

付 属 資 料

- 1．要請書及びTAPP、S/W、M/M
- 2．主要面談者リスト
- 3．クエスチョネア
- 4．収集資料リスト
- 5．ローカル・コンサルタントリスト
- 6．物価調査表

1. 要請書及び TAPP、S/W、M/M



From: Aspia Akter
Assistant Chief

DC: 11304 -
Economic Relations Division
Ministry of Finance
Shera-Bangla Nagar
Dhaka-1207

D. O No. ERD/JAP-4/FS-41/98/411

Dated 23.08.1998.

Dear Mr. Ishida,

Please refer to the letter NO. 138-GL(5)/B/98 dated May 10, 1998 regarding the submission of project proposals under different categories for JFY 1999 and 2000 year.

I am pleased to send herewith a list of the Arsenic project proposals in the prescribed proforma as per discussion held between ERD, EOI and SICA on July 15 and July 27, 1998 respectively for development study in JFY 1999 (carried over O2 + New O2, total = 4).

We would be happy to provide you with additional information if required for any of the project proposals.

With best regards.

Yours sincerely,

Aspia Akter
23.08.98
(Aspia Akter)

Mr. Tetsuki Ishida
2nd Secretary,
Embassy of Japan,
Gulshan, Dhaka.

LIST OF THE PROPOSALS ON DEVELOPMENT STUDY FOR JFY 1999

New Proposals:

No.	Project Title	Project Aid	Ministry/ Agency	Sector	- Content
1.	Study on ground water development in arsenic affected urban area.	Tk. GOB 36.30 in lakh Tk. F.A. 1122.70 in lakh Total Tk. 1159.00 in lakh	M/O. LGRD&C Local Govt. Division	Physical Planning Water Supply & Housing.	
2.	The arsenic free water supply project in Nawabganj District.	¥ 1.150 million	M/O. LGRD&C Dept. of Public Health & Engineering (DPHE)		

Carried Over:

No.	Project Title	Project Aid	Ministry/ Agency	Sector	Content
3.	Arsenic in ground water: Causes, effects and remedies (July'97 to June 2000)	Total Tk. 1080.00 in Lakh F.A. Tk. 1030.00 in Lakh	Health & Family Welfare		
4.	Arsenic hazards in Bangladesh	Tk. 9.50 crore	M/O. Health & Family Welfare		

C: Japan-Arsenic Proj

DC:11304 -

GOVERNMENT OF THE PEOPLE'S REPUBLIC OF BANGLADESH
MINISTRY OF LGRD & CO-OPETATIVES

TECHNICAL ASSISTANCE PROJECT PRPOSAL (TAPP)

For the

STUDY ON GROUNDWATER DEVELOPMENT
IN ARSENIC AFFECTED URBAN AREA

DEPARTMENT OF PUBLIC HEALTH ENGINEERING
DPHE Bhaban

14, Shaheed Captain Monsur Ali Sharani
Kakrail, Dhaka-1000

June, 1998

平成11年度 開発調査要請案件総括表

(国名：バングラデシュ；公館名：バングラデシュ日本国大使館；平成10年9月作成) (担当書記官：石田昌)

開発課題	案件名	案件概要	要請機関名	調査形態	分野	正式要請の有無	T/Rの有無	低コスト	
								百万円	千円
環境対策計画	トンギ 環境管理	トンギ地区工業排水対策	LGRD&C (DWASA)	M/P, F/S	環境	有	有	5	3
防災水資源開発	ラヤガッソ 浄水場	ラヤガッソ 市への上水供給施設検討	〃	F/S	公益	〃	〃	7	7
〃	ボストウ 浄水場	ダッカ市への上水供給施設検討	〃	F/S	公益	〃	〃	8	5
〃	シガ 井戸水供給	〃	〃	F/S	公益	〃	〃	9	6
経済インフラ整備計画	ダッカ バス	ダッカ東部の堤防兼バス	運輸省	F/S	運輸	〃	〃	1	2
〃	アリル-カン橋	ダッカ-マワバ 間の橋梁建設	〃	F/S	運輸	〃	〃	6	9
〃	バトマ橋	〃	〃	F/S	運輸	〃	〃	10	8
〃	カルナリ水力発電所 拡張	既設発電所の拡張	エネルギー省	F/S	公益	〃	〃	2	4
〃	シガ・マムリ水力発電所	発電所新設	〃	F/S	公益	〃	〃	4	10
砒素汚染対策	砒素汚染地域における地下水開発	汚染地区での代替水源確保	LGRDC (DPHE)	F/S	環境	〃	〃	3	1
〃	ラヤガッソ 浄水場	汚染地区の浄水場建設計画	〃	F/S	環境	〃	〃	13	11
〃	地下水位回復計画	内容不明確	LGED (DWASA)	---	---	〃	〃	11	---
〃	沿岸部総合開発計画調査	内容不明確	農業省	---	---	〃	〃	12	---

TAPP PART-A: PROJECT IDENTIFICATION

PROJECT NO. (1)	TAPP DATE (2)	REVISED (3)
	June 21, 1998	

PROJECT TITLE (4)	ADMINISTRATIVE MINISTRY/DIVISION
Study on Groundwater Development in Arsenic Affected Urban Areas	Ministry of LGRD & Co-Operatives, Local Government Division

EXECUTING AGENCY (6)	SECTOR (7)	PROJECT MANAGER (8)
Department of Public Health Engineering (DPHE)	Physical Planning Water Supply & Housing	Superintending Engineer, DPHE, Groundwater Circle

TAPP PREPARED BY AND ADDRESS WITH PHOHE (9)
Executive Engineer DPHE Planning Div./880-(2)-9343362/ 14, Sheheed Captain Monsur Ali Sharani, Kakrail, Dhaka - 1000

TAPP PART-B: PROJECT DATES

PLANNED START (10)	PLANNED COMPLETION (11)
DD MM YY	DD MM YY
01 09 1998	31 3 2000

TAPP PART-C: PROJECT FINANCING

DONOR (12)	Government of Japan (Expected)
LOCAL COST SOURCE (13)	Government of Bangladesh
FOREIGN EXCHANGE SOURCE (14)	Technical Co-operation by the Government of Japan
CURRENCY RATE (15)	Yen 130 = US \$ 1.00 = Tk. 45.00 Yen 2.90 = Tk. 1.00

Unit: Lakh Taka

YEAR	TOTAL COST (16)	FE COST (17)	TAKA COST (18)	GOB COST (19)	PROJECT AID (20)	RPA (21)	CDST COST (22)
FY-1	823.20	484.40	304.60	34.20	789.00	304.60	30.00
FY-2	335.80	242.20	91.50	2.10	333.70	91.50	0.00
TOTAL	1159.00	726.60	396.10	36.30	1122.70	396.10	30.00

FINANCIAL ARRANGEMENT WITH DONOR (23)	NONE	DISCUSSED
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NAME AND DESIGNATION OF DONOR CONTRACT (24)	Resident Representative of JICA Bangladesh Office
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FINANCING AFTER COMPLETION OF THE PROJECT (25)	FUND REQUIRED
	YEARS 1/2/3

MODE OF FINANCING (26)				
DONOR	LOAN	GRANT	GOB ADP BUDGET	REVENUE BUDGET
Gov't of Japan (Proposed)		X		

SWLF-FINANCING % (27)	3.13 %
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TAPP PART-D.1 PROJECT DESCRIPTION (28)

a) Introduction

Arsenic poisoning problems of local residents caused by usage of contaminated groundwater for drinking purpose have become an urgent national concern not only for medical treatment, but also preventive measures. And it has been learned that most of arsenic contaminated groundwater are derived from considerably shallower aquifer.

The proposed development study is therefore aimed to seek safe aquifer for drinking water supply in remote areas, particularly those areas forced to rely on the groundwater for daily life. Through massive hydrogeological investigation including test boring and examination of soil and groundwater, it is expected to explore safe aquifer and to develop a plan for water supply system.

Upon completion of the development study, an immediate implementation to secure safe drinking water source and its distribution in respective community will be sought to prospective donor agencies/countries.

b) Necessity and Purpose

Due to the absence of appropriate hydrogeological information in the proposed study area, no appropriate measure to develop alternative groundwater source is available.

The purpose of the proposed development study is therefore to explore potential aquifer for drinking water source; to examine safety of water quality; and to develop a plan for water supply system.

c) Justification

Lack of safe drinking water source will prolong the disastrous situation of arsenic poisoning of local residents. The development of new groundwater source in the subject area is deemed indispensable to insure the minimum requirement for their survival.

TAPP PART D.2 PROJECT OBJECTIVES (29)

As it is distinctively explained in previous subsection, the proposed development study is vested with indispensable mission:

- to conduct hydrogeological investigations and evaluation including test boring, pumping test, analysis of soil and water quality in terms of heavy metal concentration,
- to identify safe aquifer in the areas currently affected by arsenic contamination in groundwater,
- to carry out feasibility study on the water supply development in the areas where safe and potable aquifer is identified,
- to transfer technology on groundwater exploration through the course of the development study.

CONSEQUENCES IF NOT APPROVED (30)

Absence of appropriate hydrogeological information in the proposed study area has been causing difficulty for DPHE and local government units to seek for safe and potable groundwater wherein local residents are forced to rely drinking water source on the groundwater. If the proposed development study is not materialised, provision of safe and potable drinking water will be farther difficult unless otherwise drinking water is supplied through the long distance of water transmission pipe or by water-tanker and which are not economically affordable for those local residents.

Thus, the implementation of the proposed development study is deemed indispensable as a vital mean to seek for safe and potable water supply.

LINKAGE TO OTHER PROJECT/ORGANIZATION (31)

The outcome of the requested development study will be reflected on the preparation of funding including application to donors for financial assistance for realisation of the project implementation. It will have direct linkage to the sector development activities being vested to the DPHE.

PROJECT OUTPUT (32) (IN QUALITATIVE AND QUANTITATIVE TERMS)

PREPARATORY ASSISTANCE:

The Study Team/Consultants will submit the Study Report on the Groundwater Development in Arsenic Affected Urban Area. On the basis of this study, the project proposal will be prepared to seek for the financing to implement the project.

TECHNOLOGY TRANSFER:

Appropriate number of counterpart personnel of DPHE will be assigned to work under the guidance and supervision of the Study Team/Consultants. Through the day-to-day activities, these counterpart staff will be acquainted with know-how and approaches in conducting hydrogeological investigations and evaluations and feasibility study.

TRAINING:

Participation to JICA's Group Training is desired for counterpart staff of DPHE to be appointed in consultation with the Study Team/Consultants.

INSTITUTIONAL SUPPORT:

Not Applicable for TAPP

ACTION EXPECTED AFTER COMPLETION OF THE PROJECT (33)

After completion of this development study, the urgent water supply project will be implemented, if the study results conclude technically, financially and environmentally feasible.

TAPP PART : PROJECT INPUT PERSONNEL : Expatriate Consultant (34)

Expatriate	No. of Consultants	Man-Month	Cost/Month (Lakh Taka)	Total Remuneration (Lakh Taka)
<u>Field Services</u>				
1. Team Leader/Water Supply Planner	1	8.0	13.80	110.40
2. Sr. Hydrogeologist	1	5.0	11.90	59.50
3. Jr. Hydrogeologist	1	5.0	10.10	50.50
4. Geologist	1	8.0	10.10	80.80
5. Sr. Well Engineer	1	9.0	10.10	90.90
6. Jr. Well Engineer	1	9.0	8.10	72.90
7. Water Quality & Environmental Specialist	1	4.0	10.10	40.40
8. Facility Planner	1	4.5	8.10	36.45
9. Economic/Financial Specialist	1	3.0	10.10	30.3
10. GIS Specialist	1	3.5	10.10	35.35
Sub-Total	9	55.5		607.50
<u>Home Office</u>				
1. Team Leader/Water Supply Planner	1	3.0	13.80	41.40
2. Sr. Hydrogeologist	1	0.5	11.90	5.95
3. Jr. Hydrogeologist	1	0.0	10.10	0
4. Geologist	1	0.5	10.10	5.05
5. Sr. Well Engineer	1	0.0	10.10	0
6. Jr. Well Engineer	1	0.0	8.10	0
7. Water Quality & Environmental Specialist	1	0.5	10.10	5.05
8. Facility Planner	1	2.0	8.10	16.20
9. Economic/Financial Specialist	1	1.0	10.10	10.10
10. GIS Specialist	1	3.5	10.10	35.35
Sub-Total	9	7.5		119.10
Total		63.0		726.60

TASK AND QUALIFICATION REQUIRED (35)

Designation of the Consultants	Required Qualification	Tasks
1. Team Leader/Water Supply Planner	Minimum B. Sc. in Water Supply Engineering with more 15 years of experiences.	Management of the whole study work and discussion and liaison with GOB officials and concerned agencies. Development of Water Supply System Plan
2. Sr. Hydrogeologist	Minimum B. Sc. in Hydrogeology with 12 years of relevant experiences.	Preliminary survey and field supervision of groundwater development.
3. Jr. Hydrogeologist	Minimum B. Sc. in Hydrogeology with 8 years of relevant experiences.	Ditto
4. Geologist	Minimum B. Sc. in Geology with 8 years of relevant experiences.	Preliminary survey on geology to identify candidate sites for boring test
5. Sr. Well Engineer	Minimum B. Sc. in Mechanical Engineering with 12 years of relevant experiences.	Supervision of test well drilling, well design, pumping test and sampling of cuttings
6. Jr. Well Engineer	Minimum B. Sc. in Electrical Engineering with 8 years of relevant experiences.	Ditto
7. Water Quality & Environmental Specialist	Minimum B. Sc. in Civil Engineering with 10 years of relevant experiences.	Water sampling and evaluation of analysis results and environmental consideration in groundwater development
8. Facility Planner	Minimum B. Sc. in Civil Engineering with 10 years of relevant experiences.	Planning and design of water supply system with the use of deepwell water sources
9. Ecobomic/Financial Specialist	Minimum B.A. in Developmen Economy with 10 years of relevant experiences	Economic and financial study and evaluation on groundwater development for water supply.
10. GIS Specialist	Minimum B.Sc.in Civil Engineering with 10 years of relevant experiences.	System, design, data processing and mapping of GIS information.

Local Consultants (36)

Local Consultants	No. of Consultants	Man-Month	*Cost/Month (Lakh Taka)	Total Remuneration (Lakh Taka)
Field Services				
1. Asst. Team Leader/ Water Supply Planer	1	8.0	1.00	8.00
2. Hydrogeologist	1	5.0	0.80	4.00
3. Geologist	1	8.0	0.80	6.40
4. Groundwater Engineer	2	9.0	0.80	7.20
5. Water Quality & Environmental Specialist	1	4.0	0.80	3.20
6. Facility Planner	1	4.0	0.60	2.40
7. Economic Financial Specialist	1	3.0	0.80	2.40
8. GIS Specialist	1	5.0	0.80	4.00
Total	9	46		37.60

TASK AND QUALIFICATION REQUIRED (37)

Designation of The Consultants	Required Qualification	Tasks
1. Asst. Team Leader/Water Supply Planner	M.Sc or Equivalent in Environmental Engineering/ Sanitary Engineering / Water Resources Engineering with more than 15 Years of experience.	He will assist the expatriate consultant, maintain liaison with PD and guide local consultants.
2. Hydro-geologist	M.Sc or Equivalent in Civil Engineering / M.Sc in Geology with background in Hydro-geology having more than 10 years of experience in the relevant field.	Survey and field supervision of ground Water development. Assist expatriate consultants / experts and the team leader of the local consultants in related matters.
3. Geologist	M.Sc in Geology having more than 10 years of relevant experience.	Assist expatriate consultants / experts and the team leader of the local consultants in related matters.
4. Ground Water Engineer	M.Sc or Equivalent in Environmental Engineering / Sanitary Engineering / Water Resources Engineering / Civil Engineering with more than 10 Years of experience.	Survey and field supervision of ground Water development. Assist expatriate consultants / experts and the team leader of the local consultants in related matters.

5. Water Quality & Environmental Specialist	M.Sc or Equivalent in Environmental Engineering / Sanitary Engineering with more than 10 Years of experience in the related field.	Water sampling and evaluation & analysis of results. Also carryout Environmental Impact assessment.
6. Facility Planner	M.Sc or Equivalent in Environmental Engineering / Sanitary Engineering / Civil Engineering with more than 10 Years of experience in Planning and design of Water Supply System.	Planning and Design of Water Supply System with the use of both Ground & Surface water.
7. Economic / Financial Specialist	M.Sc in Economics or Finance with more than 10 Years of experience in the relevant discipline.	Assist expatriate consultants / experts and the team leader of the local consultants in related matters.
8. GIS Specialist	B.Sc Engineering / M. Sc in Geology or Geography having more than 10 years of experience with at least 4 years in GIS management.	Assist expatriate consultants / experts and the team leader of the local consultant in related matters.

PART F-1 PROJECT INPUT PERSONNEL

Project Personnel GOB (38)	Man-Months	No. of Personnel	Cost/Month	Total Remuneration
1. Project Manager (SE Ground Water Circle)	18	1	0	0
2. Executive Engineer (R & D Division)	18	1	0	0
3. Assist. Engineer	18	1	0.070	1.26
4. Hydrogeologist	18	1	0.070	1.26
5. Computer Operator	18	1	0.040	0.72
6. L.D. Assistant	18	1	0.030	0.54
7. Driver	54	3	0.030	1.62
8. MLSS (Guard)	36	2	0.025	0.90
TOTAL	198	11		6.30

No. of Staff Available Full Time (39)	No. of Staff Available Part-Time (40)	No. of Staff to be Recruited (41)
9	2	9

TASKS AND QUALIFICATION REQUIRED (42)

Designation of the Consultants	Required Qualification	Tasks
not applicable		

Project Personnel Others (43)	Man-Month	No. of Personnel	Cost/Month	Tasks and Qualifications Required
Secretary	18	1	0.15	2.70

Estimated Personnel Cost (lakh) (44)	Expatriate Consultants	Local Consultants	Project Personnel GOB	Project Personnel Others
F/Y 1	484.40	25.10	4.20	1.80
F/Y 2	242.20	12.50	2.10	0.90
Grand Total	726.60	37.60	6.30	2.70

PART F-2 PROJECT INPUT EQUIPMENT / SERVICES / EXPENSES

Specification of Items (45)	Quantity	Unit Cost	Total Cost (TK in lakh)
a. Office Equipment			
1. Computer	3	2.50	7.50
2. Photo Copier	1	5.00	5.00
Sub-Total	4		12.50
b. Transportation			
1. 4WD Jeep	6	18.00	108.00
2. Air Fare of Foreign Consultants	28	1.40	39.20
Sub-Total	6		147.20
c. Office Expenses			
1. Office Rent	1	6.00	6.00
2. Telephone	1	2.00	2.00
3. Facsimile	1	1.00	1.00
Sub-Total			9.00
d. Recurring Expense			
1. Electricity Charge	1	Lamp Sum	1.00
2. Water Charge	1	Lamp Sum	0.20
3. Office Maintc.	1	Lamp Sum	1.00
Sub-Total			2.20
e. Reports and Design Preparation			
1. Report Preparation	1	Lamp Sum	15.00
Sub-Total		Lamp Sum	15.00
f. Insurance	0		0
g. Lodging Expense	1	Lamp Sum	99.90
h. Income Tax of the Consultants	0		0
Total			285.80

ANNUAL PHASING OF THE ESTIMATED COST (46)					
F/Y 1	F/Y2	F/Y3	F/Y4	F/Y5	Total
230.70	55.10	0	0	0	285.80

PART F-3 PROJECT INPUT TRAINING			
Specification (47)	Institution (48)	No. participants (49)	Cost (50)
not applicable			

ANNUAL PHASING OF THE ESTIMATED COST (51)							
F/Y 1	F/Y2	F/Y3	F/Y4	F/Y5	F/Y6	F/Y7	Total
0	0	0	0	0	0	0	0

PART F-4 PROJECT INPUT OTHERS	
SPECIFICATION (52)	Cost (Lakh Taka)
Test Well Drilling	70.00

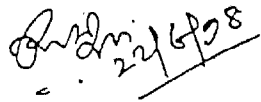
ANNUAL PHASING OF THE ESTIMATED COST (53)							
F/Y 1	F/Y2	F/Y3	F/Y4	F/Y5	F/Y6	F/Y7	Total
47.00	23.00	0	0	0	0	0	70.00

PROVISION IN FIVE YEAR PLAN (54)	PROVISION IN ADP/ATAP (55)
No provision for this project, but essential to be provided	NO

Enclosure:

1. Preliminary Information - Appendix - A

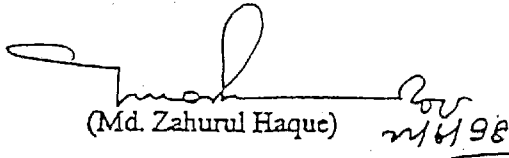
SIGNATURE / RECOMMENDING AUTHORITY (56)



(Amanullah al Mahmood)

Executive Engineer, DPHE

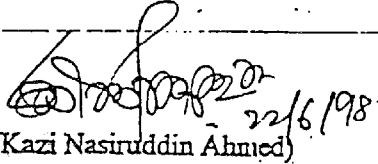
Planning Division, Dhaka



(Md. Zahurul Haque)

Superintending Engineer, DPHE

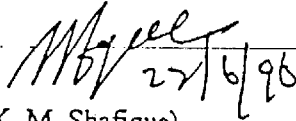
Planning Circle, Dhaka



(Kazi Nasiruddin Ahmed)

Addl. Chief Engineer (Planning), DPHE

Govt. of Bangladesh, Dhaka



(S. A. K. M. Shafique)

Chief Engineer, DPHE

Govt. of Bangladesh

(Director General)

Local Govt. Division

M/O LGRD & Cooperative

Govt. of Bangladesh

Preliminary InformationThe Study on Groundwater Development in Arsenic Affected Area

A) Study Area:

Please refer to the attached map. Please note that this is a tentative target area, the final target area will be decided through a preparatory study by JICA.

B) Present Condition:

Arsenic poisoning problem is the one of the top priority issue in Bangladesh. Local residents using of contaminated groundwater are seriously affected.

C) Objective:

- To seek safe aquifer for drinking water supply in remote areas, particularly those area forced to rely on the groundwater for daily life
- To conduct hydrogeological investigations and evaluation including test boring, pumping test, analysis of soil and water quality in terms of heavy metal concentration,
- To identify safe aquifer in the areas currently affected by arsenic contamination in groundwater.
- To carry out feasibility study on the rural water supply development in the areas where safe and potable aquifer is identified,
- To transfer technology on groundwater exploration through the course of the development study.
- To transfer technology on planning methods and skills to counterpart personnel in the course of the study

D) Scope of Work:

1. Data Collection and Review

- (1) Existing data available at government authorities and donor agencies pertaining to geology, hydrogeology, topography, arsenic poisoning and human health hazard as well as water quality.
- (2) Past, on-going and proposed plans and projects pertaining to the arsenic concerned water supply developments and remedial works

2. Site Survey

- (1) Reconnaissance survey in the proposed Study Area:

- to observe topography and outcrops of geology and to identify suitable site for boring tests in view of prospective water supply services,
- to determine accessibility of boring/well drilling equipment to the identified boring sites,
- to organize/modify implementation schedule of boring tests.

(2) Supplemental data collection

Supplemental data collection from local offices of DPHE, DOE and other government authorities as well as local government offices.

3. Preliminary Survey for Groundwater Development

(1) Georesistivity survey

Georesistivity survey, if necessary, to supplement collected data and information to determine possible presence of groundwater in deeper aquifer.

(2) Selection of sites for boring test

4. Boring Test for Batch 1 & 2

(1) Implementation method of boring test

Boring test will be carried out in two batches considering geographical distribution of proposed sites.

(2) Preparation of boring test

Implementation program of boring test will be prepared and local contractors will be recruited.

(3) Supervision of boring test

1) The Study Team/Consultants will supervise the manner and progress of boring test and evaluate test results including electric logging to determine presence of prospective aquifer.

2) Collect cutting samples and analyze contents of heavy metals at the laboratory.

~~3) Determination on whether or not to proceed test well construction based on the boring test results.~~

5. Test Well for Batch 1 & 2

(1) Implementation method of test well

Test well construction will be carried out in two batches based on the results of preceding boring test in two batches.

(2) Preparation of test well construction

Implementation program of test well construction will be prepared and local contractors will be recruited.

(3) Supervision of test well construction

- 1) The Study Team/Consultants will supervise the manner and progress of test well construction and conduct pumping test to determine dependable yield of production well.
- 2) Collect water sample from the test well and analyze the concentration of heavy metals in groundwater.

6. Hydrogeological Evaluation

- (1) Based on the results of test boring and test well including lithologic logs, concentration of heavy metals in soil materials and groundwater, as well as dependable yield of groundwater, hydrogeological and water quality evaluation will be conducted to each site.
- (2) Preparation of hydrogeological and geological data base obtained from field investigations.

7. Water Supply Plan for Batch 1 & 2

- (1) Water supply plan will be prepared for respective sites where quality and quantity of groundwater are confirmed to be suitable for water supply in every batch.
- (2) Water supply plan will cover preliminary engineering design, such as well location with specifications, transmission and distribution facilities, cost estimate.

8. Finalization of Study

- (1) The Study Team/Consultants will prepare necessary project reports for the series of study activities. The project reports will contain, but not limited to:
 - all technical data and information obtained throughout the course of the Study,
 - hydrogeological and geological data base, and
 - water supply plan with preliminary engineering design and cost estimate.

E) Work Plan of the Study:

Please refer to the attached Work Plan Flow Chart.

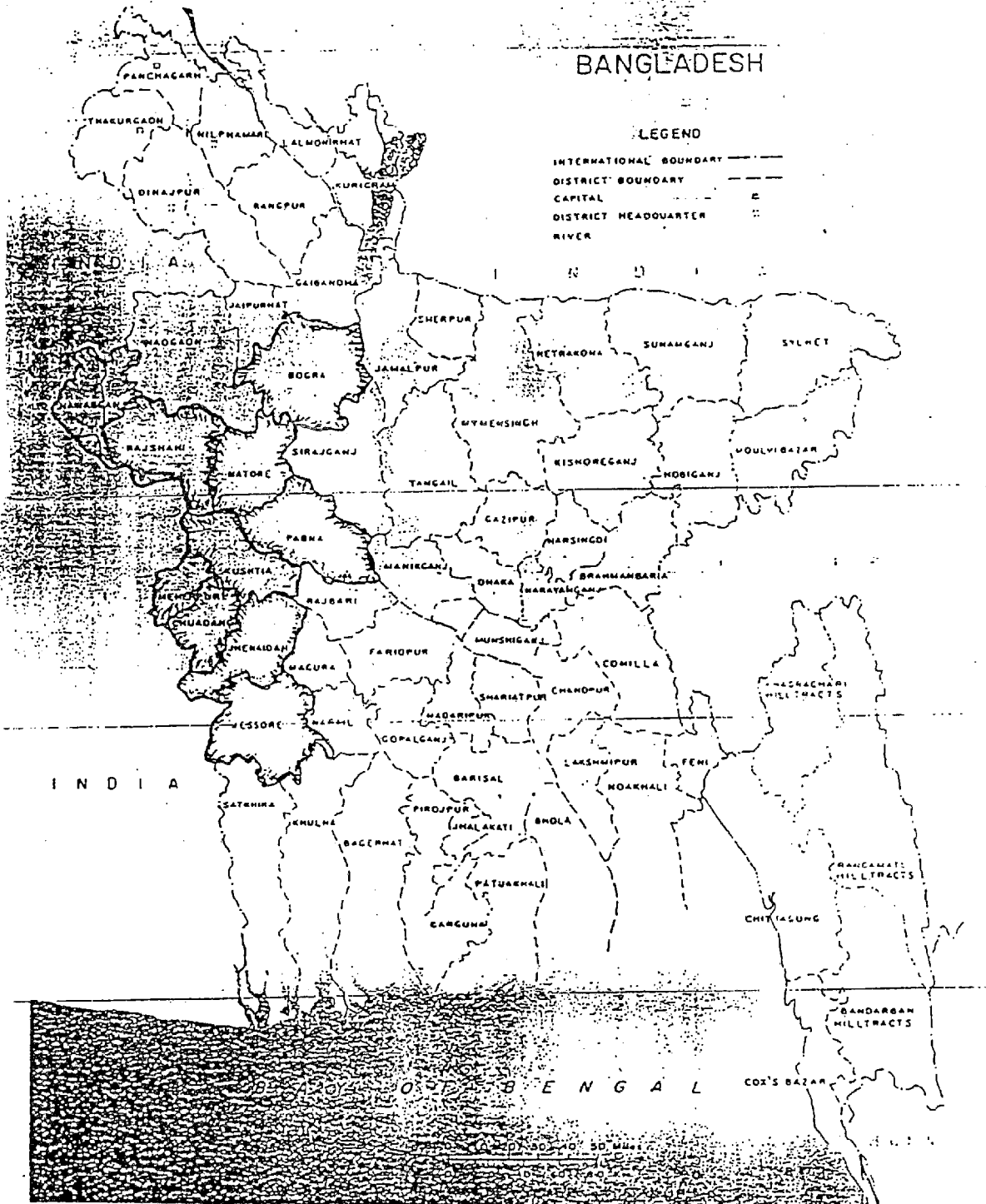
F) Tentative Schedule for Project Implementation

After the completion of this development study, the urgent rural water supply project will be implemented, if the study results concluded technically financially and environmentally feasible. Please refer to the attached Tentative Schedule for Project Implementation.

BANGLADESH

LEGEND

INTERNATIONAL BOUNDARY	---
DISTRICT BOUNDARY	- - -
CAPITAL	●
DISTRICT HEADQUARTER	□
RIVER	~~~~~



RAJSHAHI DIVISION

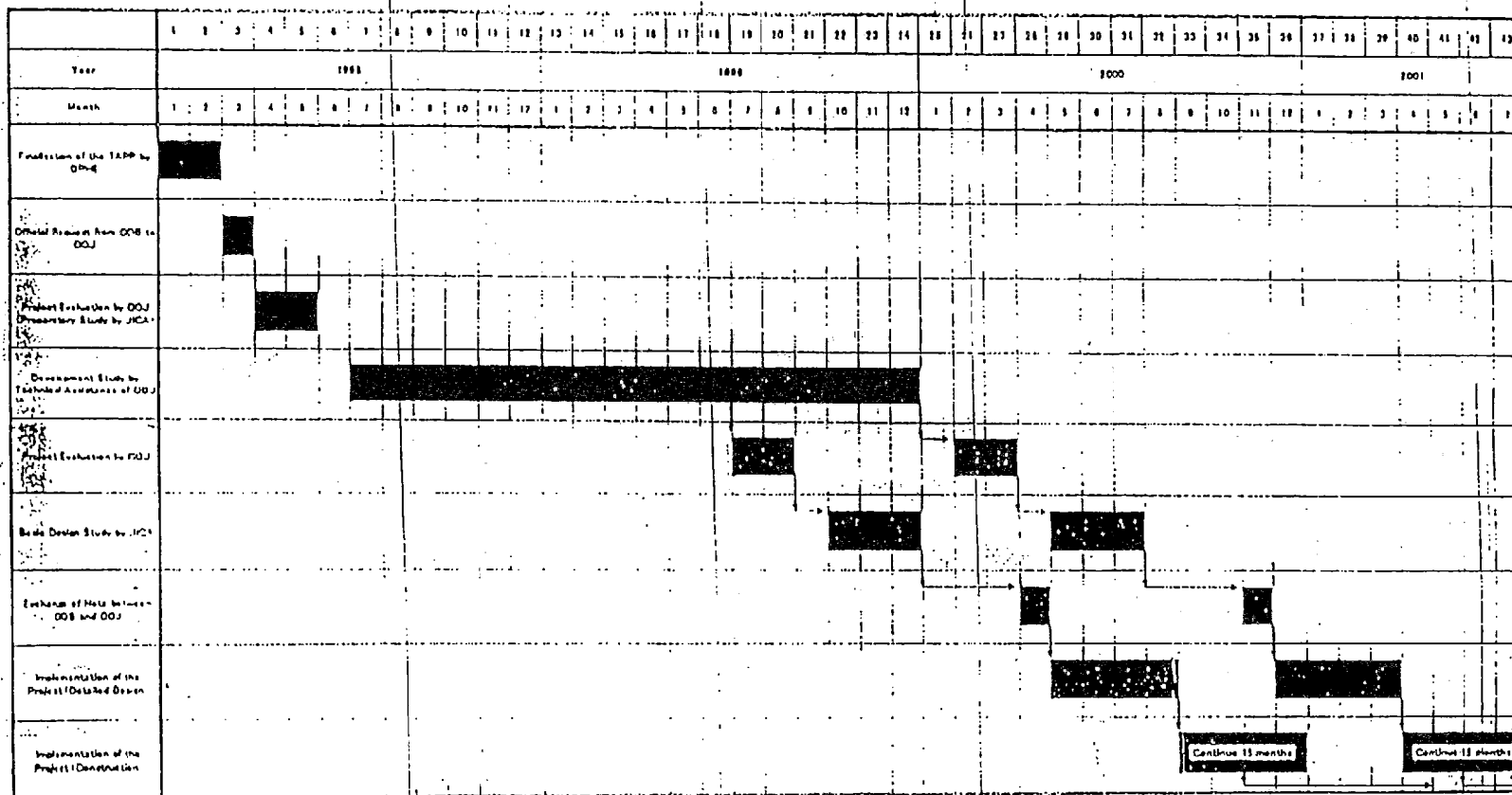
	MUNICIPAL AREA <i>Sq. Km.</i>	BOTH MUNICIPAL & URBAN HOUSEHOLD POPULATION <i>(in thousand)</i>	
NAWABGANJ	11.83	196,072	11,46,540
RAJSHAHI	60.61	360,760	18,82,934
NATORE	9.17	244,760	12,96,236
BOGRA	18.85	516,667	25,65,225
PABNA	13.90	323,006	18,63,281

KHULNA DIVISION

KUSHTIA	13.31	271,650	14,74,351
MEHEREPUR	13.62	92,605	4,85,122
CHUADANGA	36.12	145,023	7,94,576
JHENAI DAH	39.62	238,868	13,34,370
JESSORE	25.72	381,759	20,96,460

Reference: POPULATION CENSUS REPORT, July, 1991
Bangladesh Bureau of Statistics

























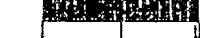



































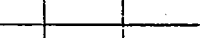











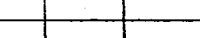
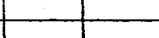










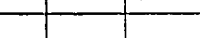












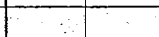










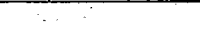
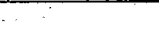










Proposed Time Schedule for the Study on Groundwater Development in Arsenic Affected Area



Proposed Work Plan for Study on Groundwater Development in Arsenic Affected Project

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Collection & Analysis of Existing Data and Information																		
Site Survey																		
Preliminary Survey for Groundwater Development and Selection of the Sites																		
Boring Test for the Batch 1																		
Test Well for the Batch 1																		
Hydrogeological Evaluation for the Batch 1																		
Water Supply Plan for the Batch 1																		
Boring Test for the Batch 2																		
Test Well for the Batch 2																		
Hydrogeological Evaluation for the Batch 2																		
Water Supply Plan for the Batch 2																		
Finalization																		

Proposed Manning Schedule for Study on Groundwater Development in Arsenic Affected Project

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Team Leader/Water Supply Planner																		
Sr. Hydrogeologist																		
Jr. Hydrogeologist																		
Geologist																		
Geographical Information System (GIS) Specialist																		
Sr. Well Engineer																		
Jr. Well Engineer																		
Water Quality & Environmental Specialist																		
Facility Planner																		
Economic/Financial Specialist																		

গণপ্রজাতন্ত্রী বাংলাদেশ সরকার
প্রধান প্রকৌশলীর কার্যালয়, জনস্বাস্থ্য প্রকৌশল অধিদপ্তর
জনস্বাস্থ্য প্রকৌশল ভবন
১৪ নং শহীদ ক্যাপ্টেন মনসুর আলী সারনী, কাকরাইল, ঢাকা-১০০০

স্মারক নং ৬০০৯ /জঃস্বঃপ্রঃঅঃ

তারিখ, ঢাকা ২২-৬-১৯৯৮ ইং
০৬-৬-১৯০৫ বাং

প্রেরক : প্রধান প্রকৌশলী
জনস্বাস্থ্য প্রকৌশল অধিদপ্তর
বাংলাদেশ সরকার, ঢাকা।

প্রাপক : সচিব
হানীয় সরকার, পল্লী উন্নয়ন ও সমবায় মন্ত্রণালয়
হানীয় সরকার বিভাগ
বাংলাদেশ সচিবালয়, ঢাকা।

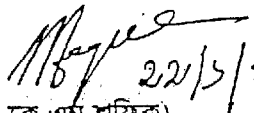
দৃষ্টি আকর্ষণ : মহাপরিচালক, হানীয় সরকার বিভাগ।

- বিষয় : 1) Technical Assistance Project Proposal (TAPP) for Study on Tongi Urgent Environment Management Project.
2) Technical Assistance Project Proposal (TAPP) for Study on Ground Water Development in Arsenic Affected Urban Area.

ঢাকা ওয়াশার আওতায় JICA কর্তৃক গৃহীত North Dhaka Sewerage Master Plan -এ টংগী পৌর এলাকার জন্য আলাদা কার্যক্রম গ্রহণের সুপারিশ করা হইয়াছে এবং JICA উক্ত সুপারিশের আলোকে টংগী পৌর এলাকার জন্য আলাদা কার্যক্রম গ্রহণ করণে Tongi Urgent Environment Management Project নামে একটি সমীক্ষা প্রকল্প বাস্তবায়নে অগ্রহ প্রকাশ করিয়াছে। ইহা ছাড়াও আর্সেনিক কবলিত পৌর এলাকার ভূগর্ভস্থ পানি উন্নয়নের ব্যাপারেও জাপান সরকারের সহযোগীতা পাওয়ার সম্ভাবনা উদ্ভূত। প্রসংগত উল্লেখ্য যে মূলতঃ পল্লী অঞ্চলে বাস্তবায়নের জন্য বিশ্ব ব্যাংকের সহায়তায় একটি প্রকল্প ইতিমধ্যেই সরকার কর্তৃক বিবেচিত হইয়াছে।

এমতাবস্থায় জাপান সরকারের সহযোগীতা নিশ্চিত করার লক্ষ্যে আগামী ৩০শে জুনের মধ্যে অর্থনৈতিক সম্পর্ক বিভাগে প্রেরণের প্রয়োজনীয় ব্যবস্থা গ্রহণার্থে বিষয়ে বর্ণিত টিএপিপিগুলি এতদসঙ্গে প্রেরণ করা হইল।

—সংযুক্তি-৫ কপি-টিএপিপি-(প্রতিটি)।


(এস এ কে এম সফিক)
প্রধান প্রকৌশলী

Scope of Work

For

*The Study on the Ground Water Development of Deep Aquifers
for Safe Drinking Water Supply to
Arsenic Affected Areas in Western Bangladesh*

Agreed upon between

Economic Relations Division, Ministry of Finance

Department of Public Health Engineering

Ministry of Local Government, Rural Development & Cooperatives

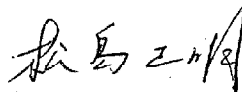
And

Japan International Cooperation Agency

Dhaka, December 15, 1999



Mr. Kamrul Hassan
Deputy Secretary
Economic Relations Division
Ministry of Finance



Mr. Masaaki Matsushima
Team Leader,
Preparatory Study Team,
Japan International
Cooperation Agency (JICA)



Mr. Serajul Islam
Deputy Chief
Local Government Division
Ministry of Local Government, Rural
Development and Cooperatives



Alhaj Md. Quadir-uz-Zaman
Chief Engineer,
Department of Public Health
Engineering

I. INTRODUCTION

In response to the request of the Government of the People's Republic of Bangladesh (hereinafter referred to as "the Government of Bangladesh"), the Government of Japan decided to conduct the Master Plan Study on the Ground Water Development of Deep Aquifers for Safe Drinking Water Supply to Arsenic Affected Areas in Western Bangladesh (hereinafter referred to as "the Study") in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the Study in close cooperation with the authorities concerned of the Government of Bangladesh.

The present document sets forth the Scope of Work with regard to the Study.

II. OBJECTIVES OF THE STUDY

The objectives of the Study are:

- 1 to formulate the master plan for development of ground water resources in arsenic affected areas in western Bangladesh;
- 2 to conduct pre-feasibility study on the project with higher priority; and
- 3 to transfer technology to counterpart personnel in the course of the Study.

III. STUDY AREA

The Study will be conducted in the western part of the country as shown in Annex 1, and cover the areas seriously affected by arsenic contamination.

IV. SCOPE OF THE STUDY

Phase I. Basic Study

- 1) Collection and analysis of related data, information
 - (1) Natural conditions (geology, hydrology, meteorology, topography etc.)
 - (2) Situation of arsenic contamination (affected areas, diseases etc.)
 - (3) Aerial photography
 - (4) Maps (topographical maps, geological maps, hydrogeological maps, etc.)
 - (5) Condition of existing boreholes
 - (6) Reports (groundwater, other water resources, etc.)
 - (7) Existing treatment facilities (groundwater, river, pond, etc.)
 - (8) Well inventory/ database
 - (9) Progress in activities of donor countries and international organizations etc.
 - (10) Progress in activities of NGOs and various institutions
 - (11) Socio-economic conditions and trends (population, land use, social

infrastructure, economic condition, awareness of the citizens on environmental issues etc.)

- (12) Related development plan and policies
- (13) Health condition
- (14) Legislation and regulations concerned with ground water development

2) Field reconnaissance

- (1) Topographical, geological, and hydrogeological investigation
- (2) Well structures, capacities, and aquifer conditions
- (3) Water levels and quality of existing boreholes
- (4) Water usage
- (5) Preliminary environmental survey
- (6) Arsenic removal test
- (7) Other relevant investigations

3) Groundwater investigation

- (1) Test well drilling, well logging, pumping test, and observatory well installation
- (2) Electric resistivity survey
- (3) Water quality analysis
- (4) Recording of groundwater levels
- (5) Study of precipitation, evaporation and surface water runoff

4) Establishment of database

5) Ground water usage and water consumption forecast

6) Evaluation for present conditions of arsenic contamination

- (1) Physical aspects
- (2) Socio-economic aspects
- (3) Environmental aspects
- (4) Operational aspects
- (5) Legal and institutional aspects
- (6) Financial aspects

7) Review of aid activities for arsenic contamination by the other donors and NGOs etc.

- (1) World Bank
- (2) British government
- (3) Dutch government
- (4) Other donors and NGOs

8) Consideration of planning framework for Master Plan

- (1) Population growth and urbanization
- (2) Economic growth and changes in living conditions
- (3) Agricultural development
- (4) Demand of water

Phase II. Formulation of Master Plan

1) Formulation of basic policies, goals and strategies on

- (1) Balance of water demand and supply
- (2) Water quality

- (3) Target year
 - (4) Utilization of deep well
 - (5) Arsenic removal method
- 2) Consideration for mechanism of arsenic contamination through analysis
- (1) Hydrological analysis
 - (2) Geological analysis
 - (3) Geochemical analysis
 - (4) Environmental analysis
- 3) Analysis and interpretation
- (1) Groundwater movement and recharge
 - (2) Groundwater potential
 - (3) Groundwater modeling
 - (4) Water balance analysis
- 4) Consideration of arsenic removal measures
- (1) Structural measures
 - (2) Non-structural measures
- 5) Formulation of Master plan for groundwater development
- (1) Development plan for groundwater
 - (2) Monitoring plan
 - (3) Institutional arrangement
 - (4) Environmental management plan
- 6) Cost estimation
- 7) Phased implementation plan
- 8) Evaluation from social, economic and environmental point of view
- 9) Selection of priority projects

Phase III. Pre-feasibility study

- 1) Supplementary data collection
- 2) Preliminary design of facilities
- 3) Structural measures
- 4) Non-structural measures
- 5) Operation and maintenance plan
 - (1) Guideline for proper operation
 - (2) Proper maintenance
 - (3) Managerial capability
 - (4) Organizational structure
 - (5) Participation of rural people
 - (6) Public awareness program

- 6) Financial plan
- 7) Cost estimation
- 8) Implementation plan
- 9) Evaluation
 - (1) Technical evaluation
 - (2) Organizational and institutional evaluation
 - (3) Financial evaluation
 - (4) Social evaluation
 - (5) Environmental evaluation

V. SCHEDULE OF THE STUDY

The Study will be carried out in accordance with the tentative schedules as attached in Annex 2. It should be noted that this timetable is subject to the modification.

VI. REPORTS

JICA shall prepare and submit the following reports in English to the Government of Bangladesh (DPHE).

1 Inception Report

Twenty (20) copies will be submitted at the commencement of the Study in Bangladesh.

2 Progress Report (1)

Twenty (20) copies will be submitted in the middle of the Phase I.

3 Interim Report

Twenty (20) copies will be submitted at the beginning of the Phase II.

4 Progress Report (2)

Twenty (20) copies will be submitted at the end of the Phase II.

5 Draft Final Report

Twenty (20) copies will be submitted at the end of Phase III. The Government of Bangladesh shall submit its comments within one (1) month after receiving the Draft Final Report.

6 Final Report

One hundred (100) copies will be submitted to DPHE after receiving the comments from the Government of Bangladesh on the Draft Final Report. DPHE can request the reproduction of the Final Report to JICA, if required.

VII. UNDERTAKING OF THE GOVERNMENT OF BANGLADESH

- 1 To facilitate the smooth implementation of the Study, the Government of Bangladesh will take necessary measures as follows.



- (1) to secure the safety of the Japanese Study team (hereinafter referred to as "the Team")
 - (2) to permit the members of the Team to enter, leave and sojourn in Bangladesh for the duration of their assignment therein, and exempt them from foreign registration requirements and consular fees
 - (3) to exempt the members of the Team from taxes, duties, fees, and any other charges on equipment, vehicles, and other materials brought into Bangladesh for the conduct of the Study
 - (4) to exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study
 - (5) to provide necessary facilities to the Team for the remittances as well as the utilization of the fund introduced into Bangladesh from Japan in connection with the implementation of the Study
 - (6) to secure permission for the Team to enter into private properties of restricted areas for the implementation of the Study
 - (7) to secure permission for the Team to take all data and documents including photographs and maps related to the Study out of Bangladesh to Japan, and
 - (8) to provide medical services if necessary. Its expenses will be chargeable to the member of the Team.
- 2 The Government of Bangladesh shall bear claims, if any, against the members of the Team, resulting from or occurring in the course of or being connected with the discharge of their duties in the implementation of the Study, except when such claims arise from gross negligence or willful misconduct on the part of the member of the Team.
- 3 Department of Public Health and Engineering (DPHE) shall act as a counterpart agency to the Team and also as a coordinating body in relation with other governmental and non-governmental organizations for the smooth implementation of the Study.
- 4 DPHE shall at its own expense, provide the Team with the followings, in cooperation with other organizations concerned:
- (1) available data and information related to the Study;
 - (2) necessary number of vehicles with driver;
 - (3) counterpart personnel and supporting staff;
 - (4) suitable office space with necessary equipment in Dhaka; and
 - (5) Credentials or identification card.

VIII. UNDERTAKING OF JICA

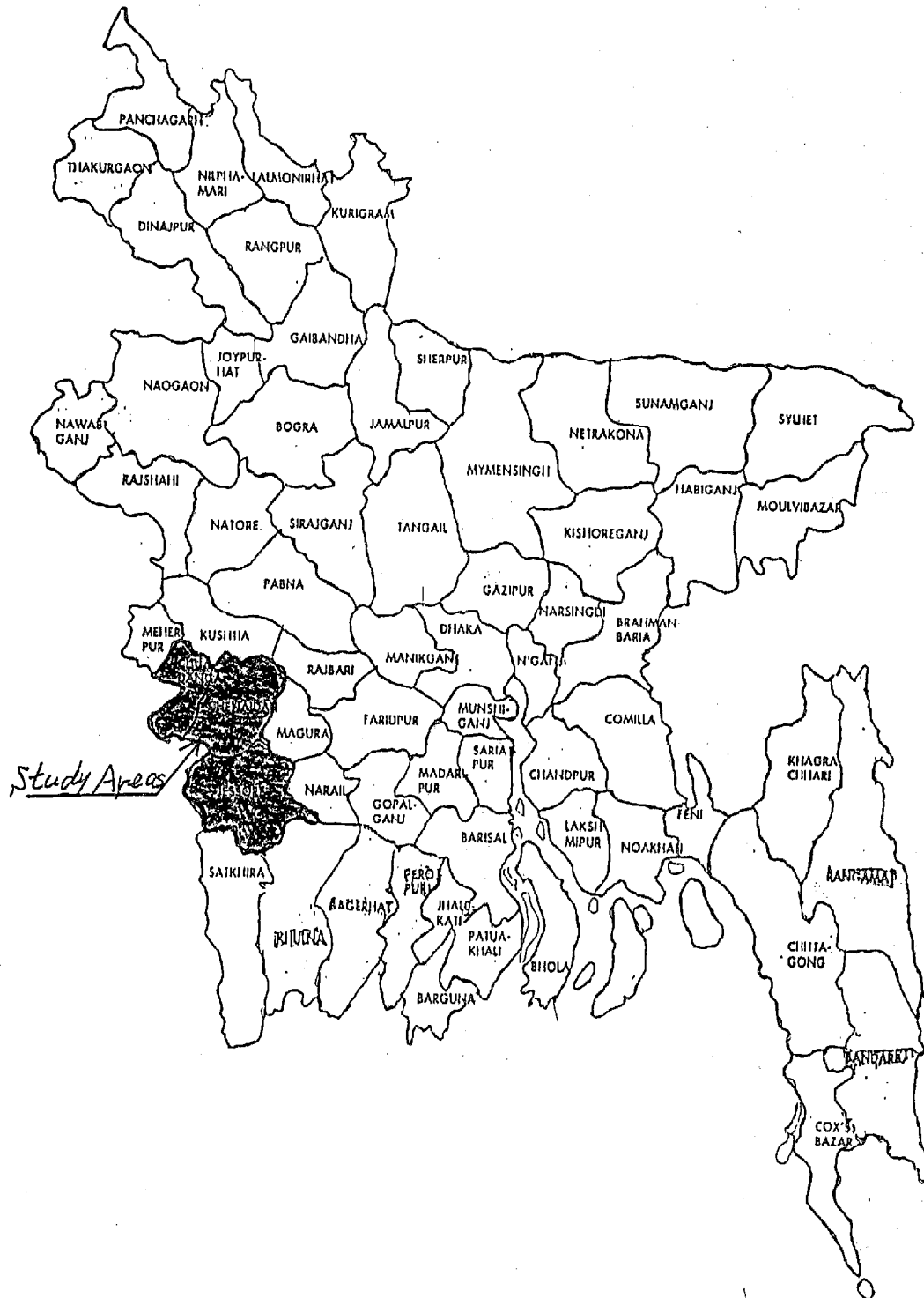
For the implementation of the Study, JICA shall take following measures:

- 1 to dispatch, at its own expense, the Team to Bangladesh; and
- 2 to pursue technology transfer to counterpart personnel in the course of the Study.

IX. CONSULTATION

JICA, DPHE, ERD (Economic Relations Division), Ministry of Local Government, Rural Development Cooperatives will consult each other about any matters arising from or being in connection with the Study.

ANNEX - 1



Copy

for

ANNEX 2

The Tentative Schedule of the Study on Ground Water Development
for Arsenic Affected Areas

Description (Month)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Work in Bangladesh																								
Work in Japan																								
Report presentation	<div>IC/R</div> <div>PR/R(1)</div> <div>IT/R</div> <div>PR/R(2)</div> <div>DF/R</div> <div>F/R</div>																							

Note

IC/R = Inception Report

IT/R = Interim Report

PR/R = Progress Report

DF/R = Draft Final Report

F/R = Final Report

MINUTES OF MEETINGS

FOR

THE STUDY

ON

THE GROUND WATER DEVELOPMENT OF DEEP AQUIFERS FOR
SAFE DRINKING WATER SUPPLY TO ARSENIC AFFECTED AREAS
IN WESTERN BANGLADESH

AGREED UPON BETWEEN

ECONOMIC RELATIONS DIVISION, MINISTRY OF FINANCE,

DEPARTMENT OF PUBLIC HEALTH ENGINEERING, AND

MINISTRY OF LOCAL GOVERNMENT, RURAL DEVELOPMENT AND COOPERATIVES,

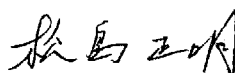
AND

JAPAN INTERNATIONAL COOPERATION AGENCY

December 15, 1999



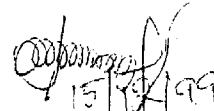
Mr. Kamrul Hassan
Deputy Secretary,
Economic Relations Division,
Ministry of Finance



Mr. Masaaki Matsushima
Team Leader,
Preparatory Study Team,
Japan International
Cooperation Agency (JICA)



Mr. Serajul Islam
Deputy Chief
Local Government Division,
Ministry of Local Government, Rural
Development and Cooperatives



Alhaj Md. Quadir-uz-Zaman,
Chief Engineer,
Department of Public Health
Engineering

In response to the request of the People's Republic of Bangladesh (hereinafter referred to as "the Government of Bangladesh"), the Preparatory Study Team (hereinafter referred to as "the Team") of the Japan International Cooperation Agency (hereinafter referred to as "JICA") visited Bangladesh from December 8 to 16, 1999 to discuss the Scope of Work (hereinafter referred to as "S/W") for the Study on the Ground Water Development of Deep Aquifers for Safe Drinking Water Supply to Arsenic Affected Areas in Western Bangladesh (hereinafter referred to as "the Study").

The Team carried out field surveys of the study area, and held a series of discussions with the officials of Economic Relations Division, Ministry of Finance (hereinafter referred to as "ERD"), of Planning Commission, of Department of Public Health Engineering (hereinafter referred to as "DPHE"), of Ministry of Local Government, Rural Development and Cooperatives (hereinafter referred to as "LGRDC"), and the other authorities concerned. The list of attendants is shown in Appendix.

The Minutes of Meetings has been prepared for the better understanding of the S/W agreed upon between ERD, DPHE, LGRDC, and the Team on December 15, 1999. As follows are the major issues discussed in the course of the preparation for the S/W.

1. Study Title

Both Bangladeshi and Japanese sides agreed that the title of the Study would be "The Study on the Ground Water Development of Deep Aquifers for Safe Drinking Water Supply to Arsenic Affected Areas in Western Bangladesh" as described in the S/W.

2. Target Year

Both sides agreed to set the target year of M/P up to 2010.

3. Study Areas

The Study is to be implemented in Jessore, Jhenaidah, and Chuadanga, as the Government of Bangladesh requested prior to the preparatory study.

4. The Counterpart Personnel

The effective and efficient implementation of the Study will be assisted by the staff of DPHE, the relevant Bangladeshi organization regarded as "the counterpart (hereafter referred to as "C/P") body" of the JICA.

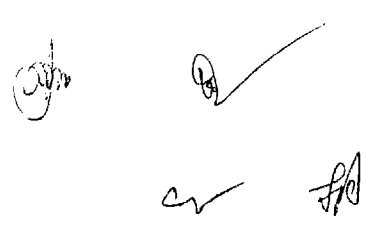
5. The Steering Committee

Both sides agreed that the steering committee would be set up to help conduct the effective Study by DPHE's initiative. The committees will be comprised of the following ministries and organizations mainly, and the other ministries and organizations could be included if DPHE recognized the necessity in future.

- a. Ministry of Health and Family Welfare
- b. Ministry of Agriculture
- c. Bangladesh Water Development Board (BWDB)
- d. Ministry of Education
- e. Ministry of Information

6. Counterpart Training

DPHE requested that JICA conduct counterpart training in Japan as well as on the job training for the purpose of the smooth transfer of technology during the Study. The Team



agreed to convey this request to JICA H.Q. for consideration.

7. Seminar on the Technology Transfer

Both DPHE and JICA recognized the importance of the seminar on the relevant issues to the Study, so that the smoother technology transfer would be realized. The topic, period, and scale of the seminar will be discussed and confirmed by the both parties after the Study starts.

8. Equipment

Bangladeshi side requested Japanese side to procure the necessary equipment due to budgetary constraints in Bangladeshi side. Japanese side understood this situation, and promised to convey this demand to JICA HQ in Tokyo for the positive consideration.

9. The Cost of the Study

Bangladeshi side has requested the Japanese side to inform the cost estimation of the Study; Bangladeshi side explained that the information would be required for the finalization of TAPP to allocate necessary budget and counterpart personnel. Bangladeshi side would finalize the TAPP process within two (2) months after receiving this information.

10. Reports

As for the Study reports, DPHE has agreed to make it open to the public in order to achieve maximum use of the Study results.

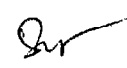
Regarding the Final Report, one hundred (100) copies will be submitted to DPHE after receiving the comments from the Government of Bangladesh on the Draft Final Report. DPHE can request further reproduction of the report to JICA, if required.

11. Undertakings of the Government of Bangladesh

Regarding the provision of necessary number of vehicles, Bangladeshi side requested Japanese side to provide at JICA's expense due to the budgetary constraints. Japanese side agreed to convey this demand to JICA HQ in Tokyo for the positive consideration.

12. Others

Bangladeshi side requested Japanese side to establish testing laboratories at the district HQ's of DPHE. Japanese side replied that the provision of facilities for the Study had to be considered as investment project. However, the Japanese side understood necessity of such kind of facilities, and added that JICA would consider the possible relevant cooperation as much as it can in the course of the Study.



APPENDIX

LIST OF ATTENDANTS

(Bangladeshi side)

Economic Relations Division, Ministry of Finance

Mr. Kamrul Hasan, Deputy Secretary

Mr. Mosaddeque Hossain Khan, Assistant Chief

Ministry of Local Government, Rural Development and Cooperatives

Mr. Syed Anwarul Islam, Joint Secretary

Department of Public Health Engineering

Mr. Alhaj Md. Quadir-uz-Zaman, Chief Engineer

Mr. Kazi Nasirudir Ahmad, Additional Chief Engineer

Mr. Md. Zainal Abedin, S.E. GWC

Mr. Amanullah al Mahmood, Executive Engineer (Planning)

Mr. S.M. Ihtishamul Haque, Executive Engineer, R & D

Mr. Md. Zahurul Haque, Superintendent Engineer (Planning)

Mr. Md. Jamanur Rahman, Assistant Engineer (Staff Officer)

(Japanese side)

Preparatory Study Team

Mr. Masaaki Matsushima

Mr. Kenji Inoue

Dr. Naoya Shigemoto

Mr. Yukishi Tomita

Mr. Fumio Fukuda

Leader

Study Planning

Water quality analysis

Hydro-geology

Planning of water supply

JICA Sort-Term Experts

Dr. Naoaki Shibasaki

Mr. Kazuyuki Suenaga

Mr. Kazuro Bando

JICA Bangladeshi Office

Dr. Altaf Ali

