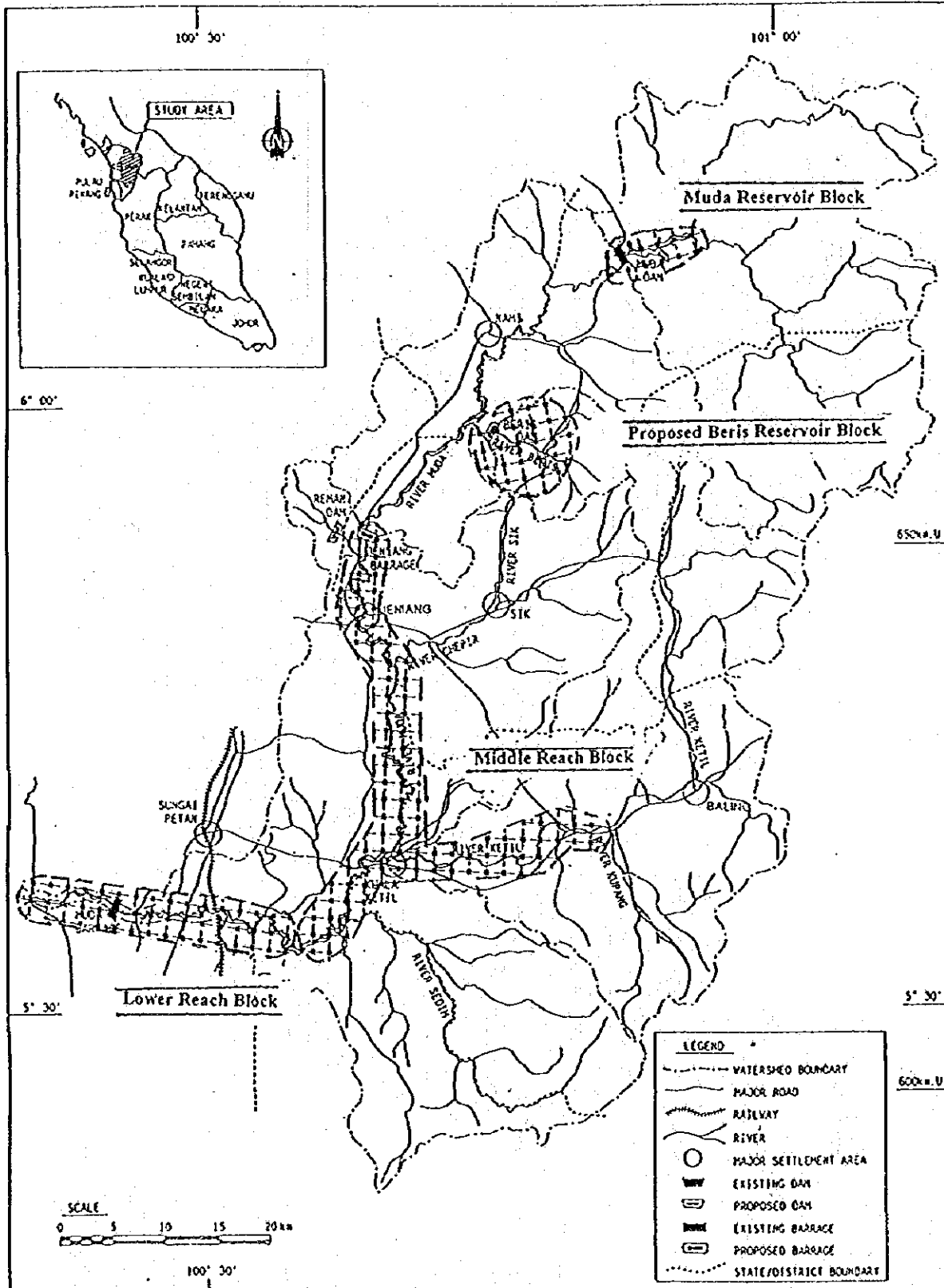
FIG. 3.2.2
PROPOSED RIVER RESERVE AREA ALONG KETIL RIVER



COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 4.2.1
WATER RESOURCES DEVELOPMENT FACILITIES

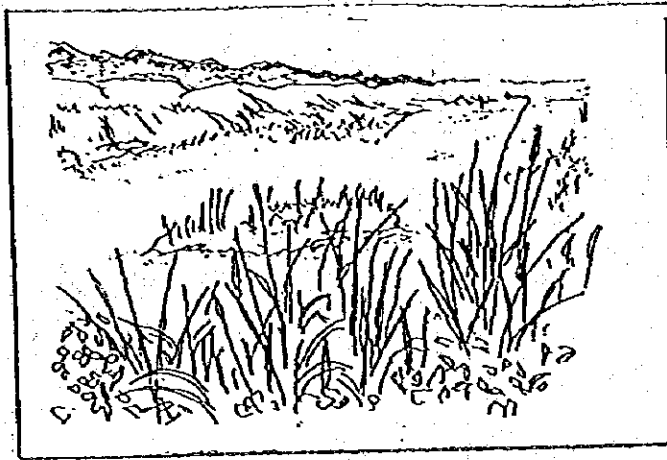


COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.1

BLOCK DIVISION FOR RIVER CORRIDOR
PLAN



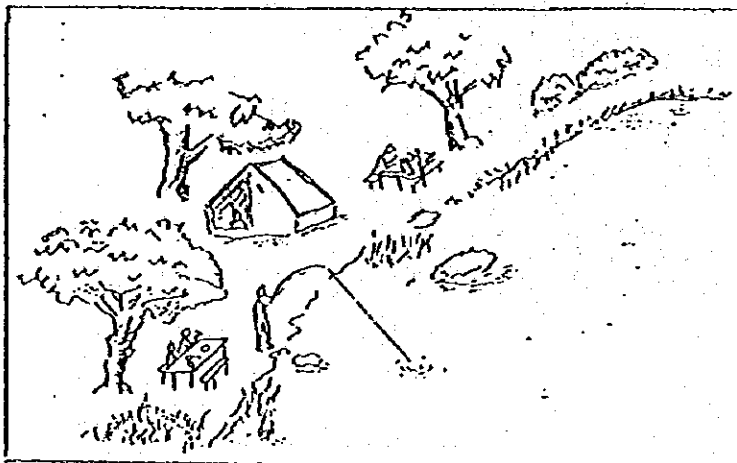
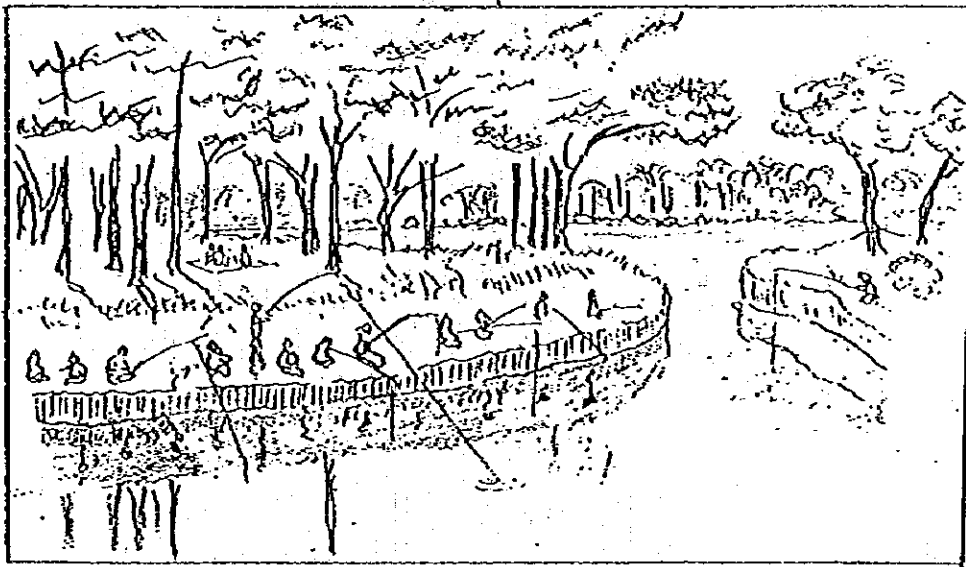
Zone type A : Natural Reserve Zone

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.2

IMAGE SKETCH OF ZONE TYPE A (NATURAL
RESERVE ZONE)



Zone Type B :

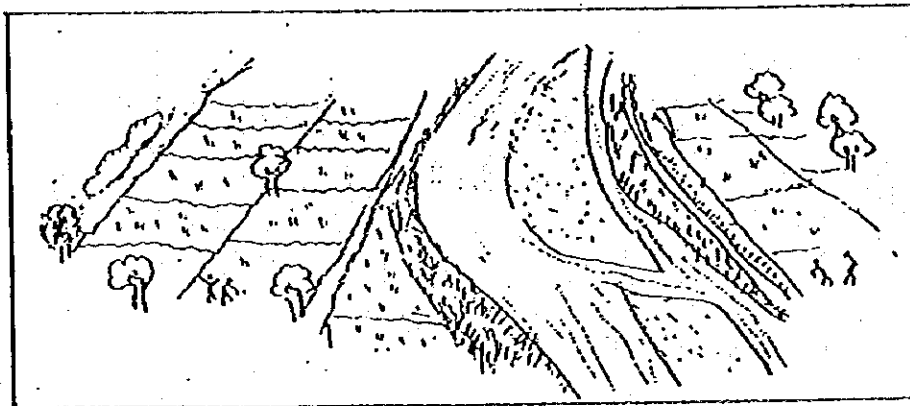
Natural Use Zone

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.3

IMAGE SKETCH OF ZONE TYPE B (NATURAL USE
ZONE)



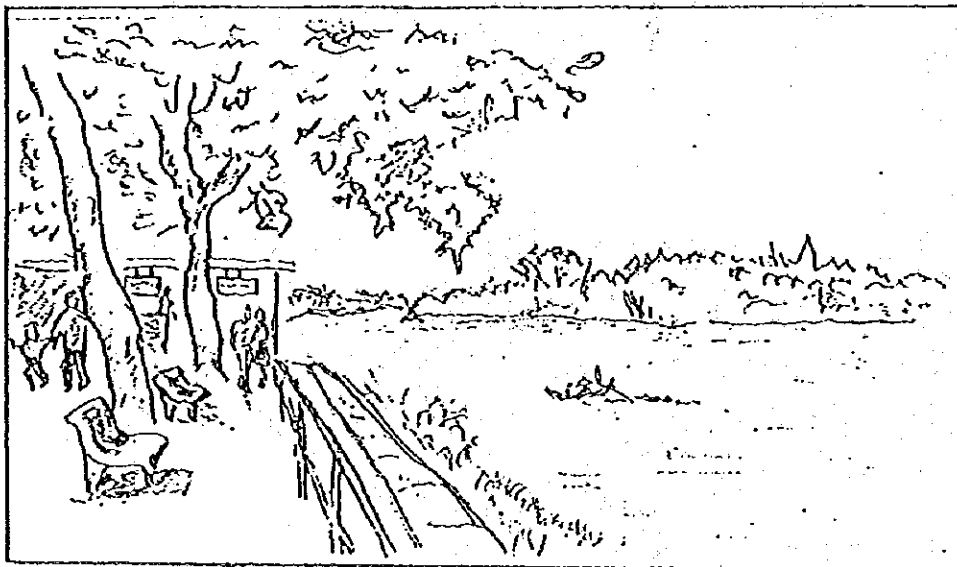
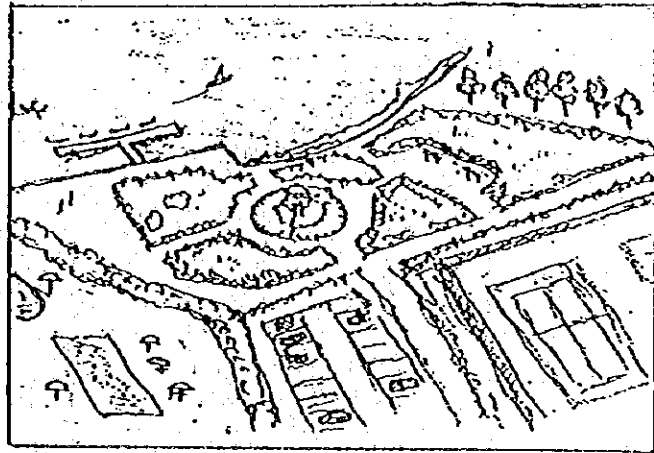
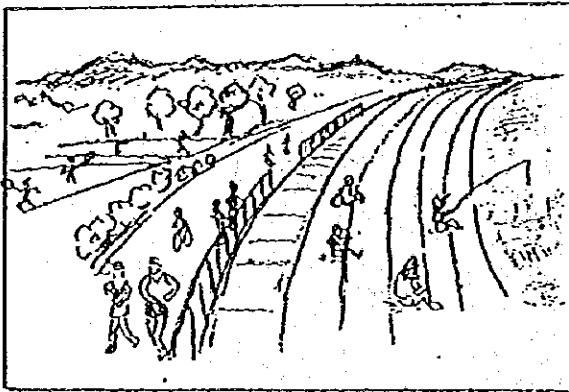
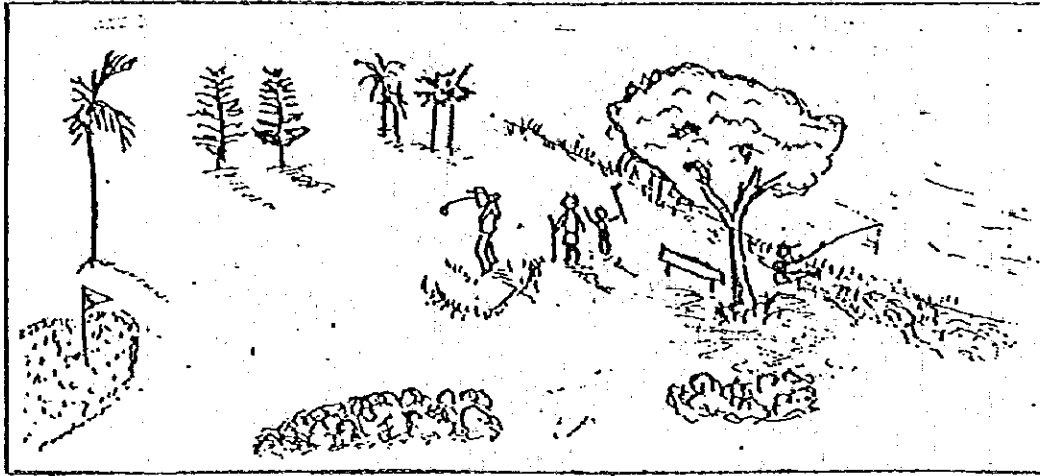
Zone Type C : Agriculture Land Zone

COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.4

IMAGE SKETCH OF ZONE TYPE C (AGRICULTURE
LAND ZONE)



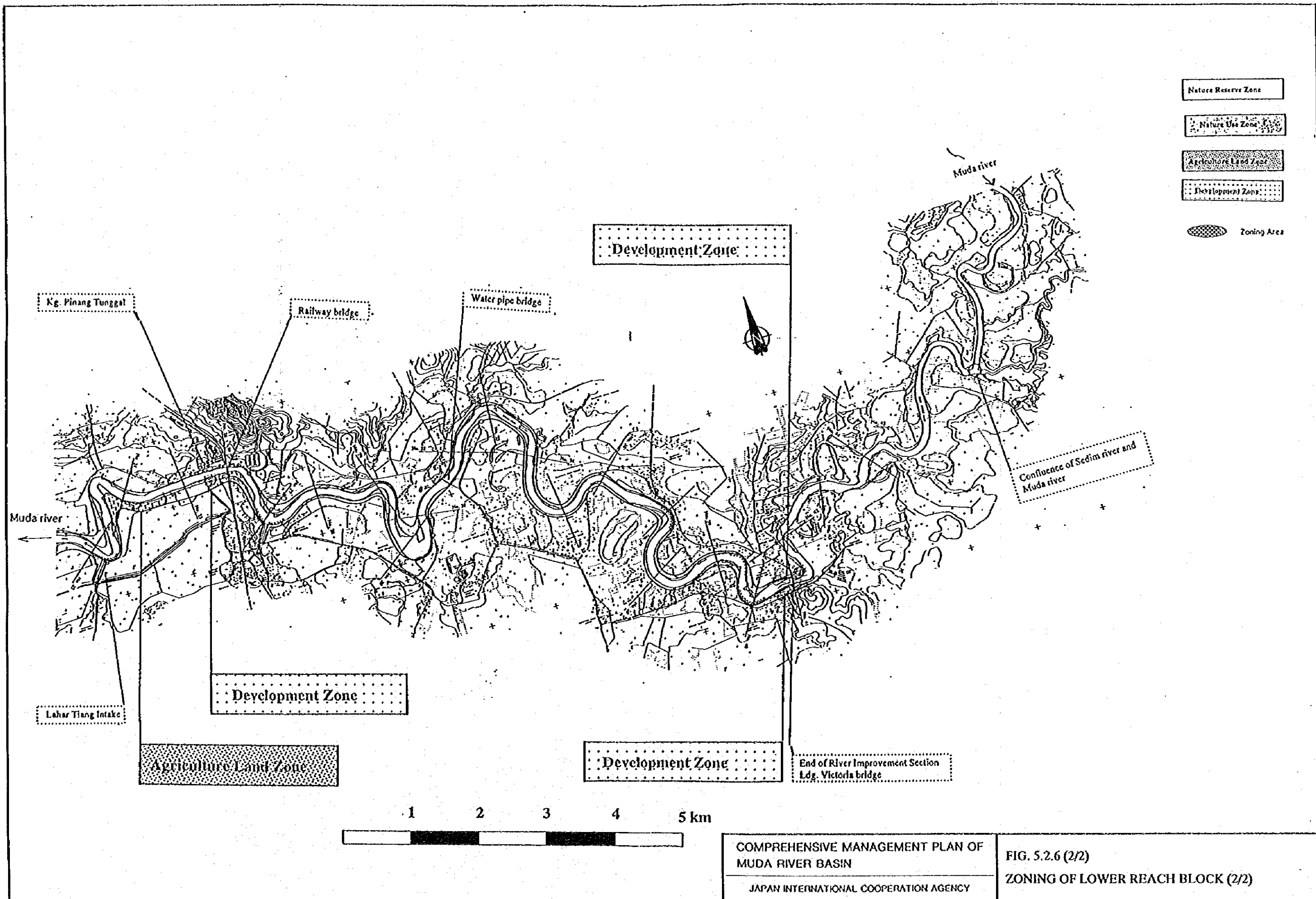
Zone Type D : Development Zone

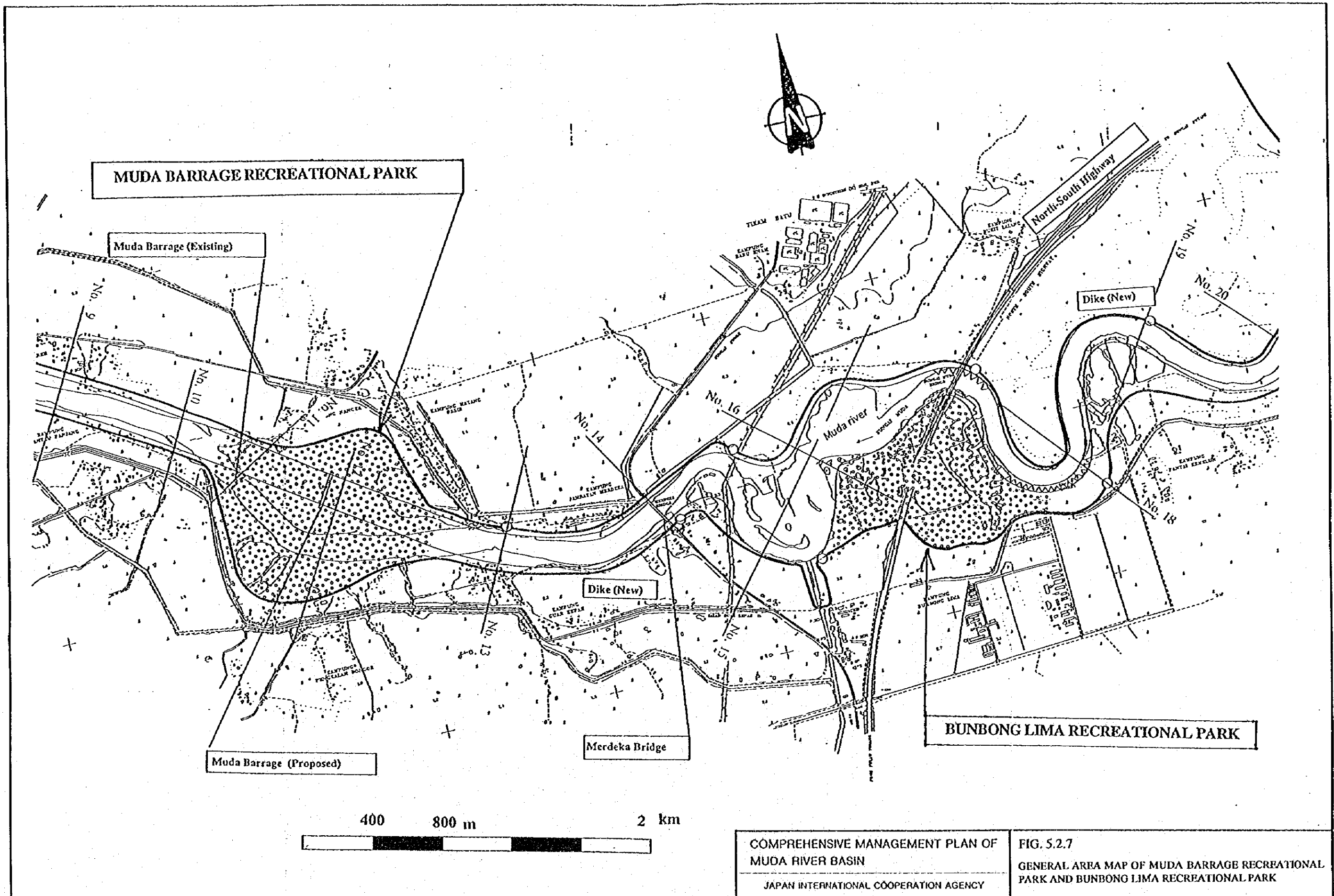
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.5

IMAGE SKETCH OF ZONE TYPE D (DEVELOPMENT
ZONE)





MUDA BARRAGE RECREATIONAL PARK

Muda Barrage (Existing)

North-South Highway

Dike (New)

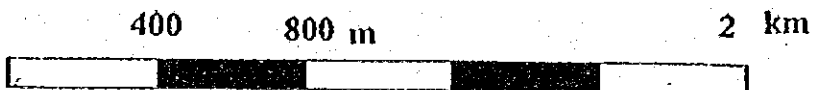
Muda river

Dike (New)

BUNBONG LIMA RECREATIONAL PARK

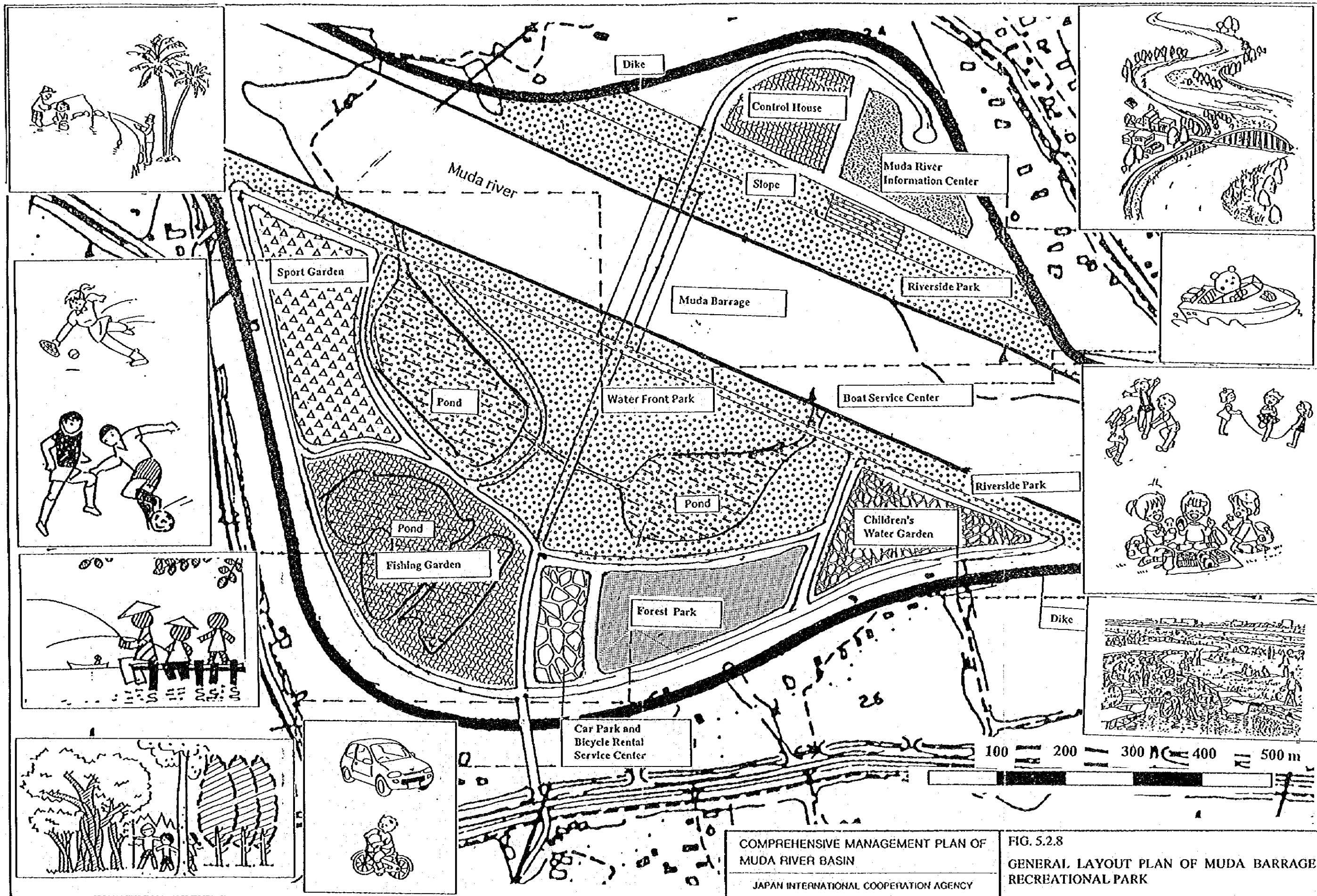
Muda Barrage (Proposed)

Merdeka Bridge



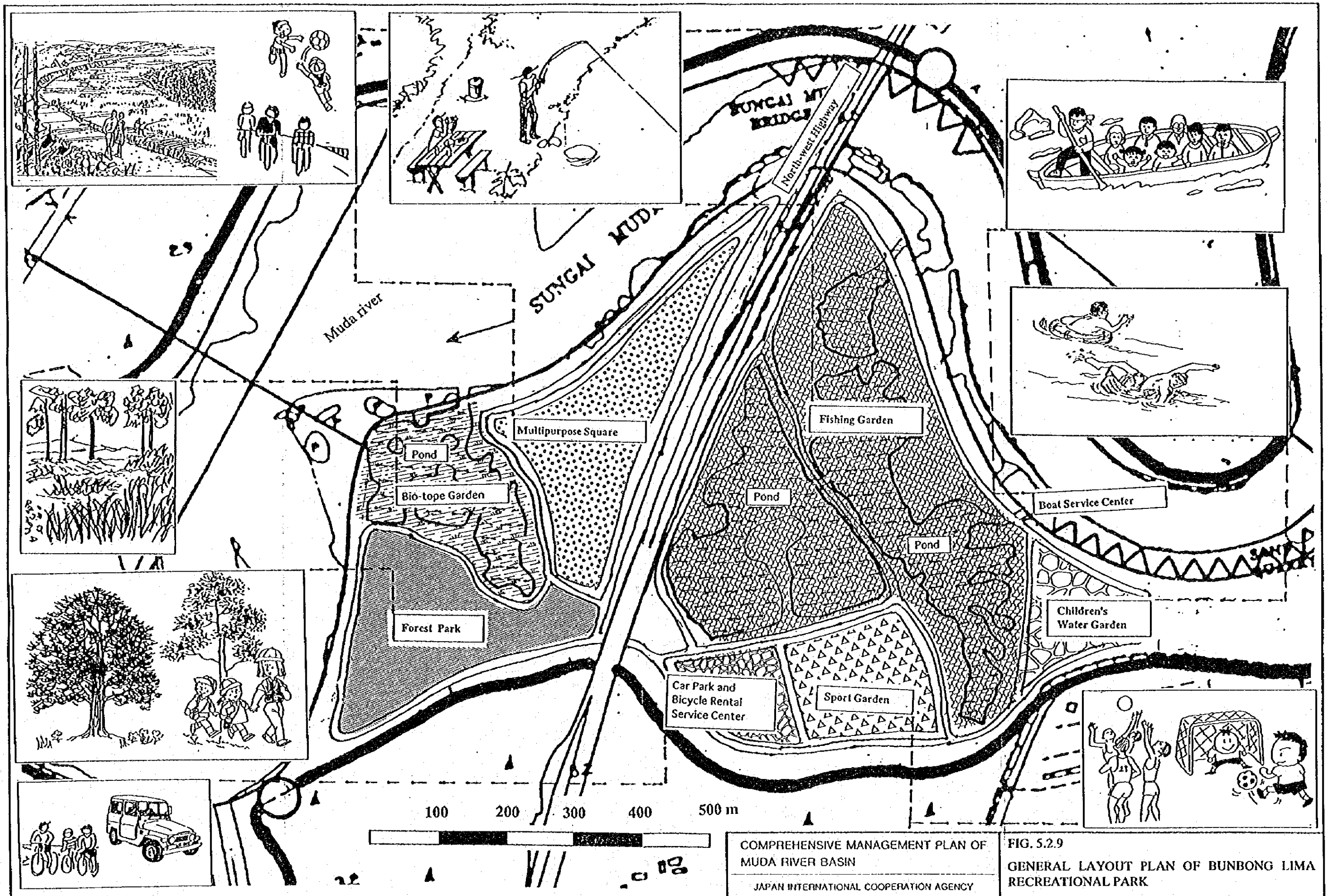
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.7
GENERAL AREA MAP OF MUDA BARRAGE RECREATIONAL
PARK AND BUNBONG LIMA RECREATIONAL PARK



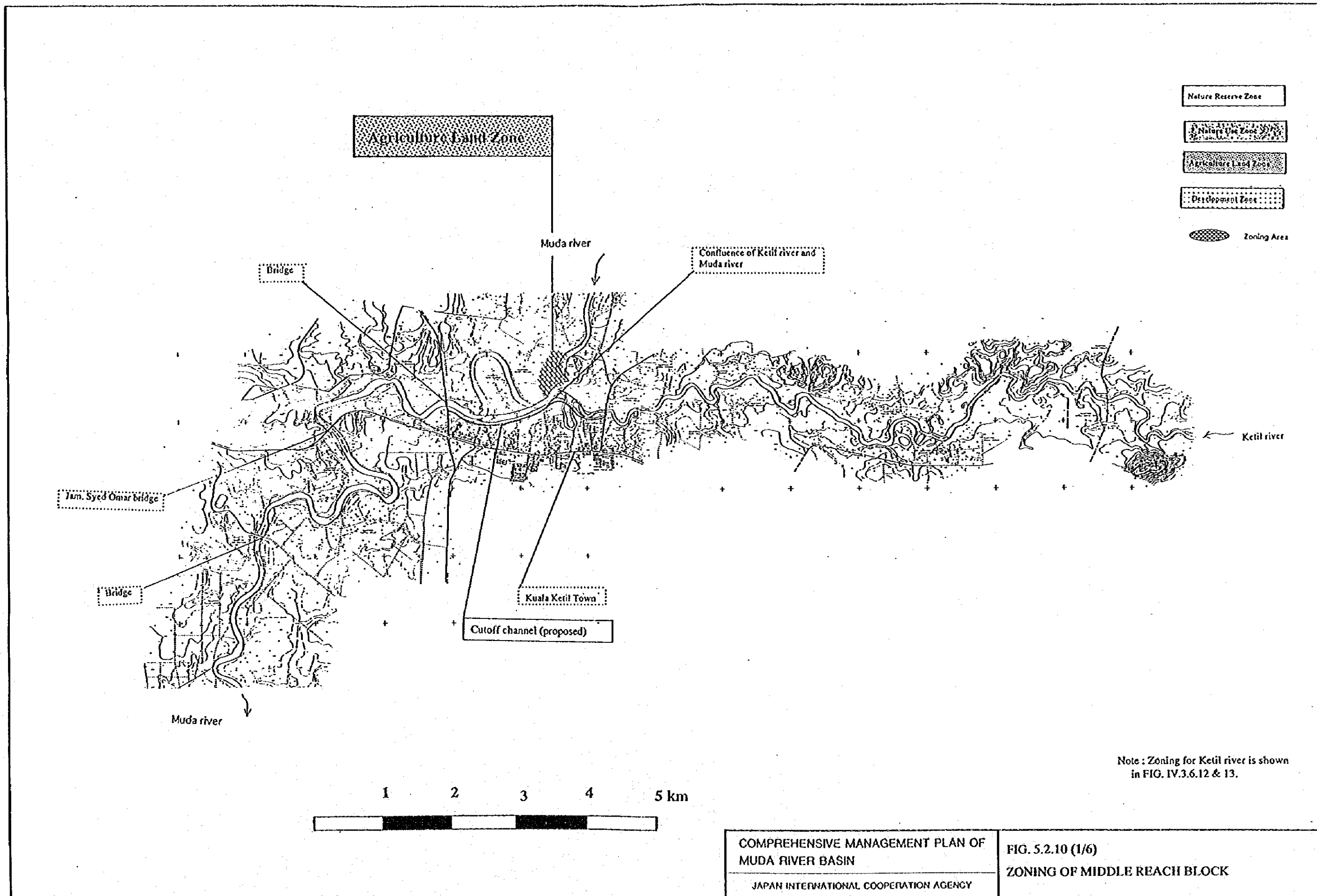
COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN
 JAPAN INTERNATIONAL COOPERATION AGENCY

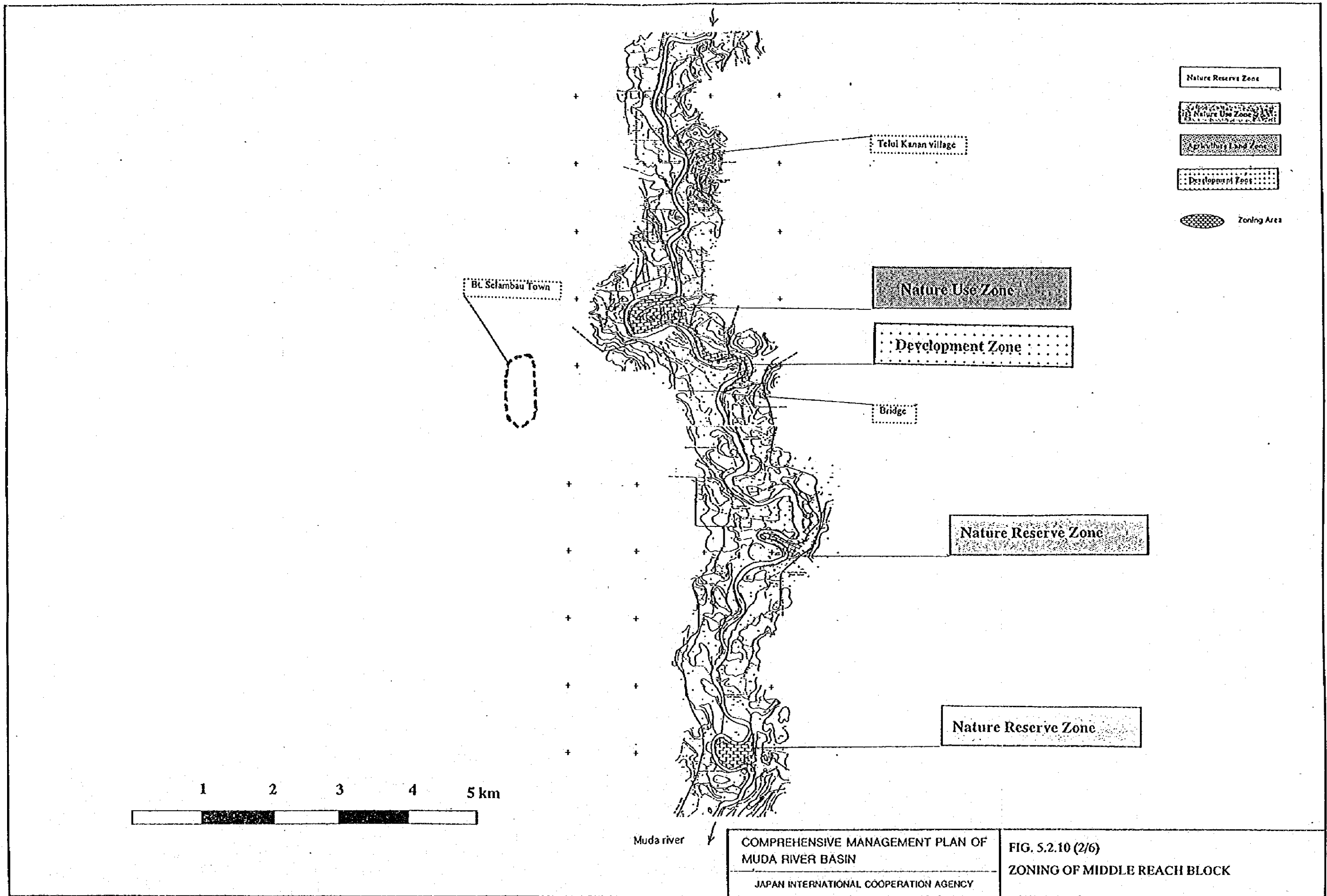
FIG. 5.28
 GENERAL LAYOUT PLAN OF MUDA BARRAGE RECREATIONAL PARK



COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

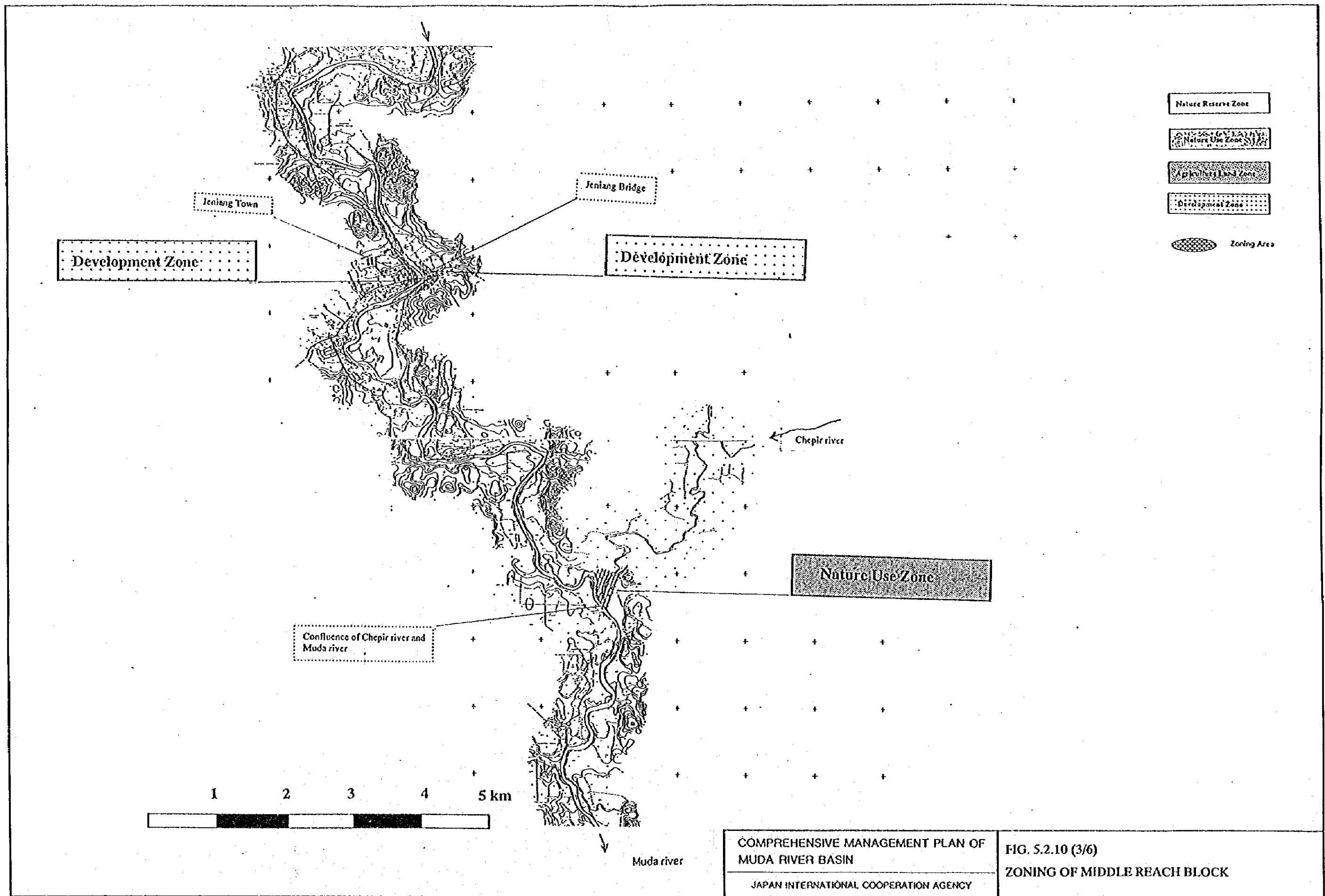
FIG. 5.2.9
GENERAL LAYOUT PLAN OF BUNBONG LIMA
RECREATIONAL PARK

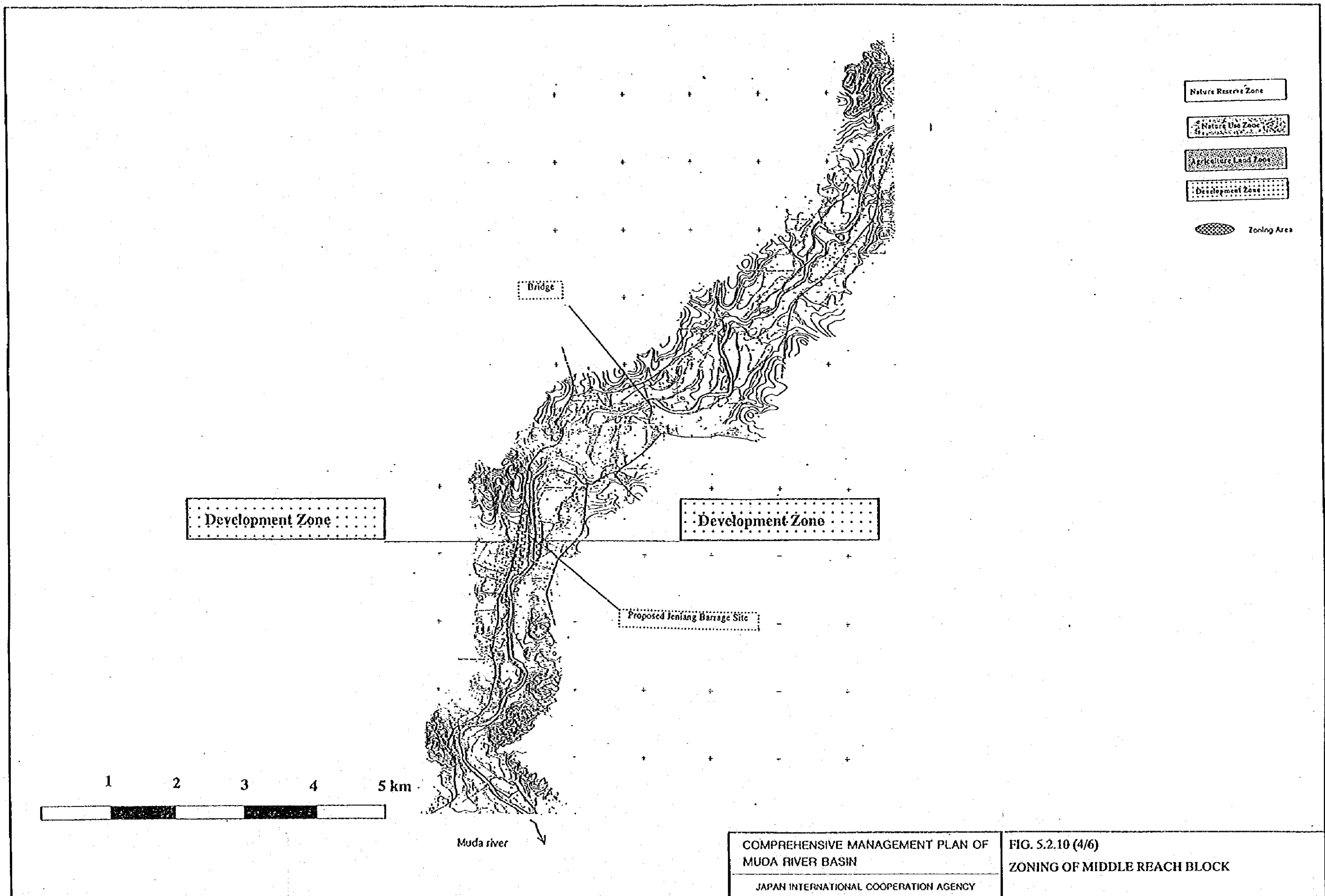




COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.10 (2/6)
ZONING OF MIDDLE REACH BLOCK





Nature Reserve Zone

Nature Use Zone

Agriculture Land Zone

Development Zone

Zoning Area

Development Zone

Development Zone

Bridge

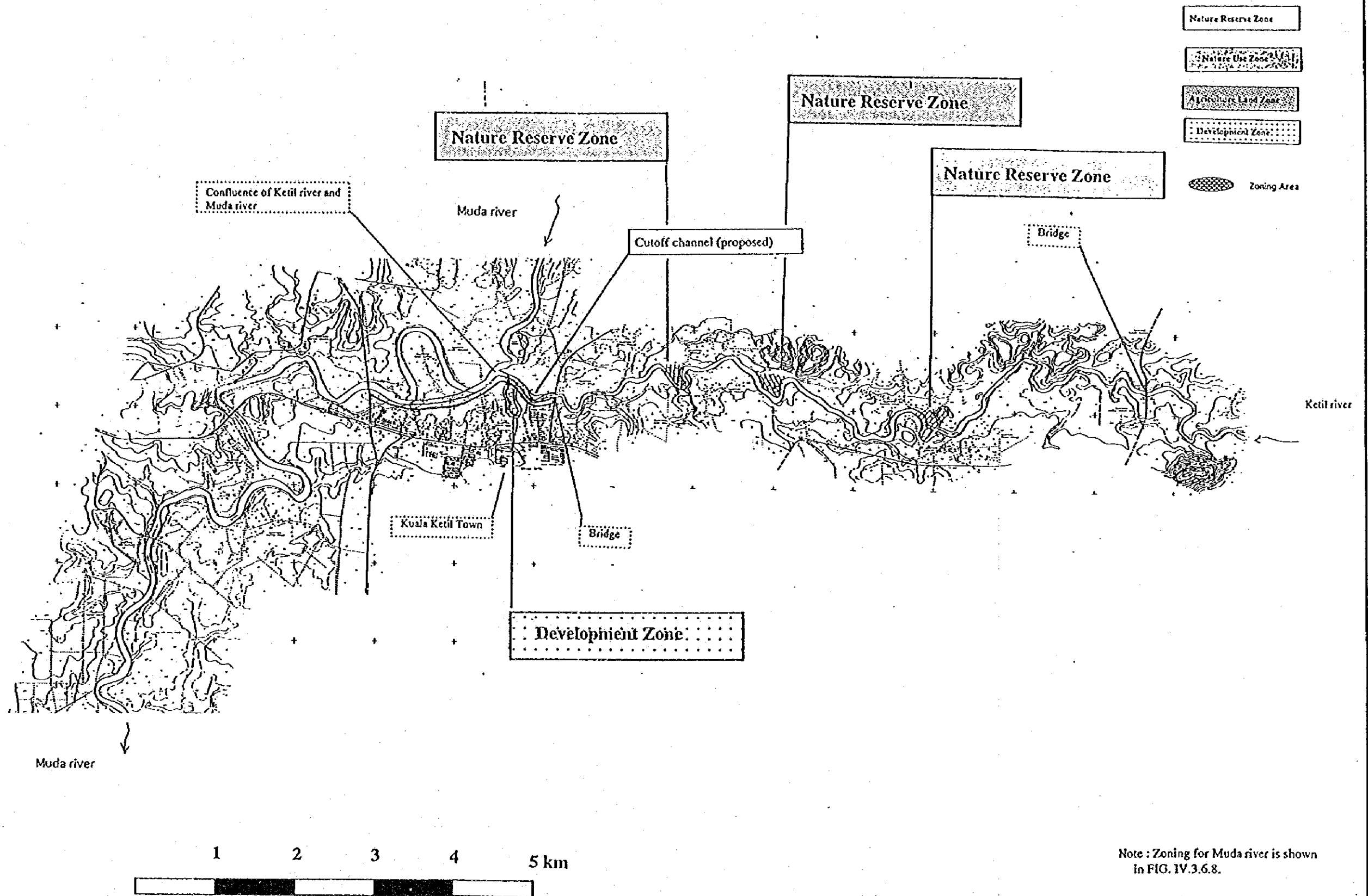
Proposed Jeniang Barrage Site

1 2 3 4 5 km

Muda river

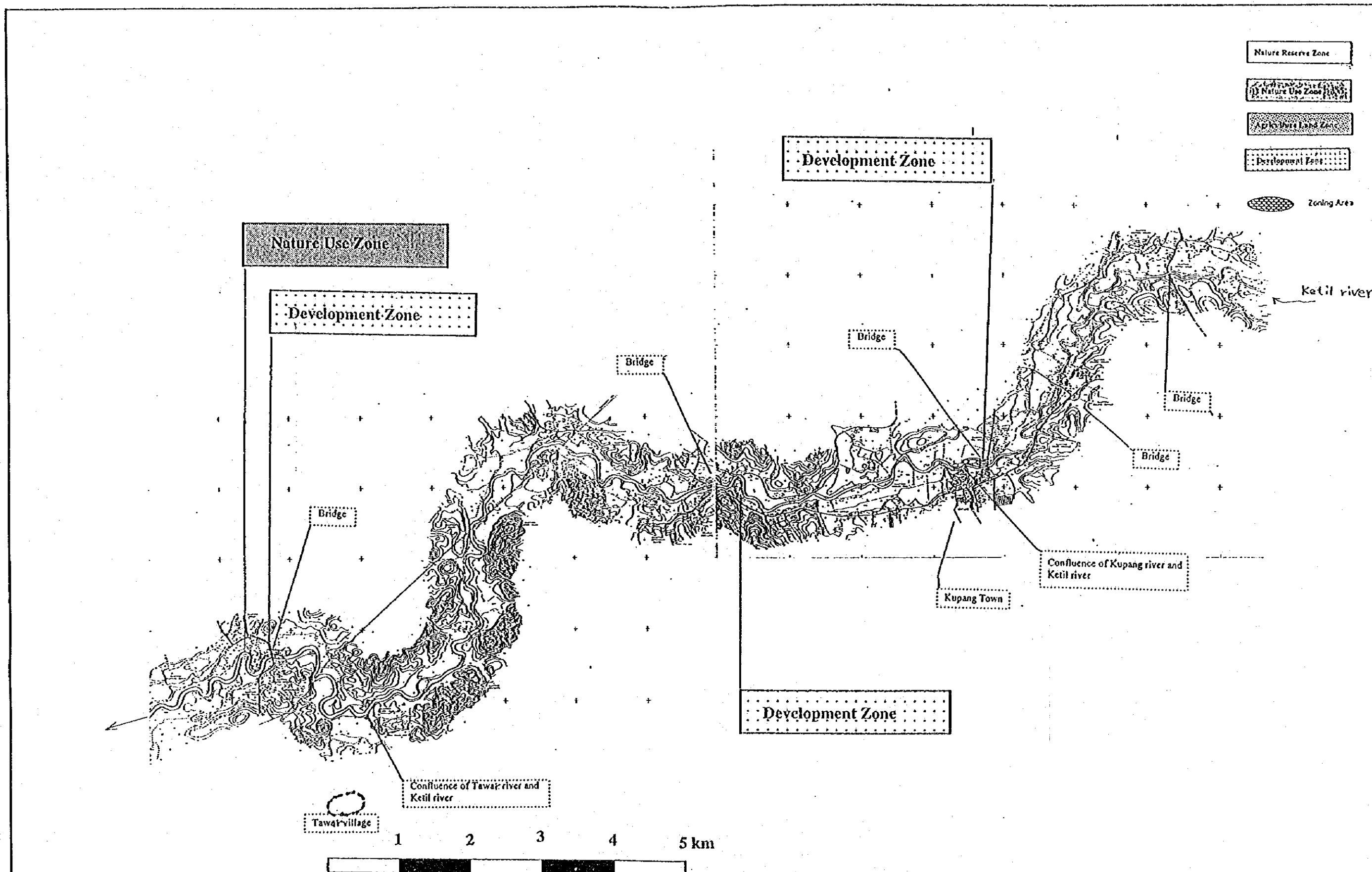
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.10 (4/6)
ZONING OF MIDDLE REACH BLOCK



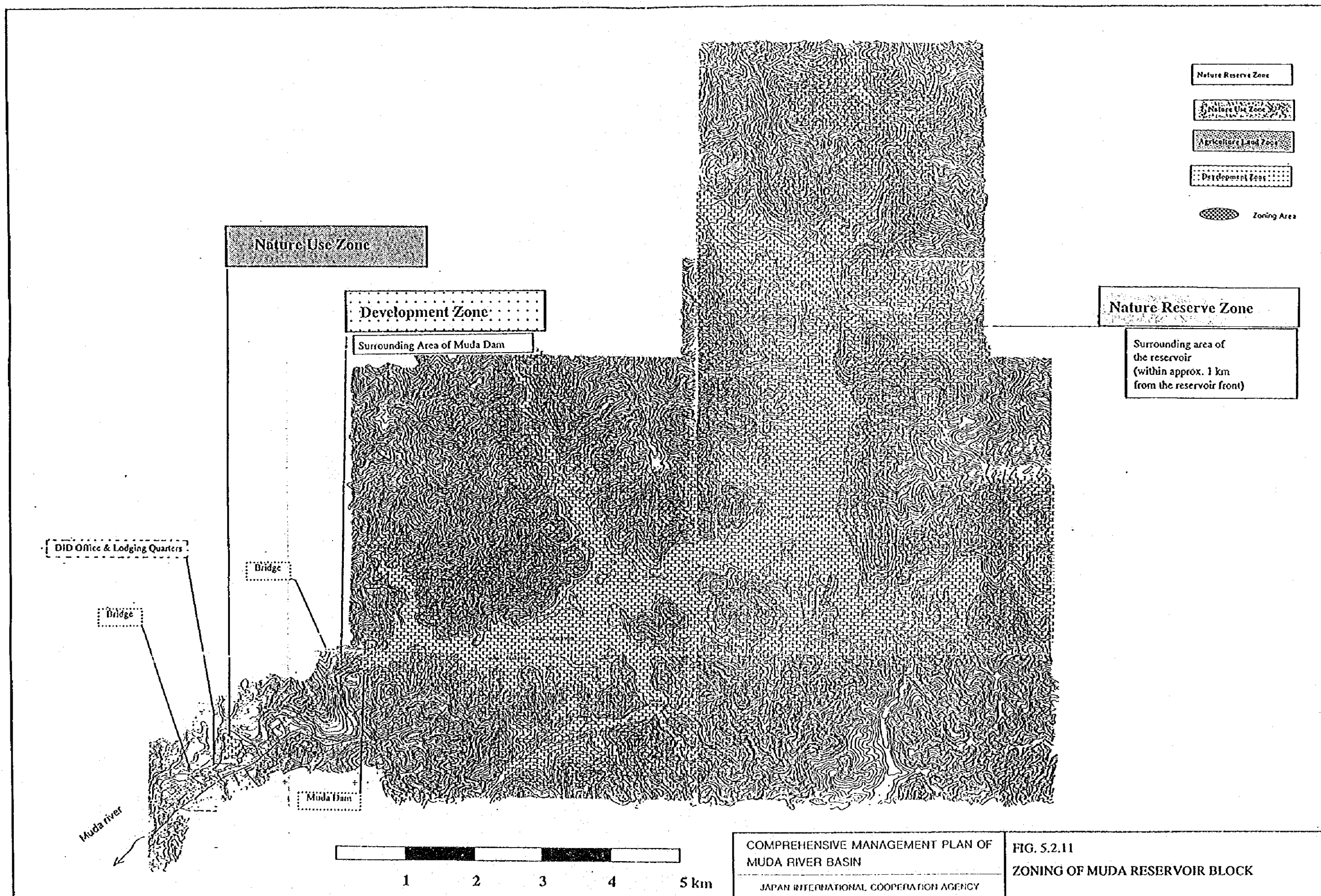
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.10 (5/6)
ZONING OF MIDDLE REACH BLOCK



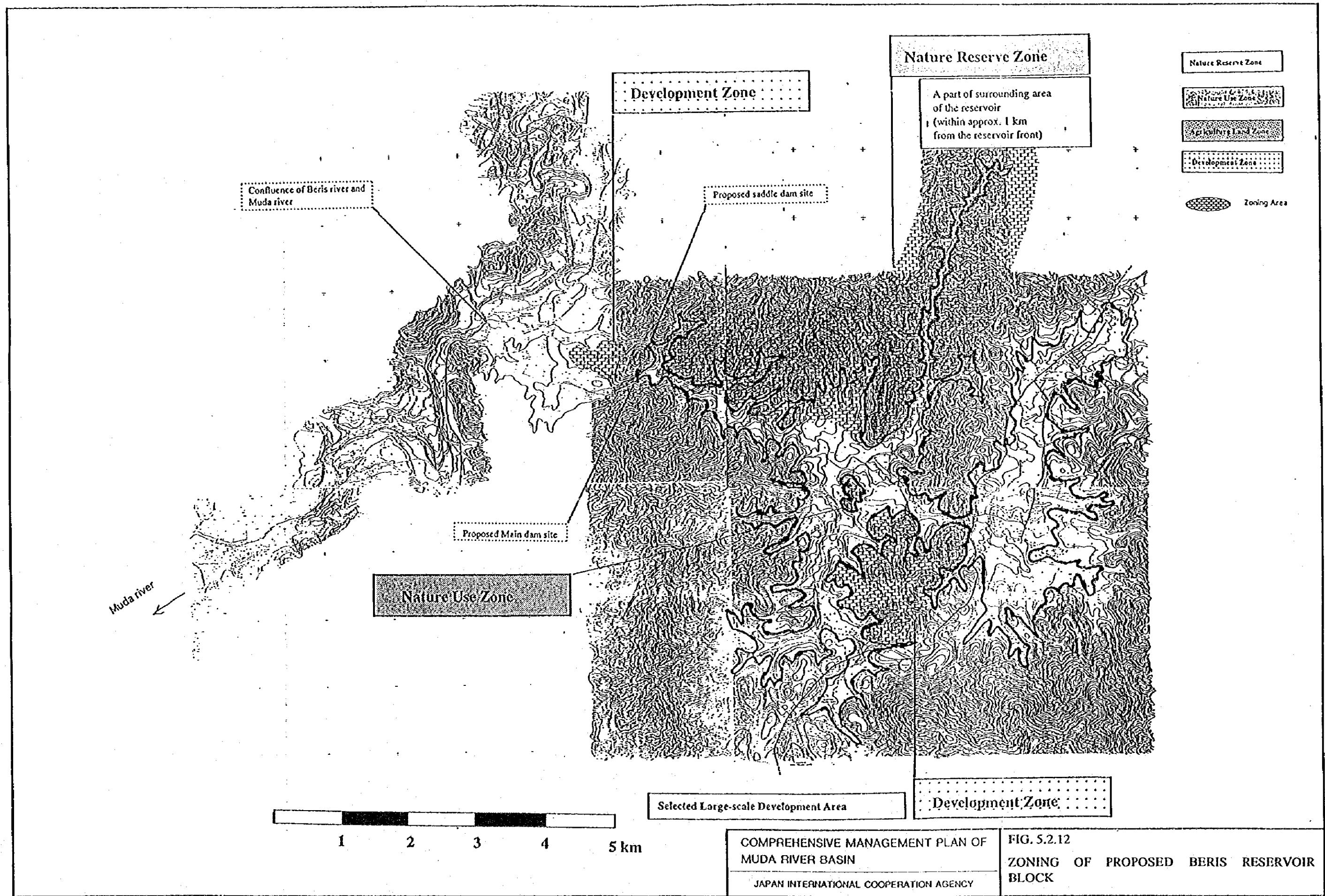
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN
JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.10 (6/6)
ZONING OF MIDDLE REACH BLOCK



COMPREHENSIVE MANAGEMENT PLAN OF
 MUDA RIVER BASIN
 JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.11
 ZONING OF MUDA RESERVOIR BLOCK



Confluence of Beris river and Muda river

Development Zone

Proposed saddle dam site

Nature Reserve Zone
 A part of surrounding area of the reservoir (within approx. 1 km from the reservoir front)

Nature Reserve Zone

Nature Use Zone

Agriculture Land Zone

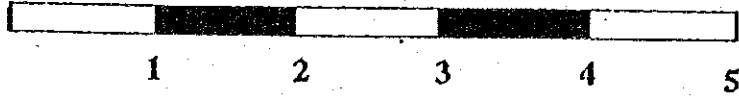
Development Zone

Zoning Area

Muda river

Proposed Main dam site

Nature Use Zone

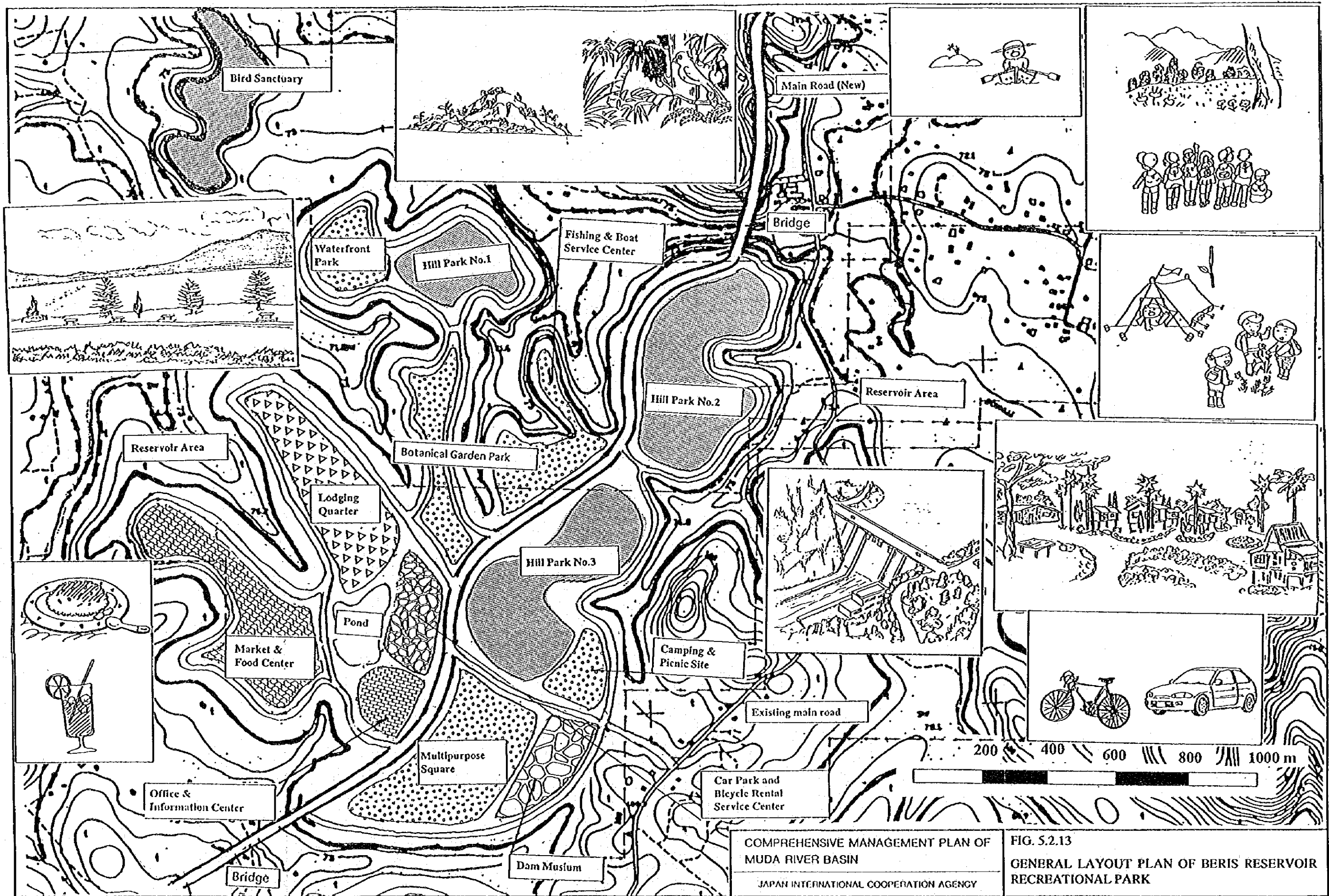


Selected Large-scale Development Area

Development Zone

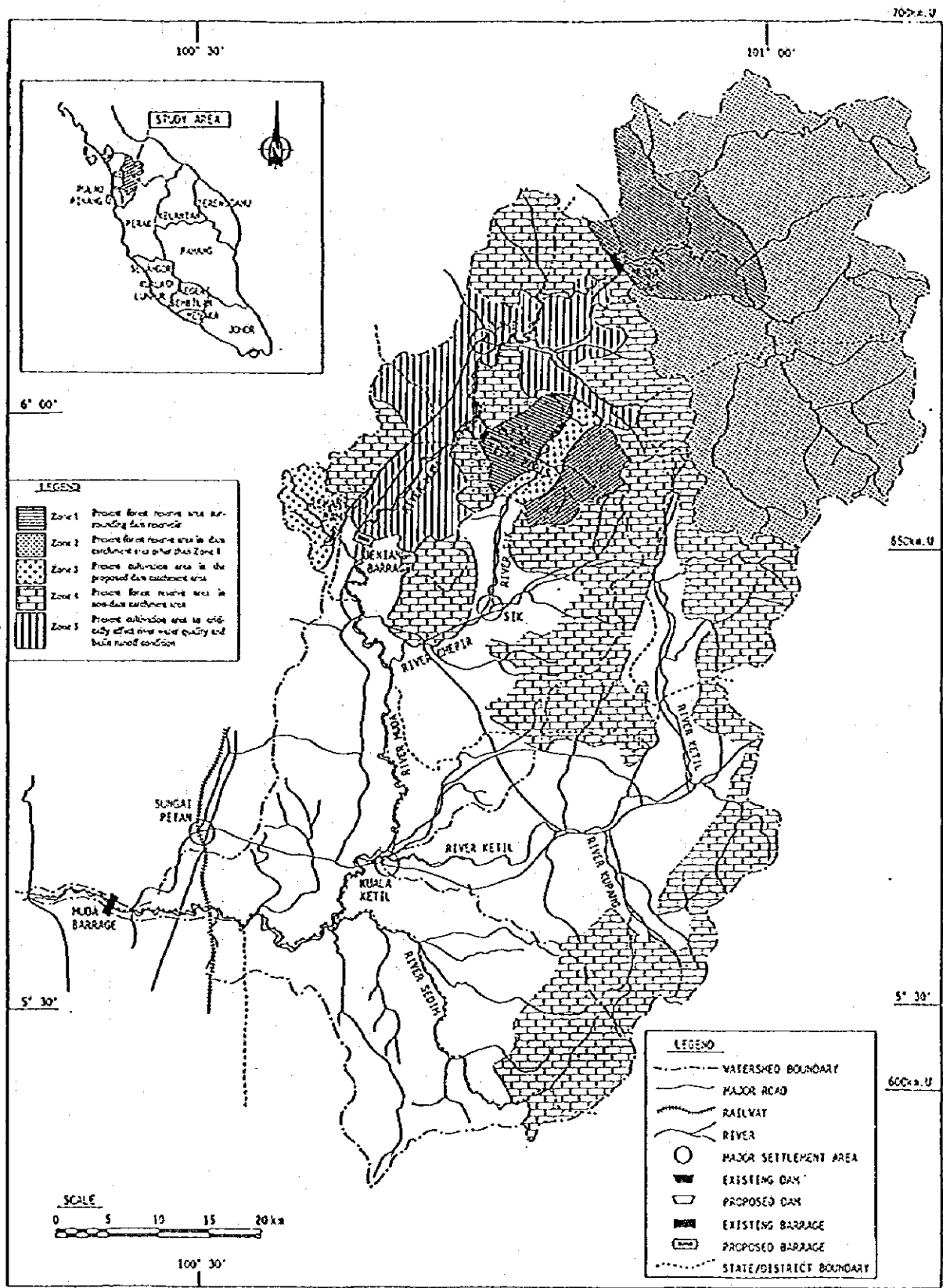
COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN
 JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.12
 ZONING OF PROPOSED BERIS RESERVOIR BLOCK



COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN
 JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 5.2.13
 GENERAL LAYOUT PLAN OF BERIS RESERVOIR RECREATIONAL PARK

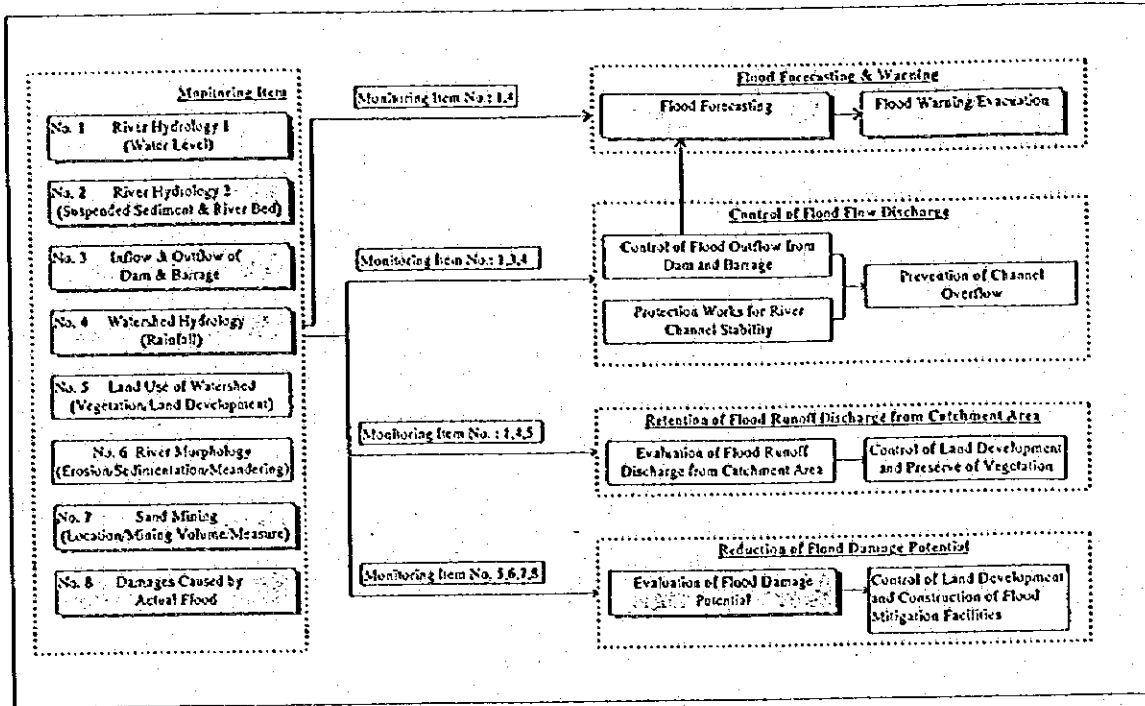


COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

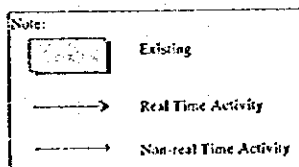
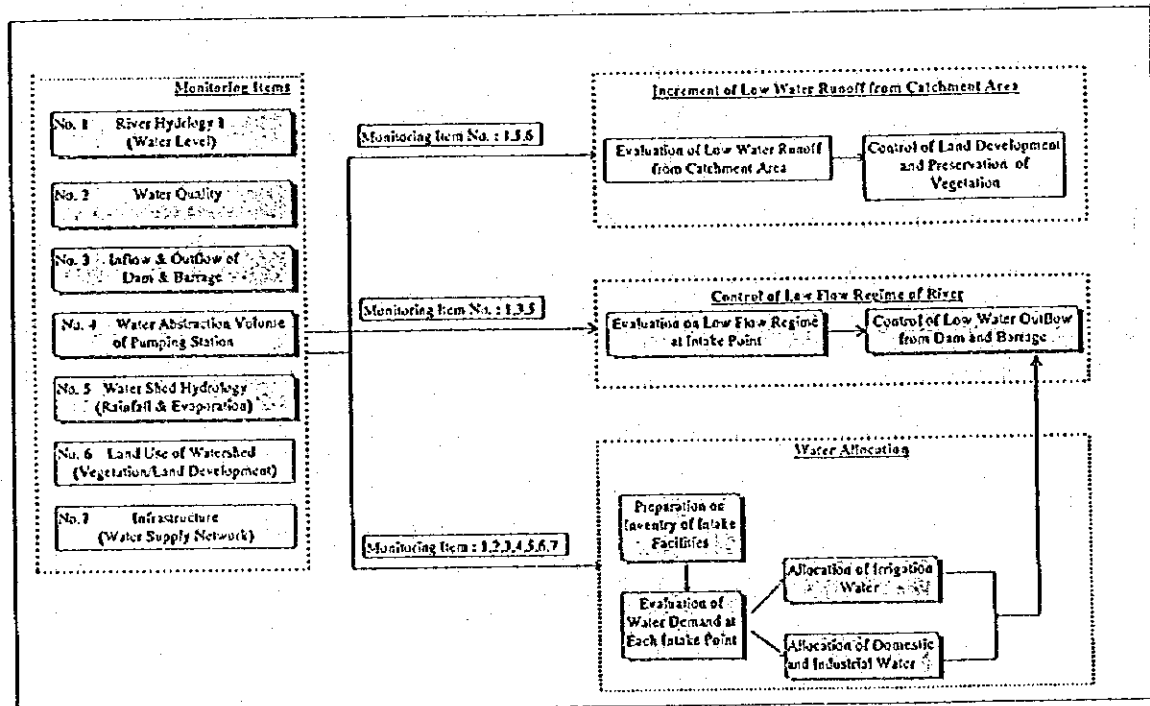
FIG. 6.1.1
PROPOSED ZONING PLAN FOR WATER SOURCE RESERVE AREA

JAPAN INTERNATIONAL COOPERATION AGENCY

Flood Management



Water Resources Development Management



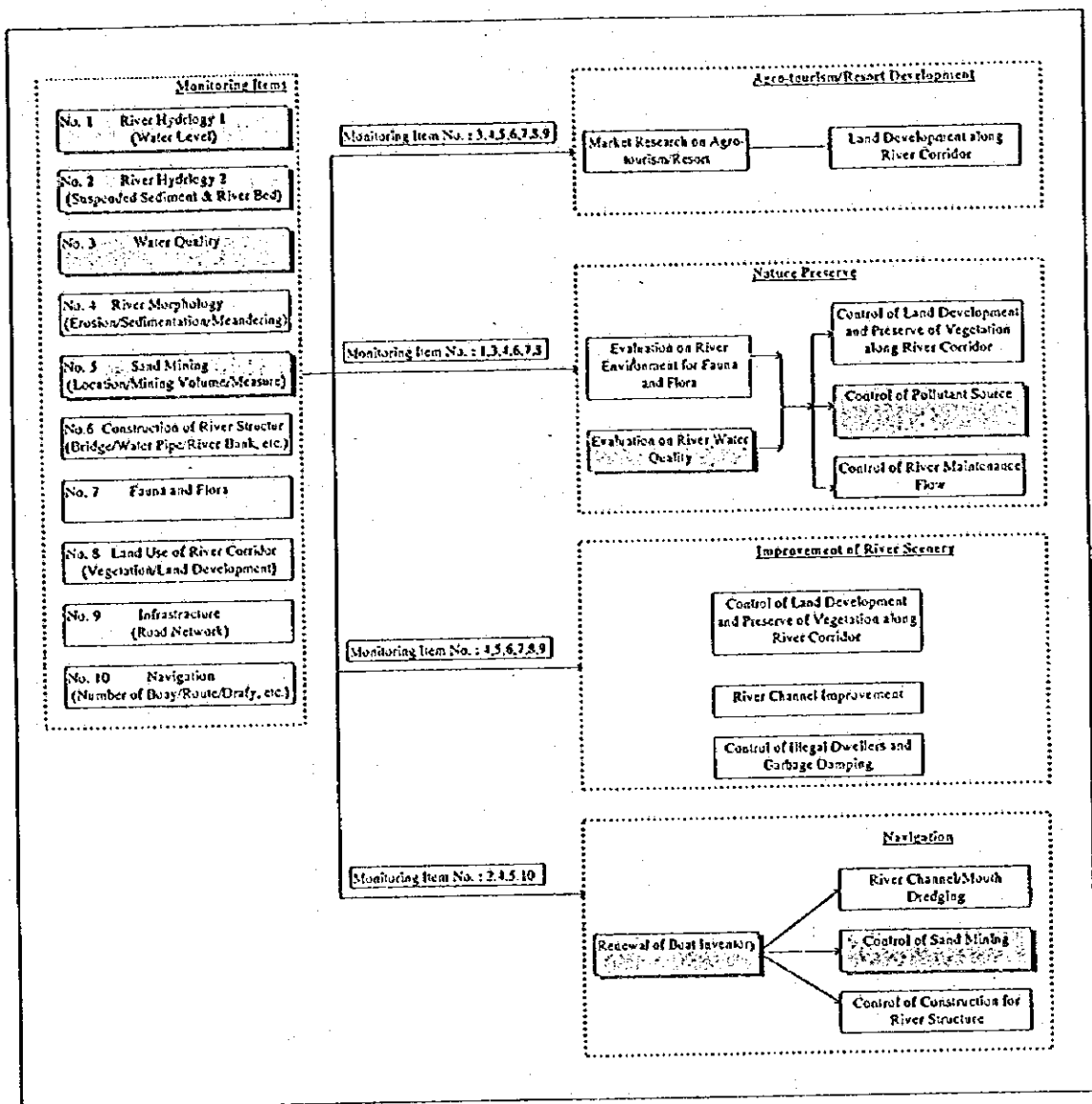
COMPREHENSIVE MANAGEMENT PLAN OF
MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 6.2.1 (1/2)

DIAGRAM OF PROPOSED MONITORING SYSTEM
(1/2)

River Environmental Management



Notes:

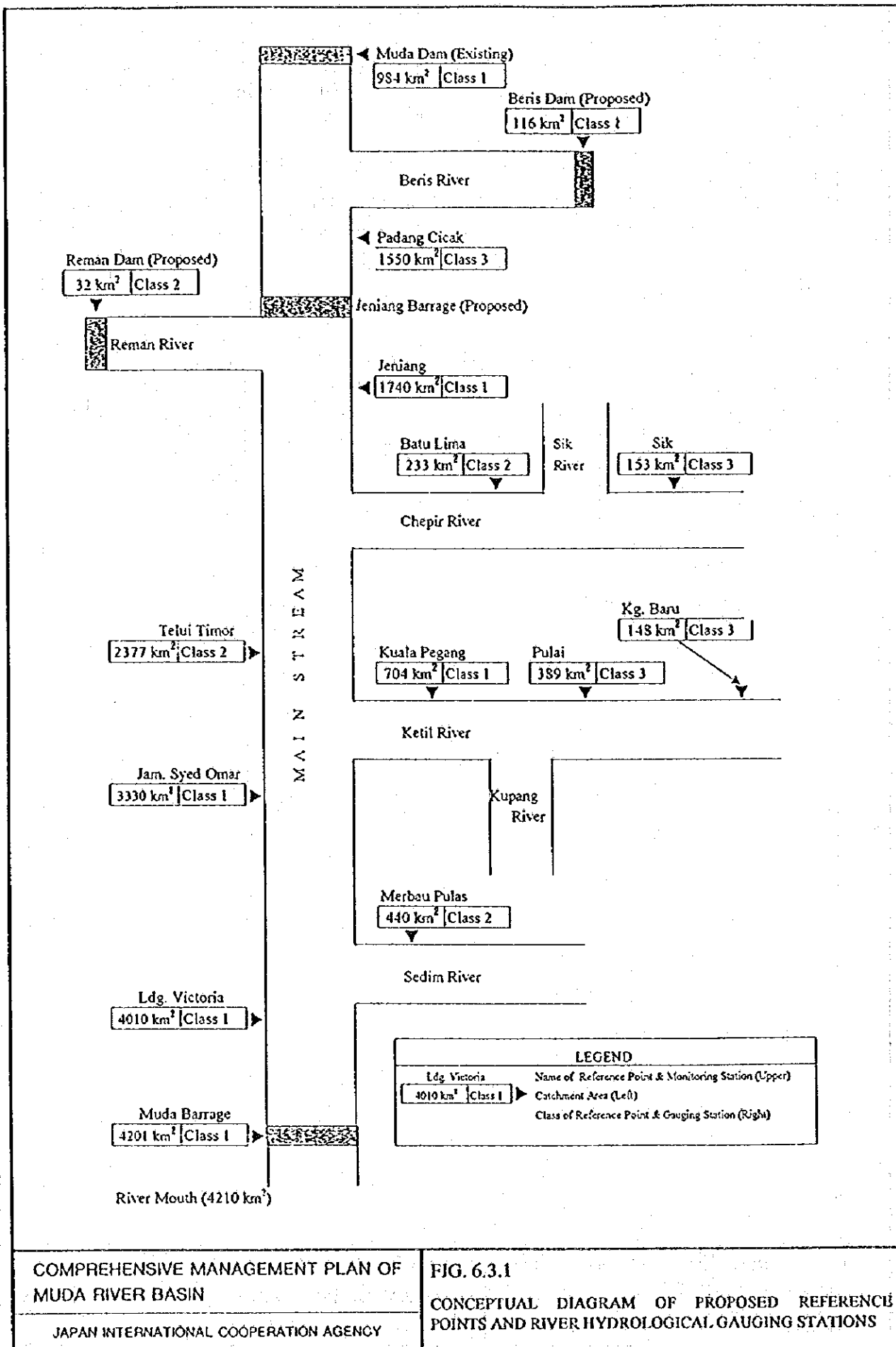
- Existing
- Real Time Activity
- Non-real Time Activity

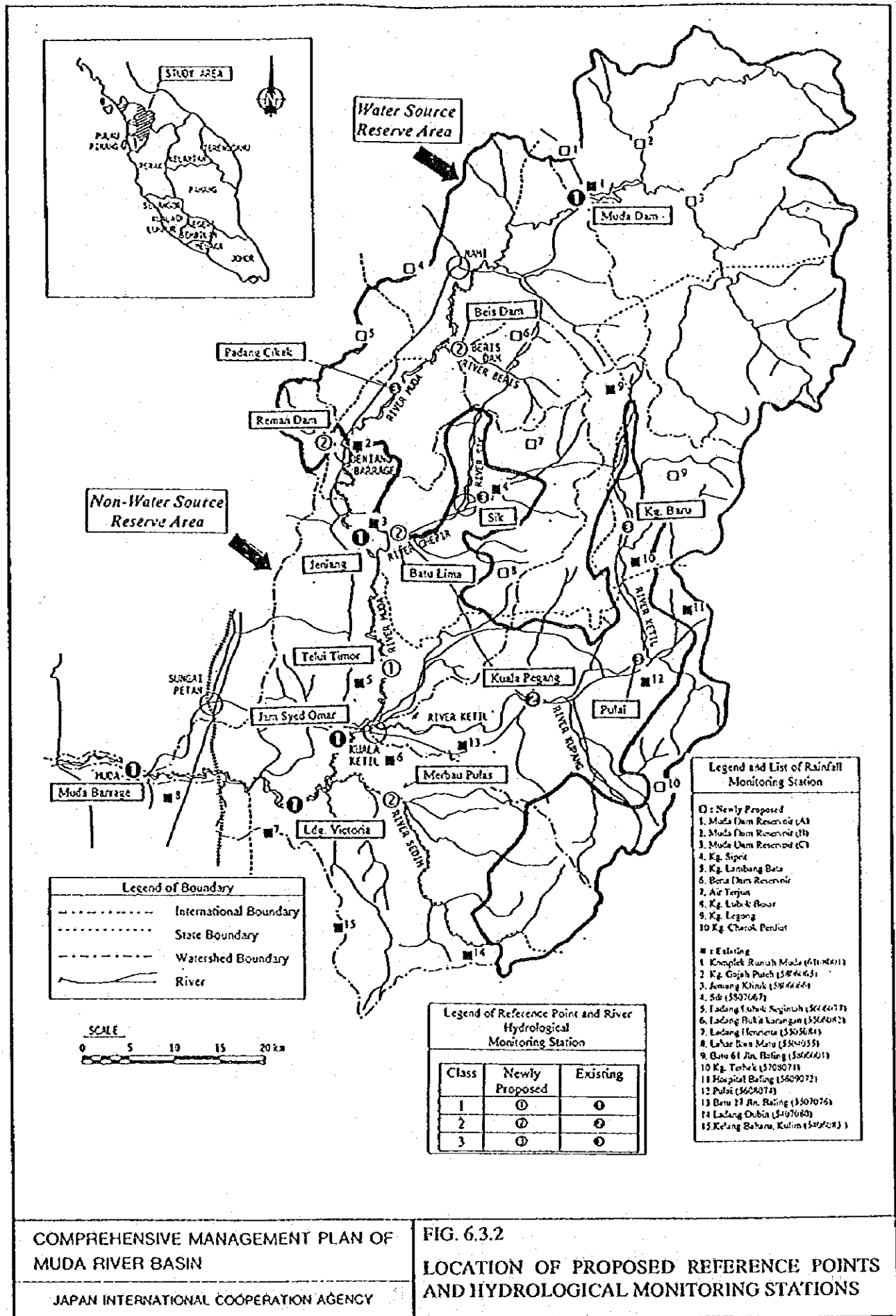
COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 6.2.1 (2/2)

DIAGRAM OF PROPOSED MONITORING SYSTEM (2/2)





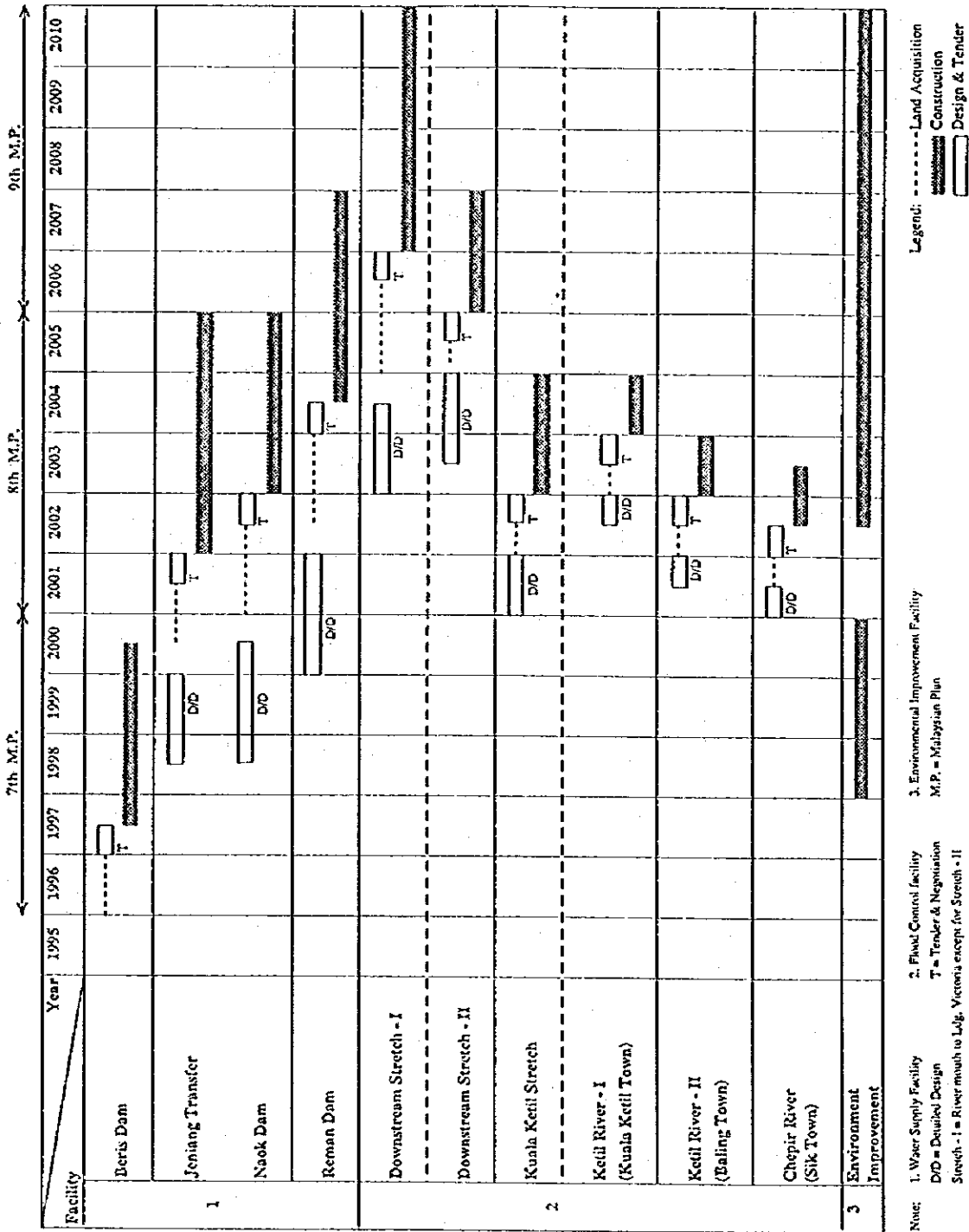
COMPREHENSIVE MANAGEMENT PLAN OF
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FIG. 6.3.2

LOCATION OF PROPOSED REFERENCE POINTS
AND HYDROLOGICAL MONITORING STATIONS

IMPLEMENTATION SCHEDULE



COMPREHENSIVE MANAGEMENT PLAN OF MUDA RIVER BASIN

JAPAN INTERNATIONAL COOPERATION AGENCY

FIG. 8.1.1
IMPLEMENTATION SCHEDULE

ANNEX

VOLUME 1

SUMMARY

**MEMBERS FOR STUDY ON COMPREHENSIVE MANAGEMENT PLAN
OF MUDA RIVER BASIN (1/3)**

Steering Committee

Name	Organization	Remarks
Mr. Kassim Sarbani	Economic Planning Unit	Chairman (Mar. 1994 - Aug. 1995)
Mr. Md. Rosnan Sulaiman	Economic Planning Unit	Chairman (Aug. 1995 - Present)
Puan Rosmah bte Jentra	Ministry of Agriculture	
Dato Hj. Mohd. Zain Osman	Economic Planning Unit, Kedah	
Ms. Siti Balkish Shariff	Economic Planning Unit, Penang	
Mr. Aminuddin Shah Hj. Ahmad	Department of Environment, Malaysia	
Ir. Teh Siew Keat	Department of Irrigation and Drainage, Malaysia	Secretary (Mar. 1994 - Sep. 1994)
Ir. Ahmad Fuad bin Embi	Department of Irrigation and Drainage, Malaysia	Secretary (Sep. 1994 - Present)

Technical Committee

Name	Organization	Remarks
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Ir. Ahmad Fuad bin Embi	Department of Irrigation and Drainage, Malaysia	Chairman (Sep. 1994 - Present)
	Federal Departments and Agencies	
Not Fixed	Ministry of Agriculture	
Not Fixed	Department of Environment	
Not Fixed	Department of Forestry	
Not Fixed	Malaysian Fisheries Development Authority	
Not Fixed	Department of Irrigation and Drainage, Muda Office	
	DID Headquarters	
Not Fixed	River Engineering Division	
Not Fixed	Irrigation Division	
Not Fixed	Coastal Engineering Division	
Not Fixed	Hydrology Division	
	Kedah State	
Not Fixed	Muda Agriculture Development Authority	
Not Fixed	Public Works Department	
Not Fixed	Department of Forestry	
Not Fixed	Department of Agriculture	
Not Fixed	Malaysian Fisheries Development Authority	
Not Fixed	Marine Department	
	Penang State	
Not Fixed	Penang Water Authority	
Not Fixed	Department of Forestry	
Not Fixed	Department of Environment	
Not Fixed	Department of Agriculture	
Not Fixed	Malaysian Fisheries Development Authority	
Not Fixed	Marine Department	

**MEMBERS FOR STUDY ON COMPREHENSIVE MANAGEMENT PLAN
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Ir. Law Kong Pook	Hydrology Division	
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**MEMBERS FOR STUDY ON COMPREHENSIVE MANAGEMENT PLAN
OF MUDA RIVER BASIN (3/3)**

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Name	Organization	Remarks
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Mr. Kesajiro YANAGISAWA	Ministry of Construction	River Planner
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Mr. Hedeki TANABE	JICA	Coordinator (Jan. 1994 - Present)

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